Spiorad na Mara Offshore Windfarm

Scoping Report

Date: 9/27/2023

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Document history					
Version	Author	Reviewed by	Approved by	Date	Comments
1.0	Elena Mianzan	James Memory	Huw Powell	27th September 2023	Final for Submission

Glossary

Term	Definition
the Project	To describe the overall development
Array Area	Includes the wind turbine generators, associated foundations, the inter-array cables and offshore substations platform (OSP) (if required).
the Applicant	Spiorad na Mara Limited.
Offshore Cable Corridor Area of Search	Includes offshore cable infrastructure between Array Area and Landfall.
Onshore Cable Corridor Area of Search	Includes onshore export cables and associated infrastructure, is 1 km wide and is routed from the potential landfall options across the Isle of Lewis predominantly along the A857 road.
Landfall and Landfall Substation Area of Search	Encompasses three potential Landfall options (1, 2, & 3) on the west side of the Isle of Lewis, within which an onshore substation and associated works may be located.
Grid Substation Area of Search	Refers to substation to be located near Stornoway, close to the planned SSEN Converter Substation.
Offshore Development Area of Search	Array Area plus Offshore Cable Corridor Area of Search.
Onshore Development Area of Search	Landfall and Landfall Substation Area of Search, Onshore Cable Corridor Area of Search and Grid Substation Area of Search.

Contents

Appendices:

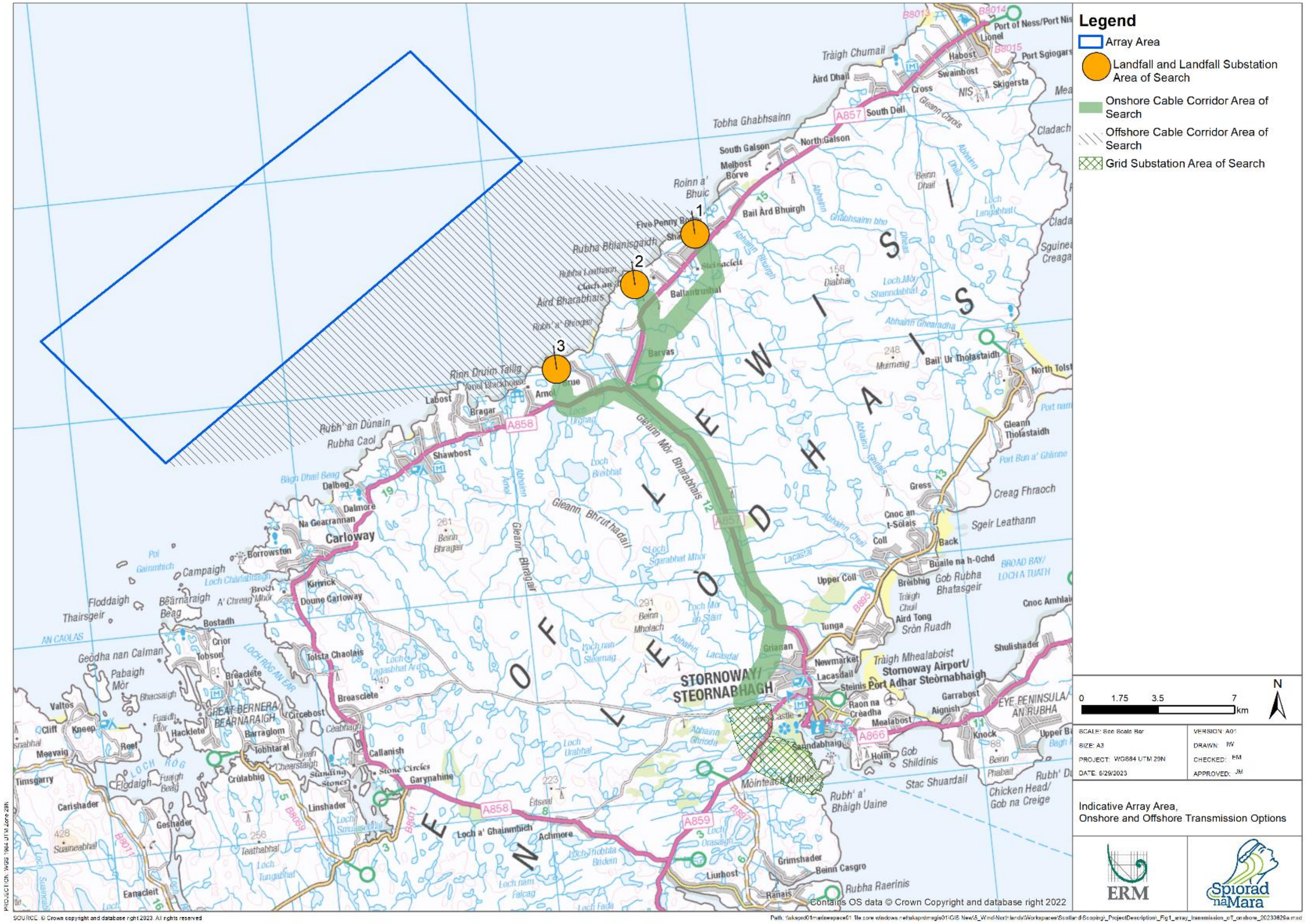
1 Introduction

1.1 Background

In January 2022, as part of the ScotWind bidding round, Spiorad na Mara Limited ('the Applicant') was successfully awarded an Option Agreement to develop an offshore wind farm (OWF) within the N4 Plan Option located approximately 5 km off the west coast of the Isle of Lewis at its closest point (the 'Project'). The proposed OWF is called 'Spiorad na Mara', a name which was inspired by Scottish and Nordic folklore and came to fruition by working in close partnership with the local community. The name reflects the local area, its heritage, culture and history. As illustrated in **Figure 1.1-1**, the Project is split into the following areas; the Array Area, the Offshore Cable Corridor Area of Search, the Landfall and Landfall Substation Area of Search, the Onshore Cable Corridor Area of Search and the Grid Substation Area of Search.

This Scoping Report covers all aspects of the Project required to generate and transmit electricity from the Array Area to the grid point of connection at the planned Scottish and Southern Electricity Networks (SSEN) Convertor Station associated with the upgraded Western Isles High-Voltage Direct Current (HVDC) Link. Offshore infrastructure includes the wind turbine generators (WTG) and associated foundations, the inter-array cables, offshore cables and landfall (below mean-high water springs (MHWS)), it may also contain offshore substation(s) and associated foundations. Onshore infrastructure includes the landfall (above mean-low water spring (MLWS)) via one of the potential Landfall options presented within this Scoping Report, onshore cables and associated infrastructure and onshore substation(s). Where there is an overlap in jurisdiction of consenting and regulatory regimes (i.e. within the intertidal area between MHWS and MLWS) both onshore and offshore topics will present relevant assessments if required.

Figure 1.1-1 Project Overview



1.2 The Applicant

Spiorad na Mara Limited (Co. No. SC717716) (the Applicant) is the company that owns the Project. Northland Power Inc. (Northland) is the indirect owner of 75.5% of the share capital in the Applicant and ESB indirectly owns the remaining 24.5%.

Northland is dedicated to developing, building, owning, and operating clean and green global power infrastructure. Established in 1987 and listed in the Toronto Stock Exchange, Northland is one of Canada's first independent power producers that has achieved a remarkable growth trajectory. Headquartered in Toronto, Canada, with global offices in eight countries, Northland owns or has an economic interest in 3 gigawatts (GW) (net 2.6 GW) of operating generating capacity and a significant pipeline of early to mid-stage development opportunities encompassing approximately 20 GW of potential capacity.

Northland has considerable experience in constructing and operating offshore wind farms in Europe and further afield, establishing long term local supply chains in these areas, offering continuity from early development, through construction to the long-term operation. 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 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. Their recent investment in the Project demonstrates the strong interest in ScotWind and in developing offshore wind in Scotland and brings together two very experienced companies with complementary skills, resources, and ambitions. ESB has been Ireland's foremost energy company since it was established in 1927, driven by an unwavering commitment to power society forward and deliver a net-zero future for our customers and the communities we serve. 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 we are decarbonising our 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 of customers in addition to using networks to carry fibre for telecommunications.

With a build-to-own mindset from the beginning of any development, the Applicant takes a long-term view of its 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 Northwest of Scotland.

1.3 Need for the Project

Offshore wind power will play an important role in future electricity generation, to tackle climate change and reduce greenhouse gases. The Project will contribute towards the Scottish Government's target to deliver an additional 20 GW of renewable electricity capacity by 2030, which equates to approximately 50% of Scotland's current total energy demand. The Scottish Government also aims to have decarbonized Scotland's entire energy system almost completely by 2050. In order to achieve this, offshore wind power will be vitally important.

1.4 Project Overview

The Applicant intends to develop an OWF containing up to 66 fixed bottom wind turbines, with an approximate capacity of 840 – 1,000 Megawatts (MW). The Project has a grid point of connection near Stornoway to connect into planned SSEN Converter Station associated with the upgraded Western Isles HVDC Link between Stornoway and the Scottish mainland. The Array Area is approximately 161 km^2 in size, having been reduced in size compared to the N4 Plan Option available through the ScotWind Leasing process, in order to avoid areas of highest navigational risk and salmon migration routes. Water depths across the Array Area generally range from approximately 37 m to 67 m, except for a localised depression in the southwest corner of the Array Area reaching approximately 72 m. An average depth of approximately 50 m makes the site well suited to fixed foundations. Further details of the Project Design Envelope (PDE) and programme are provided in Chapter 2: Site Selection and Project Description.

The Applicant is seeking at least a 35-year consent period. If, in the future, the Applicant sought to repower the Project they would do so through the submission of an application to cover an extension of life of the Project, or any proposed new development.

1.5 Scoping Report

1.5.1 Purpose and Objective

The purpose of this Scoping Report is to cover the scope of the Environmental Impact Assessment Report (EIAR). Scoping Opinions will be derived from key statutory and non-statutory consultees following responses to this Scoping Report, which will help guide the Applicant in progressing the EIAR.

This Scoping Report will allow for engagement with stakeholders and the identification of key topics to be addressed in the EIAR by providing regulators and stakeholders with information on the Project, baseline data sources and assessment methodologies to be used.

1.5.2 Approach

The approach to this Scoping Report is to identify likely significant effects associated with the Project during construction (inclusive of pre-construction surveys), operation, and decommissioning. Likely significant effects are identified based upon an evaluation of the magnitude of potential impacts from the Project, which are in part dependant on the sensitivity of relevant receptors. The Applicant proposes that, where significant effects are not likely to arise, these topics and/or receptors are scoped out of further assessment in line with the Electricity Works (Environmental Impact Assessment (EIA)) (Scotland) Regulations 2017, the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

This 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 foundations and WTG type but has applications across the Project as a whole.

As long as conditions are built into the issued consents which ensure that the maximum potentially likely impacts 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 and has been approved legally by courts. In practice, the PDE approach has been followed in the majority of offshore wind farm applications in the United Kingdom (UK).

1.5.3 Structure

The structure of this Scoping Report is as follows:

- Introduction;
- Site selection and project description;
- Relevant policy and legislation;
- Approach to EIA;
- Consultation process;
- Offshore technical topics;
- Onshore 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 S36 consent, whichever scheme is ultimately built must have been covered by the scope of the EIA.

- Whole project topics;
- Proposed 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 Project. There are a number of ways in which you can be kept informed of developments:

- The Scoping Report, other documents and updates will be published on the project website. Available online at: https://northlandpowerscotwind.co.uk/spiorad-na-mara/
- By email atspioradnamara@northlandpower.com

A number of questions have been included within the 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 Project will require the following consents, licences, and permissions:

- Offshore infrastructure:
  - a Section 36 consent under the Electricity Act 1989;
  - Marine Licence under the Marine (Scotland) Act 2010.
- Onshore infrastructure:
  - Either:
    - Full planning permission, in accordance with the Town and Country Planning (Scotland) Act 1997; or
    - Deemed planning permission under S57 of the Town and Country Planning (Scotland) Act 1997 (as amended by the Growth and Infrastructure Act 2013) as part of a single application for consent under Section 36 of the Electricity Act 1989;
  - a Section 37 consent under the Electricity Act 1989 for possible installation of overhead lines.

As the Project requires a Section 36 Consent and a Marine Licence, the Marine Directorate Licensing and Operations Team (MD-LOT) can process both consent applications together on behalf of Scottish Ministers.

1.7 References

Scottish Government (2023). Renewable and low carbon energy. Available at: https://www.gov.scot/policies/renewable-and-low-carbon-energy/#:~:text=By%202030%20we%20aim%20to,our%20energy%20system%20almost%20completely. [Accessed 28/06/2023].

2 Site Selection and Project Description

2.1 Introduction

The information presented within this Chapter is based on preliminary conceptual design information for both the on and offshore components of the Project, drawing upon the current understanding of the environment in the vicinity of the Project which has been developed from desktop studies. It should be noted that the design process for the Project is at an early stage, and therefore many of the detailed parameters of the Project are yet to be determined.

The following sections also provide an initial overview of site selection work undertaken to date.

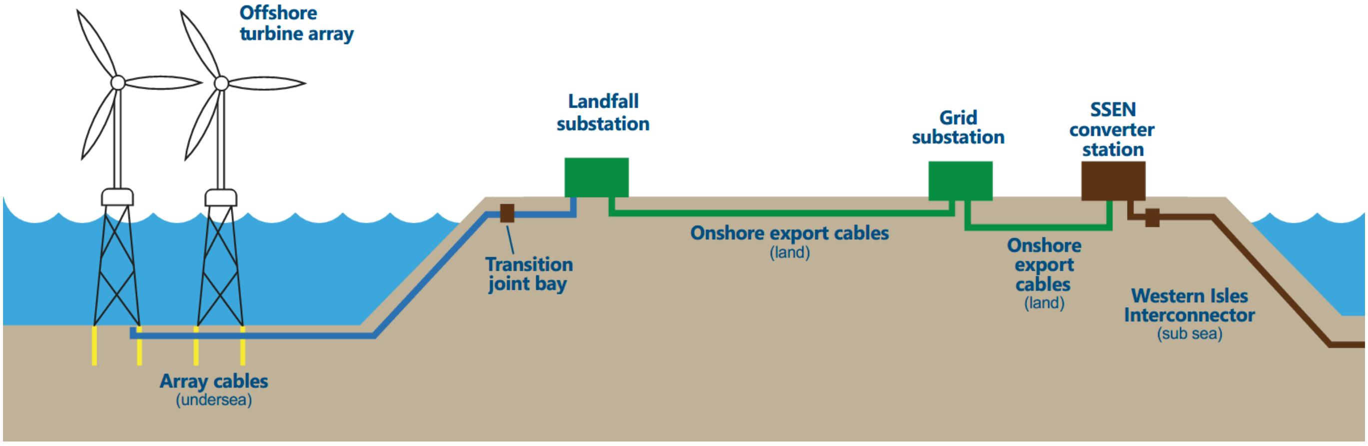
2.2 Project Scope

The Project is currently considering two design options. Option 1, a landfall substation design and Option 2 an offshore substation design:

2.2.1 Option 1- Landfall Substation Design

- Up to 66 Wind Turbine Generators (WTGs) (each comprising a tower section, nacelle and 3 rotor blades, and associated support structures and foundations);
- 2 onshore substations (no Offshore Substation Platform (OSP));
  - Landfall Substation located on the west coast of Lewis near the landfall;
  - Grid Substation in the east coast of Lewis located near the proposed Scottish and Southern Energy Networks (SSEN) Converter Station;
- 6-8 array cables linking WTG’s and terminating at Transition Joint Bays (TJB) at the landfall;
- Up to 8 Onshore cables from TJBs to the Landfall Substation;
- 2-3 export cables onshore linking the Landfall Substation to the Grid Substation;
- Export cables from the Grid Substation to SSEN Converter Station.

Figure 2.2-1 Key Project Elements – Landfall Substation Design

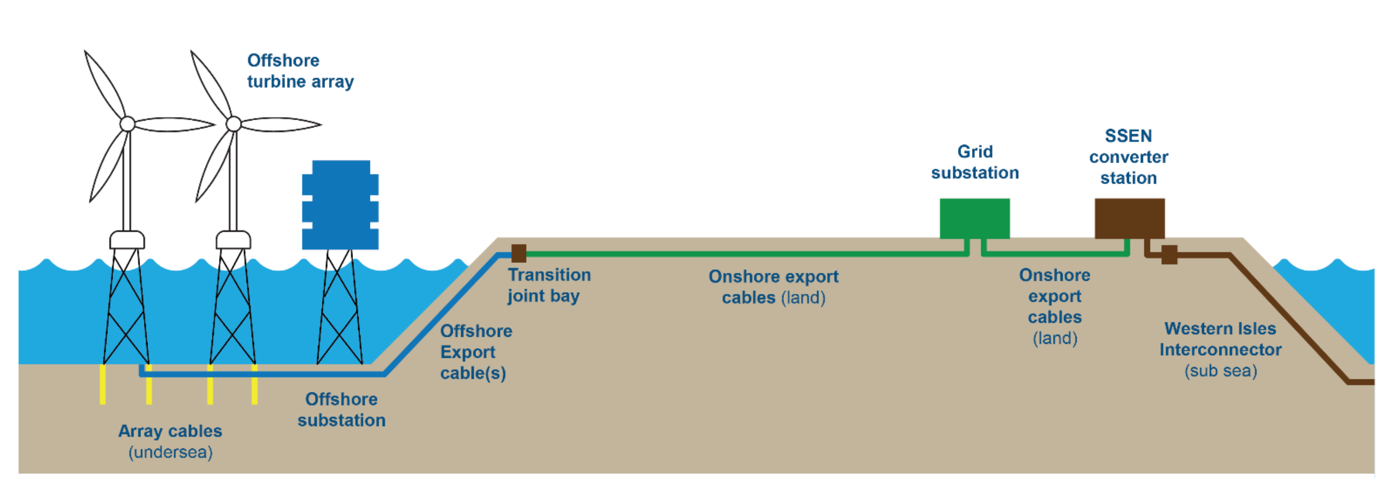


2.2.2 Option 2 – Offshore Substation Design

- Up to 66 WTGs (each comprising a tower section, nacelle and 3 rotor blades, and associated support structures and foundations);
- 1-3 Offshore Substation Platform (OSP) with associated support structures and foundations;
- Array cables linking WTG's to OSP(s);
- Interconnector cable(s) between OSP(s) (only if more than 1 OSP installed);
- 2-3 offshore export cables from OSP to TJB at landfall;
- 2-3 onshore export cable from TJB to the Grid Substation at grid interface point;
- A Grid Substation;
- 2-3 onshore export cables linking Grid Substation to SSEN Converter Station.

The Project is carrying out a series of environmental and engineering surveys throughout 2023 and the results of these surveys along with commercial and technical parameters will contribute to the identification of the final project design.

Figure 2.2-2 Key Project Elements – Offshore Substation Platform Design



2.3 The Project

The Project will comprise both offshore and onshore infrastructure. The majority of the offshore infrastructure (WTGs; foundations; inter-array cables and any OSP(s) (if required) will be located within the Array Area. A number of landfall sites are currently being considered and as such the Offshore Cable Corridor Area of Search linking the Array Area to shore is a relatively wide area which extends from the Array Area to the adjacent coastline and includes all potential landfall options. The Array Area combined with the Offshore Cable Corridor Area of Search is defined as the Offshore Development Area of Search (see **Figure 1.1-1** in Chapter 1: Background).

Due to early development stage of the Project, the exact boundaries of the onshore elements are indicative. An initial Onshore Development Area of Search has been defined, which includes a range of potential landfall and substation options.

Table 2.3-1 below summarises the two design options and the infrastructure that will be placed in each Project Area. More detailed information on the design parameters is discussed in later sections of this Chapter.

Table 2.3-1 Design Option Parameters

Area of Search	Project Area	Design Option 1	Design Option 2
Offshore Development Area of Search	Array Area (161km ^{2})	Up to 66 WTGs Up to 380m tip height (to mean sea level (MSL)) Up to 8 array cables linking WTGs	Up to 66 WTGs Up to 380m tip height (MSL) Up to 3 OSPs Up to 8 array cables linking WTGs to OSP

Area of Search	Project Area	Design Option 1	Design Option 2
			Up to 3 export cables linking OSP to offshore cable corridor Up to 2 interconnector cables linking the OSPs together
Area of Search for Offshore Cable Corridor	Offshore Cable Corridor	Up to 8 array cables linking WTGs with TJBs at landfall	Up to 3 export cables linking OSP(s) to TJBs at landfall
Landfall And Landfall Substation Area of Search	Landfall & Landfall Substation	Landfall for up to 8 array cables TJBs Temporary working area 20,000 m^2 - 40,000 m^2 Landfall Substation of 25,000 m^2 – 50,000 m^2 Temporary Site compound for Landfall substation of approx. 20,000 m^2 – 40,000 m^2	Landfall for up to 3 export cables TJBs Temporary working area 20,000 m^2 - 40,000 m^2
Onshore Cable Corridor Area of Search	Onshore Cable Corridor	2-3 circuits Search Area up to 1 km wide centered on A857 for majority of route Working area up to 100 m with localised widening Trench width up to 5 m wide	
Grid Substation Area of Search	Grid Substation	<1 km from final location of SSEN Converter Station Grid Substation 25,000m^2 - 50,000m^2 Temporary Working area/Site Compound 20,000 m^2 - 40,000 m^2	

2.4 Project Design Envelope Approach

The PDE approach (also known as the Rochdale Envelope approach) will be adopted for the assessment of the Project, in accordance with current best practice and the “Rochdale Envelope Principle”.

The PDE concept allows for some flexibility in Project design options, particularly for foundations and WTG type, where the full details of a project are not known at application submission.

The Rochdale case established a process by which the effects of a project, where the final design is not available at the time of consent assessment, can be assessed against a series of minimum and maximum design parameters, with the worst case parameter/scenario for any given EIA topic always being assessed. This approach allows for the design of a project to vary within a given ‘design envelope’ whilst ensuring that the full maximum extent of significant effects have been adequately assessed.

This approach has been approved legally by courts and endorsed by the Scottish Government as enabling the legal requirements of the relevant Environmental Impact Assessment (EIA) Regulations to be complied with, as long as conditions are built into the issued consents which ensure that the maximum parameters will not be exceeded by the final built development, and lead to a significant effect which has not been assessed.

Guidance has been prepared by The Marine Directorate and the Energy Consents Unit on using the design envelope approach for applications under Section 36 of the Electricity Act 1989 where flexibility is required within applications[2]. This guidance will be referred to in refining the design envelope to inform the EIA and states:

> *"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 the 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*".

An example of the PDE approach would be where several types of WTG foundations are being considered, then the assessment is based on the foundation known to have the greatest impact (the maximum adverse impact). In this instance, the PDE for the foundation with the greatest seabed disturbance potential would be the foundation with the largest footprint and the greatest number of turbines. If after undertaking the impact assessment, it is shown that no likely significant effect is anticipated, it can be assumed that any project parameters equal to or less than those assessed in the PDE will have environmental effects of the same level or less and will therefore also have no likely significant effects upon the receptors for the topic under consideration.

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[2] 2022, Scottish Government, Electricity Act 1989 - section 36 applications: guidance for applicants on using the design envelope, available online: https://www.gov.scot/publications/guidance-applicants-using-design-envelope-applications-under-section-36-electricity-act-1989/pages/2/

Due to the early stage of the Project, the boundaries of key project areas are indicative and the PDE allows for sufficient flexibility to accommodate further project refinement. The following sections provide the design envelope parameters, which constitute the realistic maximum design scenario for each technical assessment. Through the EIA process, the Project design will be refined to provide a final realistic maximum adverse design scenario. This will be detailed in the Environmental Impact Assessment Report (EIAR).

2.5 Site Selection and Consideration of Alternatives

2.5.1 ScotWind

The site selection process undertaken to date has been primarily driven by the first ScotWind Leasing process which was administered by Crown Estate Scotland (CES). In November 2017, CES announced their intention to undertake a leasing round for commercial scale offshore wind energy projects in Scottish Waters, known as ScotWind. To inform the spatial development for this leasing round, Marine Directorate (formerly Marine Directorate), as Planning Authority for Scotland's Seas, was required to undertake a planning exercise, in accordance with relevant European Community (EC), United Kingdom (UK) and Scottish legislation. The Sectoral Marine Plan for Offshore Wind Energy was published in October 2020 (Scottish Government, 2020).

The Sectoral Marine Plan Identified Plan Options (PO) for the future development of commercial scale offshore wind energy in Scotland. Twenty POs were identified which were subject to Strategic Environmental Assessment (SEA), plan -level Habitats Regulation Appraisal (HRA) and Socio -Economic Assessment before final adoption. These POs formed the basis of the ScotWind leasing round.

The Applicant made a strategic decision to participate in the ScotWind process and commissioned a series of desk-based studies to better understand the constraints, risks and opportunities associated with each of the POs. These studies included assessments of environmental, consenting, geological, grid capacity and stakeholder issues. Based on the outputs of these studies, the Applicant decided to submit a bid into the ScotWind process for the N4 PO.

Following evaluation of the bids by CES, option agreements were offered to the successful parties in January 2022 and confirmed as signed in April 2022[3]. The Applicant was the successful bidder for the 200 km^2 N4 PO.

[3] 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.

2.5.2 Option Agreement Area

As part of the bid preparation work undertaken by the Applicant, consideration was given to existing constraints within the N4 PO in order to refine the PO and identify the Option Agreement Area (OAA) within which the Array Area is located. The Array Area was identified through an iterative constraints mapping exercise to identify the key constraints.

Key offshore constraints considered and used to identify the Array Area included:

- Technical: bathymetry and slope, ground conditions, met-ocean 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 and fishing activities (both leisure and commercial).

The constraints analysis undertaken 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 EIAR/engineering studies to confirm this. From this assessment, a preferred 161 km^2 Array Area was identified within the N4 PO.

Key contributing factors to the selection of the Array Area were:

- Avoidance of very high-risk marine traffic area inshore of the N4 PO;
- Minimising the number of WTGs sited close to the shore;
- Avoidance of possible nearshore salmon migration routes;
- Best utilisation of wind resource.

These measures have resulted in the majority of the N4 PO being selected whilst increasing the separation distance between the Array Area and the shore.

2.5.3 Offshore Cable Corridor Area of Search Identification and Selection

An Offshore Cable Corridor Area of Search has been developed, covering a wide area between Array Area and the potential landfall sites. The specific assessments completed to determine the preferred landfall locations are noted in section 2.5.4. The final offshore cable corridor will be defined following environmental, technical and commercial studies and surveys as well as consultation with interested parties.

2.5.4 Landfall Area of Search Identification and Selection

A preliminary cable landfall study has been conducted, informed by desktop studies, in order to identify the most suitable options for the Project which minimise the distance from the Array Area and consider all options including OSPs and onshore substations. As a result of these studies a number of potential landfalls are being considered along the west coast of the Isle of Lewis (see **Figure 1.1-1** Project Overview).

Initially 5 landfall points were identified on the west coast of the Isle of Lewis. Following initial desk based investigation and an engineering walkover, two sites, the most northerly and the most southerly have been discounted for technical reasons. The remaining three locations remain under consideration and further environmental and technical surveys will be carried out within these areas before the final landfall selection is made.

2.5.5 Onshore Cable Corridor Area of Search Identification and Selection

Onshore cables and associated infrastructure are required to transmit the electricity generated offshore to the grid connection point, to be located within the vicinity of the planned SSEN Converter Station associated with the upgraded Western Isles HVDC Link. At the time of writing, the exact location of the planned SSEN Converter Station is not known, nevertheless SSEN have published information showing their preferred location[4].

An Onshore Cable Corridor Area of Search has been developed between the potential landfall locations and Grid Substation Area of Search, based on desk-based route selection, which has considered the following key technical, environmental, and land-use constraints:

- Technical: ground conditions, topography, roads, utilities and water courses;
- Environmental: water courses, designated areas, and cultural heritage;
- Land-use; areas of croft land, other infrastructure and existing planning consents.

The Onshore Cable Corridor Area of Search as defined at the time of writing, is 1 km wide and is routed from the potential landfalls across the Isle of Lewis predominantly along the A857 road (see **Figure 1.1-1**), although alternative routes may be considered. It is anticipated that the maximum working area during construction is likely to 100 m wide, although there may be points where localised widening of this will be required to accommodate any lay down areas or construction compounds. The locations of these will be determined over the course of the EIA process.

[4] Western Isles Connection Project - HVDC converter station and AC substation Site Selection Consultation, April 2023, Available Online at:
https://www.ssen-transmission.co.uk/globalassets/projects/projects/western-isles-downloads/western-isles-consultation-booklet.pdf

As the Project develops, and as the EIA progresses, the final onshore cable corridor(s) to the grid substation location will be defined following environmental, technical and commercial studies, site specific surveys and consultation with SSEN and wider stakeholders.

2.5.6 Onshore Substation Areas of Search Identification and Selection

As discussed in the section 2.2, two options are being assessed by the Project.

Technical constraints are currently being assessed (ground conditions, peat, topography, existing services, access, drainage etc.). The location of both onshore substations within the areas of search will be identified following consultation with local stakeholders and will be designed to minimise environmental effects.

The most suitable locations identified for Landfall Substation on the west side of the Isle of Lewis will be as close as possible to the selected landfall location (referred to as Landfall and Landfall Substation Area of Search).

As discussed in section 2.5.5 the Grid Substation will be located in the vicinity of the planned SSEN Converter Station associated with the upgraded Western Isles HVDC Link. Through consultation to date with SSEN, an area of search for the substation (referred to as Grid Substation Area of Search) has been defined based on the area being investigated for the planned SSEN Converter Station.

Through the EIA process, and in consultation with the public and stakeholders, the locations of the infrastructure will continue to be refined. Further site selection work will be undertaken following the completion of site -specific survey work and additional technical, environmental and commercial discussions and studies.

2.6 Offshore Project Infrastructure

2.6.1 Location

Key offshore Project infrastructure will be located in 2 areas:

- Array Area: where the actual Offshore Wind Farm (OWF) will be located, which will include the WTGs, foundations and inter-array cables.
- Offshore Cable Corridor Area of Search: the area in which export cables to shore will be located and if required an OSP. Cable protection will also be installed in this area.

Based on review of existing data, the seabed within the Array Area is gently sloping with water depths generally ranging from approximately 37 m to 67 m. Water depth increases with distance from shore except for the southwest corner of the Array Area, where a localised depression exists reaching approximately 72 m. There is evidence of the presence of rock near or at the seabed in the east and south of the Array Area.

Maximum seabed gradients are in the order of 1°, which is suitable for cable installation. Where rock is presumed present near the seabed, gradients in the order of 4°-5° may exist; however, these are likely to be quite localised and will hopefully be avoidable through detailed design.

It is concluded the Array Area is suitable for fixed bottom foundations such as monopiles or jackets and that seabed gradients are suitable for submarine cable installation and operation. Onsite geophysical and geotechnical investigations are underway in accordance with the site investigation programme.

2.6.1.1 Layout

The WTG layout within the Array Area will be determined once the design optimisation process has been completed. This is an iterative process balancing several key development sensitivities including WTG model choice, WTG spacing arrangements and wind direction, geophysical characteristics, met ocean conditions, benthic habitats, foundation structure (and associated supporting structures) and navigational safety considerations.

The distance between rows of WTGs in the down and cross wind directions will vary to maximise the efficiency of energy capture whilst minimising cable length and installation. Within the Array Area, each individual WTG will be micro -sited to consider any technical constraints and positioning accuracy. The indicative minimum spacing included as a design parameter in the WTG layout at this stage is 900 m.

Data to inform this design-led process is being collected as part of the project survey programme with surveys underway in Summer 2023. The data collected will also be available to inform the EIA process.

2.6.1.2 Wind Turbine Generators

The Project will be comprised of up to 66 WTGs. The final number of WTGs will be dependent on the iterative wind farm layout process which is influenced by the capacity of individual WTGs used and site specific survey results. There is the potential for a reduced number of WTGs to be used if an increased rated output of WTG model is chosen when the final Project design is developed.

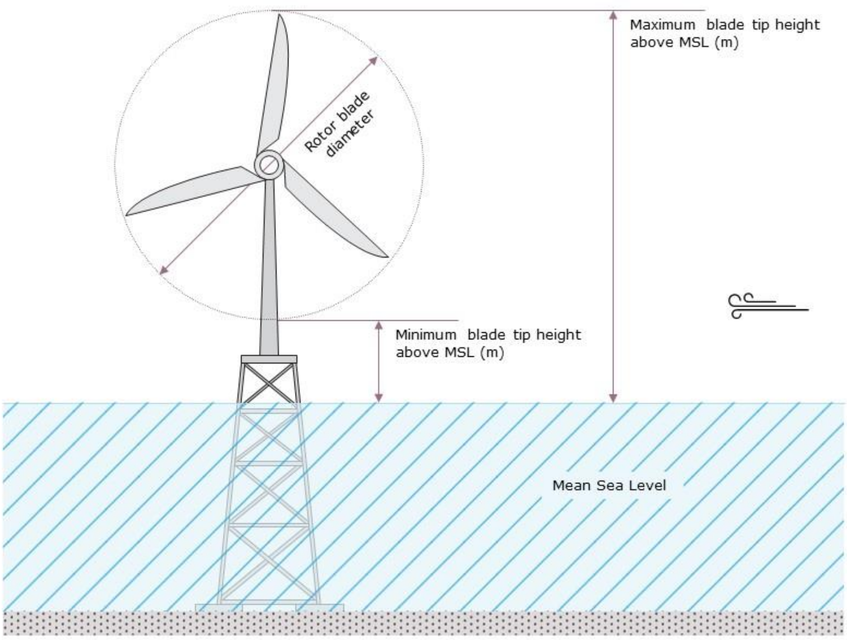
A scheme for WTG lighting and navigation marking will be agreed with consultees but will follow policies and best practise guidance from aviation and shipping and navigation authorities.

A schematic of a typical offshore WTG is illustrated in **Figure 2.6-1**, and the PDE values as defined for this EIA Scoping exercise are presented **Table 2.6-1.**

Table 2.6-1 EIA Scoping PDE Parameters for WTGs

Parameter	Range
Capacity	15 MW – 27 MW
Rotor Diameter	235 – 330 m
Blade Tip Height (above MSL)	280 – 380 m
Air Gap (between minimum blade tip height and MSL)	22 m (minimum)
Number of WTGs	Up to 66
Hub Height (above MSL)	150 – 220 m

Figure 2.6-1 Schematic of Wind Turbine Generator



2.6.2 Foundations

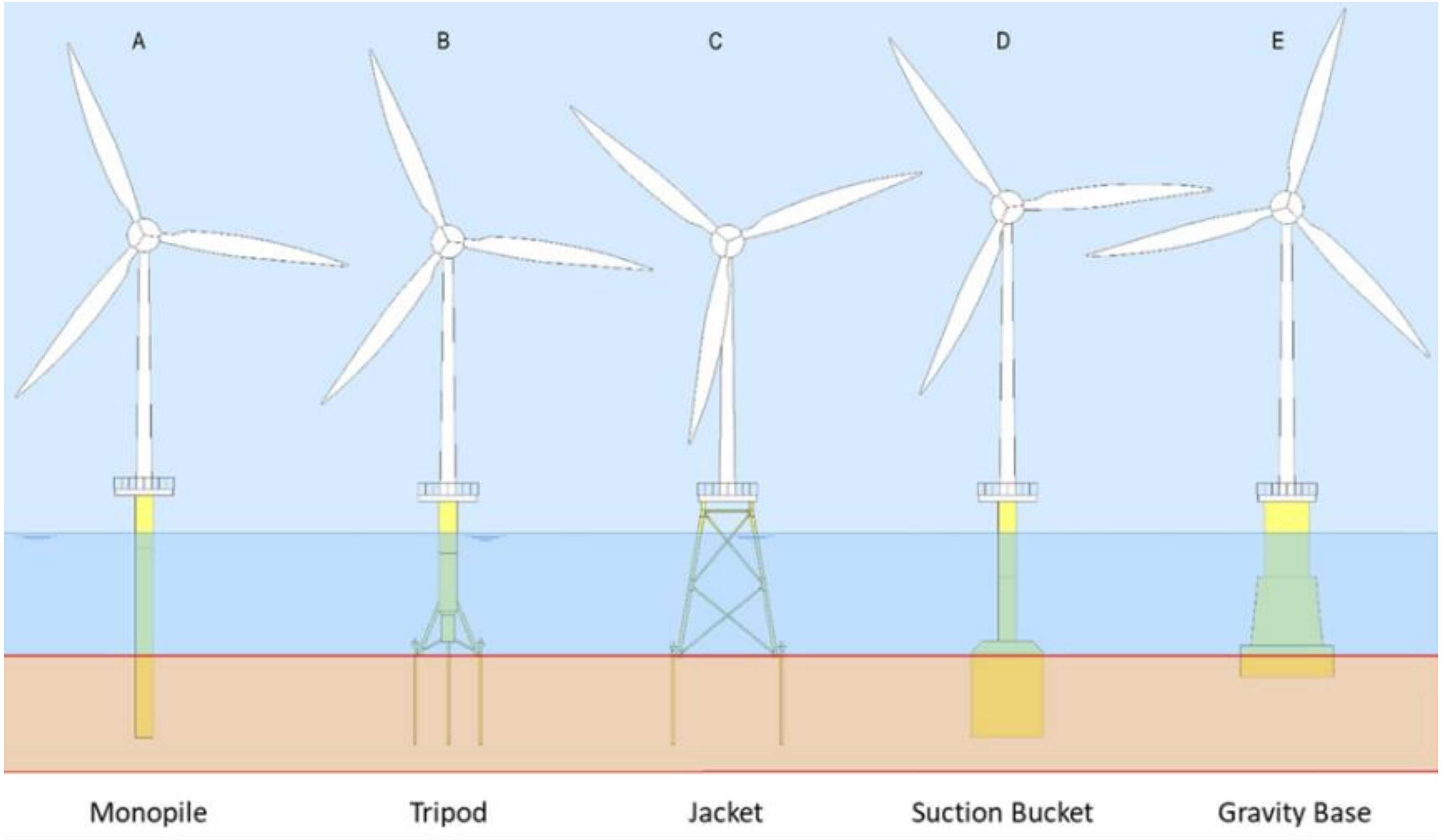
WTG foundations must be suitable for the site characteristics such as ground conditions, water depth and wave heights and for the loads transferred by the candidate WTG. It must also allow safe and efficient installation and Operations and Maintenance (O&M) activities. The exact foundation type to be deployed at the Array Area and its associated installation method will not be confirmed until the design of the wind farm has been finalised, which in turn, will not be completed until detailed geophysical and geotechnical surveys have been undertaken. Consequently, the EIAR will consider a range of fixed foundation types, including monopiles, tripods, jackets, suction bucket, and Gravity Base Structures (GBS). It is possible that the site could consist of one type of foundation across the entire array area or alternatively a mixed foundation approach could be used for example monopiles in shallower parts of the array and jackets in greater water depths. Water depths in the Array Area generally range from approximately 37m to 67 m with an average depth of approximately 50 m. The WTG foundation selection process therefore has focused on fixed type foundations. While some floating foundation concepts may be feasible, they are unlikely to be cost -effective for this site and its programme for installation.

All fixed foundation concepts depicted in **Figure 2.6-2** have been evaluated as part of initial feasibility analysis undertaken by the Applicant. This analysis compared their respective strengths and weaknesses for the development site and concluded that they all represent feasible foundation options.

WTG support structures will include access facilities and appropriate maritime and aviation lighting and marking for surface and airborne navigation. Options for the configuration of the support structures, and details of their potential environmental impacts, will be included in the final EIAR.

Scour protection may also be required at some foundation types and locations, dependent on the local hydrodynamic regime and seabed characteristics. A range of possible options will be considered for scour protection including but not limited to rock placement; frond mats; concrete mattressing or the use of integrated skirts/aprons.

Figure 2.6-2 Schematic of Foundation Types that may be deployed in the Array Area



Monopile

This concept is the most commonly used solution on operational wind farm developments to date in water depths typically ranging up to 35 m, but technology evolution is making possible its use in deeper waters. The structure consists of a cylindrical steel pile with an anticipated maximum diameter of 15 m.

Conical transitions are occasionally used to reduce the diameter of the structure at the top of the foundation. Corrosion protection will be required for this substructure. This is likely to take the form of cathodic protection and/or protective coatings for the submerged areas, and protective coating for areas above the water line.

Installation methods will depend on the seabed conditions and may include, percussive pilling and/or vibropiling / drill-drive-drill or drill and grout. Where monopiles are installed via piling methods, in certain locations across the site, ground conditions may necessitate drilling prior to piling commencing. This would be undertaken via industry standard drilling rigs inserted within the pile itself. Any drill arisings produced via this activity would most likely be deposited *in situ* within the Array Area.

Table 2.6-2 EIA Scoping PDE parameters for Monopile Foundations

Monopile Reference Design	
Water depth	up to 55 m
Monopile diameter	8 – 15 m
Pile Penetration Depth	20 – 60 m beneath seabed
Overall mass	Up to 3000 tonnes

Tripod

Tripod foundations have three-legged bases that connect to a cylindrical central column below the waterline. This design is different from the three-legged jacket foundation, which uses three separate pile legs that connect to a central support tower above the waterline. Above the waves, a turbine installed using a tripod foundation appears like a monopile however the tripod design provides additional flexibility and structural strength. The tripod is most often attached to the sea floor with piles.

Corrosion protection will be required for the steel structures, both above and below water level. This is likely to take the form of cathodic protection and/or protection coatings for the submerged areas, and protective coating for areas above the water line.

Table 2.6-3 EIA Scoping PDE parameters for Tripod Foundations

Tripod Reference Design	
Typical Water depth	60 m
Max Tripod height	90 m
Footprint	50 m equilateral triangle. Some scour protection may be required.
Foundation	Piles (pin or drill and grout)

Steel Jacket

Jackets are steel structures with 3 or 4 legs, each of which is fixed to the seabed using a steel "pin" pile, drill and grouted pile or use of a suction bucket (see next section for suction bucket details). Jacket structures can assume different configurations with sub-concepts including braced monopods, tripod structures and 3- or 4-legged lattice structures. Pile diameters would vary depending on specific design but are expected to be up to 6 m in diameter. The number of braced bays required shall be determined on a clustered basis, to suit the water depth and structural performance requirements with respect to the WTG operation.

Similar to monopiles, installation methods for jacket foundations depend on the seabed conditions and may include percussive pilling and/or vibropiling / drill-drive-drill or drill and grout. At certain locations, as with monopiles, drilling and disposal of drill arisings may be required prior to piling.

Corrosion protection will be required for the steel structures, both above and below water level. This is likely to take the form of cathodic protection and/or protection coatings for the submerged areas, and protective coating for areas above the water line.

Table 2.6-4 EIA Scoping PDE parameters for Steel Jacket Foundations

Steel Jacket Reference Design	
Typical Water depth	60 m
Max Jacket height	90 m
Footprint	55 m x 55 m (either square or equilateral depending if 3 or 4 legs). The footprint would be slightly larger if caissons/buckets are used (see below). Some scour protection may be required also.
Foundation	Pin piles, drill and grout or caissons. Max 2 piles per leg.
Overall mass	Up to 4000 tonnes (incl. jacket and transition piece)

Suction Bucket

This concept has had limited use to date in the offshore wind industry but has been used extensively in the oil and gas industry as alternatives to piles at the base of jackets.

Suction bucket can be used at the base of monopiles or jackets for offshore WTGs. The concept consists of a cylindrical steel skirt or skirts which penetrate the seabed. Corrosion protection will be required for this substructure. This is likely to take the form of cathodic protection and/or protective coatings for the submerged areas, and protective coating for areas above the water line.

There may be some boulder clearance required in advance of suction caisson installation. After installation the void of the bucket would be grouted and there may be some scour protection of the foundation required. This would involve rock placement etc. around the perimeter of the caisson foundation.

If there is shallow bedrock found to be present, then there is a new concept of caisson. This is a hybrid gravity caisson concept. Here the caisson (or bucket) would allow for a ballast to be added to the top of the bucket to weight it down when the penetration depth is compromised by shallow bedrock.

Table 2.6-5 EIA Scoping PDE parameters for Suction Bucket Foundations

Suction Bucket Reference Design for Monopile	
Typical Water depth	60 m
Suction Bucket diameter	25 m
Suction Bucket footprint	491 m^2
Seabed penetration depth	Up to 25 m
Overall mass	4000 tonnes (incl. jacket and transition piece)

Suction Bucket Reference Design for Jackets	
Water depth	60 m
Suction Bucket diameter	Up to 20 m x (3 or 4 legs)
Suction Bucket footprint	Up to 1250 m^2 (this is for a 4 leg jacket)
Seabed penetration depth	Up to 20 m
Overall mass	Up to 4000 tonnes (incl. jacket and transition piece)

Gravity Base Structure

The generic GBS is composed of 1 or more hollow concrete base, which are filled with ballast for stability, and either a concrete or steel structure on top. The GBS may have a steel "skirt" which penetrates the seabed. The maximum base diameter of the structure is anticipated to be 80 m.

The concept may require the preparation of the seabed with the installation of a flat gravel bed to provide a stable foundation for the GBS. Depending on the seabed soil conditions an area of seabed may require to be dredged prior to the installation of the gravel bed. If dredging is required, it is expected that the area of seabed which is excavated will be greater than the final area of the laid gravel bed.

In some cases, grouting injected under the GBS or rubber friction enhancing mats may be a suitable alternative to the gravel bed foundation. The placing of scour protection around the concrete base (graded rock placement, concrete mattress or scour mats) is likely. As with a steel jacket or monopile, corrosion protection will be required for any steel work (including boat landings and ladders) of the substructure. This is likely to take the form of cathodic protection and/or protective coatings for the submerged areas, and protective coating for areas above the water line.

Table 2.6-6 EIA Scoping PDE parameters for Gravity Base Structure Foundations

Gravity Base Structure Reference Design	
Typical Water depth	Max 60 m
Base diameter	80 m
Footprint	5,027 m^2

2.6.2.1 Inter-Array Cables

Two design options are being considered for the offtake of the electricity produced by the turbines. This impacts the inter-array cable requirements. The number of array cables will vary depending on the windfarm size, WTG capacities and electrical design option taken forward. However a small number of WTGs will typically be grouped together on the same cable 'string' connecting those WTGs to the landfall Substation or the OSP. For the project, up to 8 inter array cables ('strings') could be used.

Flexibility is required in the location, depth of burial and protection measures for the inter array cables to ensure physical and technical constraints, changes in available technology and project viability can be accommodated within the final design.

Exact cable route(s) have not yet been defined as these will be determined during the finalisation of the windfarm layout design process (section 2.6.1). The locations of the inter array cable corridors will be defined by site -specific geophysical and geotechnical survey information to be collected as part of the EIA process, which will also support the decision on requirements for any additional cable protection.

The inter-array cables will be buried where possible. Where shallow/no burial occurs, external cable protection will be deployed. If cable protection is required, the protection measure will be dependent on several factors such as seabed conditions, seabed sedimentology and marine physical processes.

A range of installation methodologies exist for inter-array cable installation including but not limited to cable plough; jet trencher; mechanical cutting trencher and/or mass flow excavator. The type of installation methodology to be used will be dependent upon site specific surveys that are to be undertaken as per the projects Site Investigation programme however it can be assumed that a variety of techniques will be used across the site.

Prior to any export cable installation, preparatory works may be required, including sandwave levelling and disposal *in situ*, Pre-Lay Grapnel Runs (PLGR), scar ploughs, Unexploded Ordnance (UXO) clearance and boulder clearance.

The EIA Scoping PDE for inter-array cables is presented in **Table 2.6-7.**

Table 2.6-7 EIA Scoping PDE Parameters for Inter-Array Cables

Parameter	Range
Number of array cables / strings	6 - 8
Voltage	66 – 132 kV
Target Cable burial depth	Up to 3 m subject to cable burial risk assessment
Width of direct seabed footprint from installation	Up to 21 m
Total length of inter-array cabling	Up to 300 km

2.6.3 Offshore Substation(s)

If required, OSP(s) provide a centralised connection point for the inter-array cable circuits. The inter array circuits all link the WTGs and connect to the OSP(s) and the OSP(s) then connect to the export cable(s). The export cables then transmit the electricity that has been converted on the OSP(s) (voltage stepped up) to shore. They comprise 2 main components: (1) a substructure foundation; and (2) a topside. The substructure will likely be a large jacket structure which will be attached to the seabed either through piles, suction caisson, GBS, or monopile, depending on the size of the OSP, ground conditions and water depth. As with the foundations for the WTGs, scour protection may be required.

The topside will house electrical equipment where it steps up the voltage from the array cables, as well as housing supporting functions, such as storage, communications (including masts), and accommodation facilities. The structure would also be fitted with appropriate navigation markings and lights in accordance with relevant guidance and legislation and may also support a heli-pad. Two to three export cables will exit the OSP(s) towards landfall where they will terminate at TJBs.

It is not yet decided if OSP(s) will be required for the Project as an option exists for a substation to be installed at landfall. However, for the purposes of EIA Scoping OSPs are included and presented in **Table 2.6-8.**

Table 2.6-8 EIA Scoping PDE Parameters for Offshore Substations

Offshore Substation Reference Design	
Number of Platforms	0 – 3
Max Height of platform above MSL	90 m (30 m air gap and 60 m of decks)
Length of Topside	30 – 60 m
Width of Topside	30 – 60 m
Steel Jacket Structure Reference Design	
Typical water depth	50-70 m
Max Jacket height	100 m (50-70 m water depth + air gap)
Footprint / Number of jacket legs	Max 6 legs (if one large OSP) Up to 1900 m^2 based on 20 m caissons with 6 legs. Scour protection may be required.
Foundation (if one large OSP)	Monopile or Jacket with Pin piles, drill and grout or caissons
Overall mass (if one large OSP)	Jacket – 6000 tonnes Topside – 6000 tonnes

2.6.4 Interconnector Cables

Interconnector cables will only be required should more than one OSP be installed as part of the project. Interconnector cables are needed to link OSP(s) within larger offshore array areas and to improve transmission reliability. Exact interconnector cable route(s) have not yet been defined and will only be available once final project design has been established and OSP location(s) (if required) are finalised.

Flexibility is required in the location, depth of burial and protection measures for the interconnector cables to ensure physical and technical constraints, changes in available technology and project viability can be accommodated within the final design.

As with inter-array cables, interconnector cables will be buried where possible. Where shallow/no burial occurs, external cable protection will be deployed. This could take the form of (but not limited to) a rock berm; rock bags; and/or concrete mattresses or similar. If cable protection is required, the protection measure will be dependent on several factors such as seabed conditions, seabed sedimentology and the marine physical processes.

As for inter-array cables, a range of installation methodologies exist and the preferred technology will be dependent on ground conditions, however the use of different installation methods could be applied such as cable plough, jet trencher, mechanical cutting trencher, controlled flow excavator (CFE) and/or mass flow excavator.

Prior to any cable installation, preparatory works may be required, including but not limited to including sandwave levelling and disposal *in situ*, PLGR, scar ploughs, Unexploded Ordnance (UXO) clearance and boulder clearance.

The EIA Scoping PDE for interconnector cables is presented in **Table 2.6-9**.

Table 2.6-9 EIA Scoping PDE parameters for Interconnector cables

Parameter	**Range**
Number of interconnector cables	0 – 2
Voltage	66 – 275 kV
Target Cable burial depth	Up to 3 m subject to cable burial risk assessment
Width of seabed footprint from installation	Up to 21 m
Total length of interconnector cables	Up to 25 km

2.6.5 Export Cable

Offshore export cables will be required if an OSP(s) is needed and are used for the transfer of power from OSP(s) to landfall. At the time of writing, exact export cable route(s) have not yet been defined, therefore only indicative cable corridors can be provided. The locations of the offshore export cable corridors will be defined by site -specific geophysical and geotechnical survey information to be collected as part of the EIA process, which will also support the decision on requirements for any additional cable protection. Flexibility is required in the location, depth of burial and protection measures for the export cables to ensure physical and technical constraints, changes in available technology and project viability can be accommodated within the final design.

Up to 3 offshore export cables may be required if the OSP option is taken forward. These will likely be 220 kV or 275 kV 3-core cables which are currently industry standard. Based on an assumption of a cable route running in a straight-line from the centre of the Array Area to the Landfall and Landfall Substation Area of Search, the offshore export cables (up to 3) will have an approximate total length of 50 km (all cables combined).

With respect to installation, as with the inter-array cable, the export cables will be buried where possible. Where shallow/no burial occurs, external cable protection will be deployed. This could take the form of (but not limited to), rock berm; rock bags; and/or concrete mattresses. If cable protection is required, the protection measure will be dependent on several factors such as seabed conditions, seabed sedimentology and the physical processes.

A range of installation methodologies exist for export cable installation and the preferred technology will be dependent on ground conditions, however the use of different installation methods could be applied such as (but not limited to) cable plough, jet trencher, mechanical cutting trencher, CFE and/or mass flow excavator.

Prior to any export cable installation, preparatory works may be required, including sandwave levelling and disposal *in situ*, Pre-Lay Grapnel Runs (PLGR), scar ploughs, Unexploded Ordinance (UXO) clearance and boulder clearance.

The EIA Scoping PDE for offshore export cables is presented in **Table 2.6-10.**

Table 2.6-10 EIA Scoping Project Design Envelope Parameters for Offshore Export Cables

Parameter	Range
Number of Export Cables	Up to 3
Total Length (3 cables)	Up to 50 km

Voltage	Up to 275 kV
Width of seabed footprint from installation	Up to 21 m (for each trench)
Target Cable burial depth	Up to 3 m subject to cable burial risk assessment

2.7 Landfall

Landfall is the interface between the offshore and onshore aspects of an OWF. The infrastructure and installation methods associated with landfall involve both offshore and onshore elements.

There are a number of techniques currently being considered for the installation of the offshore export cables in the shallow subtidal and intertidal sections of the landfalls. The technique that will be utilised will be dependent upon ground survey results but could include:

- Option 1: Trenchless techniques e.g. Horizontal Directional Drilling (HDD), Direct Pipe or similar;
- Option 2: Open-cut trench;
- Option 3: Rock pinning.

2.7.1 Trenchless Techniques

2.7.1.1 Horizontal Direct Drill (HDD)

HDD is a method adopted for cable landfalls that can reduce direct impacts on existing intertidal habitats. Ducts are installed after initial drilling work and then the export cable(s) are pulled through these ducts. The ducts are generally installed deep enough to avoid exposure via erosion and/or to contribute to natural erosion rates in the landfall area.

If HDD is required, a temporary onshore HDD compound will be utilised at the selected landfall site. At the cable landfall point(s), a concrete TJB may be required to house the interface joint between the offshore export cables and onshore cables. The TJB would be located above Mean High Water Springs (MHWS). The purpose of the TJB is to allow a firm, solid base for cable jointing which can be covered by a tent or container to allow the necessary environmental conditions. Following connection of the cables, the TJB may be backfilled to protect the joint. The area will then be reinstated. A temporary working area will also be required to construct the landfall and TJB infrastructure.

If the HDD is undertaken from the landward end, then HDD exit points will be required in the shallow subtidal region. These may require some form of rock protection over the lifetime of the Project.

2.7.1.2 Direct Pipe

Direct Pipe is an installation method that combines horizontal directional drilling and micro tunneling techniques to allow cable installation in one run. It requires a larger set up area than HDD noted above but dependant on rock type and engineering requirements has the potential to be better suited for specific geographical areas than the HDD option.

The EIA Scoping PDE for trenchless techniques to install landfall infrastructure is presented in **Table 2.7-1**.

Table 2.7-1 EIA Scoping PDE Parameters for Landfall Works

Parameter	**Range**
Trenchless Techniques	
Number of HDDs / Ducts installed	0 - 8
Number of TJBs	0 - 8
Dimensions of single TJB	0 - 3 (W) x 10 (L) m
Landfall compound dimensions	0 - 30,000 m^2

2.7.1.3 Open Cut Trenching

This methodology involves an open cut trench (OCT) to be formed (usually via terrestrial and/or amphibious plant with excavator buckets attached) in which the cable is laid and then buried. This can avoid unwanted cable displacement, keeping it out of the surf zone, hence reducing risk of damage. Temporary coffer dams are sometimes required to safely construct the trench which are removed after cable installation. There is also a requirement at some landfalls to install a permanent layer of external protection over the trench to mitigate the risk of cable exposure via erosion/changing beach levels over the lifetime of the Project.

2.7.1.4 Rock Pinning

If a landfall location is in a particular rocky environment, a landfall option sometimes considered is to surface-lay the cable over areas of shallow sub-tidal/intertidal rock and pin the cable to the local rock via a series of appropriately engineered pins and braces. In this scenario, additional external cable protection may also be placed over the pinned cable.

2.8 Onshore Project Infrastructure

2.8.1 Onshore Export Cables and Associated Infrastructure

An initial Onshore Development Area of Search has been defined, which includes potential landfall and substation options. Option 1 noted in the section 2.2 requires an onshore substation located on the west side of the Isle of Lewis (referred to as Landfall and the Landfall Substation Area of Search) and an onshore substation located near Arnish where the SSEN Converter Substation may be located (referred to as Grid Substation Area of Search). Option 2 only requires an onshore substation located near Arnish where the SSEN Converter Substation may be located (referred to as Grid Substation Area of Search). Both options require the onshore cable routing (referred to as Onshore Cable Corridor Area of Search) (see **Figure 1.1-1**).

For either option, onshore cable circuits will be routed across the Island. Whilst NPF 4 shows a clear preference for underground connections where possible, at the time of writing the use of overhead lines cannot be ruled out entirely. In the event that underground cabling proves to be unfeasible, sections of overhead line may be required.

It is anticipated that OCT will be the primary installation method, however this will be reviewed once the onshore cable routes are finalised. HDD may be required if obstacles are encountered, including sensitive features such as water courses and crossings beneath permanent features like roads.

The onshore cable trenches will be located within a working corridor, which will also include any access tracks, excavated material and any other equipment/machinery. Certain sections of the working corridor may be wider, to accommodate lay down areas, temporary parking, tracks, storage and cable pulling equipment etc.

The working corridor will also include Cable Joint Bays (CJBs), which are typically required every 500 to 1,500 m to string together the onshore cable sections depending on the manufacturing specification of the cable supplier. Temporary working areas may also be required along the onshore cable route for the cable installation works, including compounds and haul roads. The PDE for the onshore export cables will be subject to local ground conditions, landowner requirements and cable characteristics.

In addition to the cable to Grid Substation, there will also be a section of cable required from Grid Substation to the SSEN Converter substation. This will be similar in nature to the other onshore cable with a shorter distance envisaged. The total length will be dependent on final location of SSEN Converter Station and that of Grid Substation. Two to three 132 kV to 275 kV circuits will be required here.

Table 2.8-1 EIA Scoping PDE Parameters for Onshore Cables

Parameter	Range
Number of circuits	2 -3
Voltage	132 – 275 kV
Maximum length of export cable from TJB to onshore substation (for 1 circuit)	45 km

2.8.2 Onshore Substation(s)

The Project will require either one or two onshore substations; Landfall Substation located on the west side of the Isle of Lewis or Grid Substation located near Arnish where the planned SSEN Converter Station associated with the upgraded Western Isles HVDC Link, will be located. Grid Substation will include the electrical equipment required to connect the Project to the grid Point of Connection (PoC).

The onshore substation(s) will be designed and constructed to align with the most relevant and up -to -date guidance and specifications available but will include either Air Insulated Switchgear (AIS) or Gas Insulated Switchgear technology. Additional electrical infrastructure may be required in the case of a 'loop-in' connection to an existing overhead line in order to facilitate the safe connection of the Project to the local grid.

The onshore substation compounds will include control buildings and external electrical and ancillary infrastructure required to safely export the electricity generated from the OWF to the grid. Access roads, civil engineering earthworks and drainage will all form part of the project envelope.

Examples of electrical and ancillary infrastructure associated with the onshore substation(s) compound(s) include but not limited to:

- Shunt reactors;
- Harmonic filters;
- Static Synchronous Compensators (Statcoms);
- Cable/Line disconnects and circuit breakers;
- Current and voltage transformers;
- Busbars;
- Power transformers;
- Control Buildings;
- Gas Insulated Switchgear Buildings;
- Earth Grids;

- Lightning protection and telecommunications masts;
- Steel gantries and cable chairs;
- Concrete plinths and bunds;
- External lighting;
- Security cameras;
- Palisade fencing and gates;
- Access and sustainable drainage systems.

Grid connection for the Project will be through the planned SSEN Converter Station associated with the upgraded Western Isles HVDC Link, a 1.8-gigawatt (GW) HVDC interconnector planned from Arnish to Beauly expected to be operational by 2030. The EIA Scoping PDE for the onshore substation(s) is presented in **Table 2.8-2**.

Table 2.8-2 EIA Scoping PDE Parameters for Onshore Substations

Parameter	Range
Number of onshore substations	Up to 2
Footprint of temporary construction compounds	20,000 - 40,000 m^2
Footprint of each substation once completed	25,000 - 50,000 m^2
Maximum Height of each onshore substation	Up to 20 m

2.9 Project Phases

2.9.1 Construction

2.9.1.1 Offshore

The exact sequencing and timing of offshore construction works will be developed further and presented in the main EIAR however indicative sequencing is provided in **Table 2.9-1.**

Table 2.9-1 Indicative Sequence of Offshore Construction Activities

Activity	Description
Pre-construction surveys and site investigations	Pre-construction surveys (surveys undertaken post consent) may include geophysical, geotechnical and benthic, surveys, UXO clearance surveys and metocean measurement campaigns.

Activity	Description
Site preparation, foundation and substructure installation	Seabed preparations may also be required prior to the installation of WTG and OSP foundations (if required) and offshore cable infrastructure. This may include boulder clearance and PLGR.
OSP installation (if required)	OSP foundation structures are typically pre-installed ahead of the topside structure. The installation technique for the foundation structures will vary depending on the selected design.
Offshore export cable – landfall and offshore installation (if required)	Following the completion of the necessary onshore works (including the necessary landfall preparations) and the offshore site preparations, the offshore export cables will be installed from the landfall out to the array or pulled from offshore vessels towards the onshore side, with the potential for pre-trenching works to be undertaken ahead of cable installation. The export cables will be buried wherever possible and may be installed using a variety of techniques, as discussed in section 2.6.5. Following cable lay and burial (which may occur simultaneously or sequentially) external cable protection will be installed, as necessary.
Foundation or substructure installation	Foundations will be installed ahead of the WTG, typically transported as partially pre-assembled sub-units. WTGs are subsequently installed onto the foundation structures.
Inter-array and interconnector cable (if required) installation	The inter-array cables will be installed between the WTGs typically as strings connecting multiple WTGs to a single circuit. The installation techniques for the inter-array cables and interconnector cable(s) will be similar to that of the offshore export cables.
WTG installation/commissioning	The WTGs will be fabricated onshore and transported to the array area for installation. Following installation of the WTG and connection to the inter-array cabling, a process of testing and commissioning will be undertaken.

Specific details on installation will vary depending on the technologies adopted and may change due to improvements in both the technology and supply chain. It is anticipated that a range of vessels will be used in the construction phase, including jack-ups, semi-submersible crane vessels, transportation barges, heavy lift vessels, cable laying vessels, service operated vessels (SOVs), diving support vessels, construction support vessels (CSVs), remote operated vehicle support vessels (ROVSVs), rock placement vessels and guard vessels.

During construction activities, appropriate safety zones will be required to be in place around WTGs, construction vessels and work areas. The Project intends to apply for standard safety zones of 500 m during construction and major maintenance activities. Both statutory and advisory operational safety zones are being considered as part of the Project development process and the Navigational Risk Assessment (see Chapter 6.10: Shipping and Navigation). The requirement for these safety zones will be discussed further with consultees during the EIA process.

2.9.1.2 Onshore

The sequencing and timing of onshore construction works will be developed further and presented in the main EIAR however indicative sequencing is provided in **Table 2.9-2**. These works may not follow the same timelines as the offshore construction activities although the two will dovetail as the Project nears completion.

Table 2.9-2 Indicative Sequence of Onshore Construction Activities

Activity	**Description**
Pre-construction surveys and site investigations	Pre-construction surveys and site investigations may be undertaken, including intrusive archaeological investigations, ecology surveys, hydrology surveys, geotechnical and geophysical surveys and contaminated land investigations. Other surveys may also be undertaken if required.
Landfall works	The landfall works will involve the following activities: • Setting up of a temporary construction site and potential HDD compound for the landfall works; • Excavation or HDD for landfall installation; • Possible laying of ducts for later installation of cables; • Construction of TJB; • Installation of onshore and offshore cables to TJB; • Reinstatement, where necessary.
Cable enabling works	The cable enabling works will be carried out ahead of cable installation and may involve site preparation, including site clearance, topsoil stripping and fencing off of construction areas, setting up of temporary work areas and construction of access roads.
Cable route installation	Following the enabling works, the cable will be installed. The primary installation method is expected to be open-cut trenching which will involve the excavation of trenches along the cable route and the construction of CJBs. The onshore cable would then be drawn through buried ducts and laid in the trenches at the CJBs. HDD will be used to avoid disturbance to sensitive surface features. In the event that a section of overhead line be required the methodologies would be adjusted accordingly.
Onshore substation enabling works	The substation enabling works will involve the following stages: • Site preparation, including site clearance, fencing off the construction areas, provision of services to the site and creation of temporary works areas; • Construction of temporary and permanent access roads.
Onshore substation civil and electrical works	Following the enabling works, the substation civil and electrical works will commence, which will comprise the following stages:

Activity	Description
	• Civil works to prepare the site for the heavy-duty equipment required for the installation of the foundations and buildings. This will comprise earthworks to create a firm and level platform across the site; • Foundation works for the main electrical components and buildings which may comprise piled and/or shallow foundations; • Provision of the main utilities to services the site including electrics, water and telecommunications; • Construction of the main buildings; • Installation and testing of electrical equipment; • Landscaping works including earthworks and vegetation planting; • Commissioning activities.

2.9.2 Operations and Maintenance (O&M) Phase

2.9.2.1 Offshore

The overall O&M strategy will be finalised once the project design is finalised and a location for the onshore O&M base has been confirmed. Options for the O&M base are currently being considered and work has already been undertaken to assess Scottish port capabilities to understand the viability of options available to meet the Project requirements. During the operations period, the following classifications of maintenance may be required:

- Routine maintenance: activities that are carried out on a regular basis based on the original equipment manufacturer (OEM) 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, foundations, cables and any required offshore substation platforms and their ancillary infrastructure will be included in monitoring and maintenance programmes. The EIA will assess the potential impacts of maintenance activities (planned, unplanned and major component) based on experience and best practice.

O&M activities may be required at any time during the lifecycle of the Project. It is anticipated that routine maintenance could be serviced through SOVs, Crew Transfer Vessels (CTVs), daughter craft, ROVSVs and/or helicopters. Any major exchanges may require the use of jack-up barges or semi-submersible crane vessels.

2.9.2.2 Onshore

Following commissioning, it is assumed that the onshore substation(s) will operate continuously (24 hours a day, 7 days a week) except during planned shutdowns for maintenance. The onshore substation(s) will be designed to remain *in situ* during the lifetime of the Project.

There will be a limited amount of traffic to and from the substation(s) for general O&M purposes. Unexpected faults may lead to increasing traffic volumes for short periods, depending on the type of fault. It is expected that the landfall substation will be unmanned with limited lighting requirements, whilst the grid substation will be staffed during normal working hours.

Activities on the cable route during the operational phase will include:

- Regular and ad-hoc visits: including activities for inspection/maintenance purposes;
- Non-routine activities: including activities to troubleshoot, repair of damage to cable or replacement of failed cable joint.

2.9.3 Decommissioning Phase

2.9.3.1 Offshore

The Energy Act (2004) and the Scotland Act (2016) contain statutory requirements in relation to the decommissioning of offshore renewable energy installations (OREI) and require the Project to provide a Decommissioning Programme, supported by appropriate financial security, prior to construction.

The Decommissioning Programme will follow the guidance found 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[5]. Decommissioning activities will comply with all relevant legislation at that time.

The Decommissioning Programme will be reviewed and updated in line with relevant legislation and guidance at the time. 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.

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[5] July 2022, Scottish Government, Decommissioning of Offshore Renewable Energy Installations in Scottish waters or in the Scottish part of the Renewable Energy Zone under The Energy Act 200, guidance Notes for industry (in Scotland)

Best practice will be followed when developing a Decommissioning Programme. It is expected that WTGs and any OSPs will be removed in a 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.

2.9.3.2 Onshore

A Decommissioning Plan is likely to be required as a planning condition to be approved by the regulator, prior to the onshore decommissioning works. Decommissioning best practice and legislation will be applied at that time. It is expected that decommissioning will follow a reverse order of the installation activities with some infrastructure potentially left *in situ*.

2.10 References

Scottish Government (2020) Sectoral marine plan for offshore wind energy. Available at: https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy/ [Accessed 17/06/2023]

3 Policy and Legislation

This chapter of the Scoping Report presents the key policy and legislation relevant to the Project.

3.1 United Nations Framework Convention on Climate Change

The Kyoto Protocol operationalises the United Nations Framework Convention on Climate Change by committing industrialised countries and economies in transition, to limit and reduce greenhouse gas emissions in accordance with agreed individual targets. Commitments associated with the Kyoto Protocol were transposed into United Kingdom (UK) law by the Climate Change Act 2008, which requires a net 80% carbon account reduction for the year 2050 compared to the 1990 baseline.

3.2 European Parliament and Council Directives

3.2.1 Brexit

Following the departure of the UK from the European Union (EU) on 31st January 2020, the UK has committed to implement international environmental obligations in accordance with the EU (Withdrawal) Act 2018 and to maintain previous environmental commitments and legislation. Existing EU renewable energy targets such as the EU Renewable Energy Directive 2009/28/EC and the recast Renewable Energy Directive 2018/2001/EU will therefore remain applicable to the UK. Policies and procedures under the Environmental Impact Assessment (EIA) Regulations remain unchanged.

The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 and The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 ('the Habitats Regulations') policies ensure the same protections and standards are continued as those in place prior to exiting the EU. There have been some changes in terminology allowing Scottish Ministers to exercise some functions that were previously carried out at an EU level.

Guidance is available via the Scottish Government website on the implications of Brexit on marine environmental legislation, including EIA and HRA.

3.2.2 European Union Renewable Energy Directive

The Revised Renewable Energy Directive (2018/2001/EU) entered into force in December 2018, as part of the Clean Energy for all Europeans package. This directive prioritises keeping the EU a global leader in renewables and contributes towards the Paris Agreement helping the EU to meet its emission reduction commitments. The Revised Renewable Energy Directive set the following targets:

- At least a 32% share of renewable energy consumption within the EU;
- Member States to establish their contribution to the renewable energy consumption target as part of integrated national energy and climate plans, pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council.

3.3 Scottish Policy and Legislation

3.3.1 The Scottish Energy Strategy: The Future of Energy in Scotland

The Scottish Energy Strategy: The Future of Energy in Scotland (Scottish Government, 2017) establishes the Scottish Government's 2050 vision for energy in Scotland. Of the six 2050 visions, one focuses on renewable and low carbon solutions. This vision specifically aims to champion and explore Scotland's huge renewable energy resources and its ability to support renewable energy targets.

3.3.2 Scotland's Emission Reduction Targets

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 aims to reduce greenhouse gas emissions through setting targets. The Act aims to ensure Scotland will contribute appropriately to the world's efforts to deliver on the Paris Agreement reached at the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change. Targets set include a reduction of all greenhouse gases to net-zero by 2045 at the latest, with interim targets for reductions of at least 75% by 2030, and 90% by 2040.

3.3.3 National Marine Plan

Scotland's National Marine Plan was published by the Scottish Government in March 2015 (Scottish Government, 2015), which sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 nautical miles (NM) from shore.

3.3.4 National Planning Framework 4

The National Planning Framework (NPF) 4 was established following approval from Scottish Ministers, replacing NPF3 on 13 February 2023 as the new national spatial strategy for reducing greenhouse gas emissions, adapt to future impacts of climate change and align with the delivery of United Nations (UN) Sustainable Development Goals (SDG) up to 2045. NPF4 also highlights the importance of North East Scotland as an area crucial to achieving a just transition to net zero. The development of Strategic Renewable Electricity Generation and Transmission Infrastructure (both onshore and offshore renewable electricity generation) are set to reach more than 50 megawatts (MW) capacity; these are classed as priority National Developments.

A further addition in NPF4 is National Planning Policy 11, that is concentrated on encouraging, promoting and facilitating the development of onshore and offshore sustainable renewable energy developments.

3.3.5 Scottish Planning Policy

The Scottish Planning Policy (SPP) was published on 23 June 2014, which sets out policy on how important land use matters should be addressed by the Scottish Government policy as well as outlining Governmental priorities for land-use planning (Scottish Government, 2014). The SPP 2014 complements other key Scottish Government documents including the NPF3 and Circulars. NPF4 will incorporate updated Scottish Planning Policy.

3.3.6 Sectoral Marine Plan for Offshore Wind Energy

The Sectoral Marine Plan aims to identify the most sustainable plan options 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 limit) (Scottish Government, 2020a).

The Sectoral Marine Plan seeks to contribute to the achievement of Scottish and UK energy and climate change policy objectives and targets, through the provision of a spatial strategy to inform the seabed leasing process for commercial offshore wind energy in Scottish waters, which:

- Minimises the potential adverse effects on other marine users, economic sectors and the environment resulting from further commercial-scale offshore wind development;
- Maximises 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 Sectoral Marine Plan identified sustainable options for the future development of commercial-scale offshore wind energy in Scotland, including the N4 Plan Option.

3.3.7 Offshore Wind Policy Statement

The Offshore Wind Policy Statement (Scottish Government, 2020b) aims to set out the Scottish Government's ambitions for the future of offshore wind policy in Scotland. The Policy Statement sets the context for The Marine Directorate's Sectoral Marine Plan for Offshore Wind.

3.4 Planning Legislation

As the Project is a generating station with a capacity of greater than 1 MW, it requires the following consents, licences, and permissions:

- A marine licence under the Marine (Scotland) Act 2010 as the Project is located entirely within 12 NM of the coast;
- A Section 36 consent under the Electricity Act 1989;
- A Section 37 consent under the Electricity Act 1989;
- Planning permission under the Town and Country Planning Act 1997 (as amended).

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

3.4.1 Marine Licence

Under the Marine (Scotland) Act 2010 which applies to Scottish Territorial Waters (between 0 and 12 NM from mean-high water springs (MHWS)), where the Project is planned to be 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.

3.4.2 Section 36 Consent

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) 1 MW within Scottish territorial waters.

As the Project meets this criteria, Section 36 consent will be required to permit the installation, operation, and maintenance of offshore electricity generation and associated transmission infrastructure.

3.4.3 Section 37 Consent

Section 37 of the Electricity Act applies to proposals which include overhead lines where consent must be obtained in order to install and maintain overhead lines. As the project currently includes the option for the installation of overhead lines, if this is taken forward Section 37 consent will be required.

3.4.4 Town and Country Planning Act 1997 (as amended)

Onshore aspects of the Project will require planning under The Town and Country Planning (Scotland) Act 1997 (as amended). The Act forms the basis of the Scottish planning system and determines the roles of the Scottish Ministers and local authorities with regard to development plans, management and enforcement.

Onshore consent will either require full planning permission, in accordance with the Town and Country Planning (Scotland) Act 1997 or deemed planning permission under S57 of the Town and Country Planning (Scotland) Act 1997 (as amended by the Growth and Infrastructure Act 2013) as part of a single application for consent under Section 36 of the Electricity Act 1989.

3.5 Environmental Impact Assessment Legislation

3.5.1 Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)

The Electricity Works (Environmental Impact Assessment (EIA)) (Scotland) Regulations 2017 identifies specific types and sizes of developments that are subject to EIA (as defined under Schedule 1 of the Regulations). As the Project is classified as "a generating station" it falls under Schedule 2 of the Regulations, meaning consideration of the likelihood of the Project to cause likely significant effects is required to determine if it will be subject to EIA. The Applicant accepts the Project could have likely significant effects on the environment, with an EIA required under the Regulations.

3.5.2 The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)

These EIA Regulations apply to applications for a marine licence out to the 12 NM limit. The Project falls under Schedule 2 of the Marine Works EIA 2017 (Scotland) Regulations, which apply to projects located out to the 12 NM limit. Schedule 2 states that for installations harnessing wind power for energy production (wind farms) EIA is required if:

- The development involves the installation of more than two wind turbine generators (WTG); or
- The hub height of any WTG or height of any other structure exceeds 15 m.

As this Project exceeds these requirements, an EIA will be required.

3.5.3 Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) are the relevant EIA regulations for the onshore components associated with the Project.

If the Applicant decides to submit a separate application for the onshore components of the Project, an EIA under these regulations will be required.

3.6 Pre-application Consultation

3.6.1 The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013

As the Project is located within Scottish Territorial Waters, the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 (hereafter referred to as the 'Pre-Application Consultation (PAC) Regulations') will apply. The PAC regulations are a statutory requirement to undertake public consultation in advance of relevant marine and planning licence applications being submitted. The PAC consultation will cover both the Offshore Development Area of Search and Onshore Development Area of Search.

3.7 The Habitats and Bird Directive and Associated Regulations

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

Following the United Kingdom's (UK) exit from the EU and the end of the transition period on the 31 December 2020, legislation has been passed to remove the domestic constitutional basis for EU law in the UK. Overall, the legislative changes do not result in material changes in how Habitat Regulation Appraisals (HRA) are undertaken in the UK.

The Conservation of Habitats and Species Regulations 2017 (as amended) and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) transpose the 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) into UK law. Most functions of these Regulations have now been transferred from the European Commission (EC) to the appropriate authorities in Scotland under the Conservation of Habitats and Species (Amendment) (Scotland) (EU Exit) Regulations 2019.

The 2019 amendments provide legal certainty, and minimise disruption immediately following EU exit, by maintaining, as closely as possible, that which was already in place. For example, references in an EU context throughout the legislation have been re-defined to a UK only context. Habitat and species protection and standards will be implemented in the same or an equivalent way, maintaining existing protections for habitats and species. The environmental assessment regimes that inform planning decisions, including HRA, continue to apply post-EU exit.

3.8 European Protected Species Licencing

In Scotland, the European Habitats Directive (European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) is implemented by the Habitats Regulations.

The Habitats Regulations provide protection of European Sites that are internationally important for threatened habitats and species and a legal framework for European Protected Species (EPS). Annex IV of the Habitats Directive lists certain species that are strictly protected across their entire European range, the animals from Annex IV whose natural range includes any area in Great Britain are listed in Schedule 2 of the Habitats Regulations in Scotland as EPS. Regulation 39 (1) of the Habitats Regulations defines what constitutes an offence, such as to recklessly capture, injure, kill or disturb EPS.

3.9 Decommissioning

Statutory requirements in relation to the decommissioning of offshore renewable energy installations and their associated electricity lines are contained within Sections 105 to 114 of the Energy Act 2004. Preparation and undertaking of a costed decommissioning programme may be required by the person(s) responsible for these installations for submission and approval by Scottish Ministers (Scottish Government, 2022b).

Responsibilities and powers associated with decommissioning for Offshore Renewable Energy Installations within Scottish Waters were transferred from the Secretary of State to Scottish Ministers in April 2017 (Section 62 of the Scotland Act 2016 transfers to Scottish Ministers powers under the Energy Act Part II chapter 2). Previously, the Department for Business, Energy and Industrial Strategy (BEIS) was responsible for the requirement of decommissioning programmes (BEIS, 2019). The Guidance Note for Decommissioning of Offshore Renewable Energy Installation in Scottish Waters or in the Scottish Part of the Renewable Energy Zone under the Energy Act 2004 (Scottish Government, 2022b) was finalised in August 2022.

Decommissioning requirements in Scotland is between the mean low water springs (MLWS) mark and the seaward limits of the territorial waters, including coastal water and the Scottish part of the Renewable Energy Zone (REZ). The intertidal zone is not covered within the Energy Act, however decommissioning of infrastructure within the intertidal zone should be carried out under any conditions attached to a Marine Licence (under the Marine Directorate Act 2010).

3.10 References

Department for Business, Energy & Industrial Strategy (BEIS) (2019), Decommissioning of Offshore Renewable Energy Installations Under the Energy Act 2004. Guidance notes for industry. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916912/decommisioning-offshore-renewable-energy-installations-energy-act-2004-guidance-industry__1_.pdf [Accessed 22/07/2023].

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Scottish Government (2022a), National Planning Framework 4. Available online at: National Planning Framework 4 (www.gov.scot) [Accessed 31/08/2023].

Scottish Government (2022b), Decommissioning of Offshore Renewable Energy Installations in Scottish waters or in the Scottish part of the Renewable Energy Zone under The Energy Act 2004: Guidance notes for industry (in Scotland). Available online at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2022/08/offshore-renewable-energy-decommissioning-guidance-scottish-waters/documents/decommissioning-offshore-renewable-energy-installations-scottish-waters-scottish-part-renewable-energy-zone-under-energy-act-2004-guidance-notes-industry-scotland/decommissioning-offshore-renewable-energy-installations-scottish-waters-scottish-part-renewable-energy-zone-under-energy-act-2004-guidance-notes-industry-scotland/govscot%3Adocument/decommissioning-offshore-renewable-energy-installations-scottish-waters-scottish-part-renewable-energy-zone-under-energy-act-2004-guidance-notes-industry-scotland.pdf [Accessed 22/08/2023].

4 Proposed Approach to EIA

4.1 Introduction

This chapter describes:

- The method to be applied to assess potential Project impacts (as defined in the Environmental Impact Assessment (EIA) Regulations);
- The approach to cumulative effects, inter-related effects and transboundary effects;
- The approach to certain technical topics;
- The approach to the Habitat Regulations Appraisal (HRA) and Marine Protected Area (MPA) assessment.

4.2 Baseline and Study Areas

Baseline conditions of areas covered by offshore and onshore Project components are determined through classification of the baseline environment. This includes identification and evaluation of the surrounding topic/receptor-specific study areas for the issues scoped into the Environmental Impact Assessment Report (EIAR), and is accomplished by the following steps:

- 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 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.

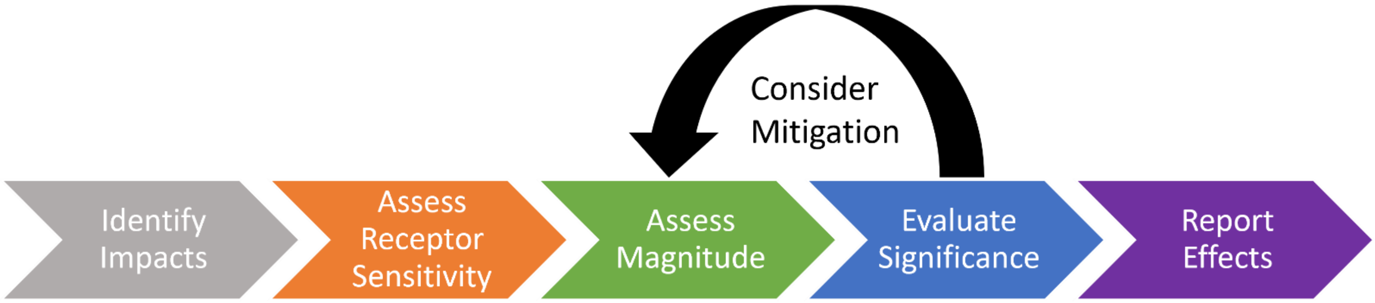
4.3 Assessment of Potential Impacts

This document identifies the potential environmental impacts associated with the Project and, by evaluating sensitivity of the relevant receptors and available evidence on potential effects, determines those proposed to be scoped into the EIA process, scoped out (with relevant justification), and/or those with the potential to be scoped out at a later date. This assessment also considers embedded mitigation measures that are built into the Project concept, either through design or implementation of industry good practice.

Using best practice EIA methodology, the EIAR will assess the level of significance of effect expected to result from the Project for those potential impacts scoped into the EIA[6]. The assessment will be based on potential magnitude of change to baseline conditions arising from the Project and relevant receptor sensitivity, as well as any embedded mitigation measures.

The Project may result in both adverse and beneficial environmental effects, these will be identified during the impact identification process and stated in the EIAR. The process of assessing significant effects is outlined in **Figure 4.3-1.**

Figure 4.3-1 Assessment of Effects Process



4.3.1 Receptor Sensitivity

A receptors adaptability, tolerance and recoverability from potential impacts is key in assessing its sensitivity to the impact under consideration. Sensitivity will be classed as 'negligible, low, medium or high'. Further guidance will be followed where value/importance is attributed to receptors through designation or protection under law, and where specific guidance exists.

4.3.2 Impact Magnitude

Impact magnitude considers extent, duration, frequency and reversibility of the impact. Categorisation of impact magnitude varies for specific pathways, receptors and technical assessments, but will broadly follow:

- High: significant changes or total alteration to key features/elements of the baseline conditions;
- Medium: partial change to key features/elements of the baseline conditions;
- Low: minor change to key features/elements of the baseline conditions;

[6] EIA guidance and methodologies will be appropriate for each topic area and detailed within the individual assessments.

- Negligible: any change would be negligible, unnoticeable, or there are no predicted changes.

Magnitude definitions will be defined for both adverse and beneficial effects.

4.3.3 Significance Evaluation

To ensure consistency in defining the significance of effect, a matrix approach is used, an example of which is illustrated in **Table 4.3-1** (note, significance of effect evaluation may differ between topic chapters). The significance of a beneficial or adverse effect is determined by the combined magnitude of impact and sensitivity of the receptor.

The levels of effect categories provide a threshold to determine whether or not significant effects may result from the Project. A level of effect of Moderate and Major is considered 'significant' in EIA terms, as highlighted in amber. **Table 4.3-2** provides a broad definition of effect significance categories.

Table 4.3-1 Significance of Effect Evaluation Matrix

		Magnitude of Impact			
Sensitivity of Receptor		**Negligible**	**Low**	**Medium**	**High**
	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

Table 4.3-2 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.

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

Where an aspect of the Project may result in a significant effect, mitigation measures (additional to any mitigation already embedded into the design), or further design changes will be incorporated into the EIAR assessment with the aim of avoiding such impacts entirely or reduce them to acceptable levels. At which point the impact will then be reassessed to determine the residual effect.

4.4 Approach to Cumulative Effects Assessment

A Cumulative Effects Assessment (CEA) is a legal requirement of the EIA Regulations where, rather than considering impacts from the Project alone, there must also be consideration of impacts arising cumulatively with other relevant plans, projects and activities (resulting in a cumulative effect). Each topic assessment within the EIAR will consider cumulative effects and provide a topic-specific CEA section if required.

The CEA will consider other developments and activities which are 'reasonably foreseeable', including:

- Existing developments already built or in construction, including, but not limited to:
  - Offshore and onshore wind farms and all associated infrastructure;
  - Cable installations;
  - Carbon capture and storage;
  - Oil and gas installations and pipelines;
  - Seismic surveys;
  - Coastal developments (i.e. ports and harbours);
  - Aggregate extraction areas;
  - Licensed dredging disposal sites.
- Permitted applications, but not yet implemented;
- Submitted applications awaiting determination with design information in the public domain (including other ScotWind offshore wind farms (OWFs) where applicable).

The most up-to date publicly available information in relation to all other relevant plans, projects and activities will be considered in the CEA. This includes the temporal and spatial extent of impacts which may be associated with particular phases of the Project, and which encompass 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 which may arise, as not all proposed projects or activities will take place or happen as currently described. This level of uncertainty is dependent upon which phase such projects or activities are currently at which will be considered when drawing conclusions on cumulative effects and completing the CEA.

The potential in-combination effects on European designated sites will be considered through the HRA process and will be assessed using the same approach as the CEA.

4.5 Inter-related Effects and Transboundary Effects

The EIAR will consider inter-related effects. This includes the potential effects that occur throughout more than one phase of the project lifetime (during construction, operation and decommissioning) upon a receptor, as well as effects that overlap spatially and/or temporally. For example, the effect of subsea noise upon marine mammals may be greater when multiple sources of noise interact to produce a different or greater effect upon that receptor than when single sources are considered alone. This will ensure that the Project as a whole is appropriately considered within the EIAR.

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). The EIA Directive, which has been transposed into Scottish law through Domestic legislation prior to the UK's withdrawal from the EU, requires the assessment of transboundary effects. Where significant transboundary effects are potentially identified, Scottish Ministers must provide information about the development to the government of the affected country under Regulations 41 and 42 of the EIA Regulations, inviting them to participate in consultation procedures. This report will identify relevant transboundary impacts to be considered within the EIAR or state if no transboundary impacts are anticipated.

4.6 Additional EIA Matters

4.6.1 Approach to Major Accidents and Disasters

The EIA Regulations require that any direct or indirect effects relating to Climate, and any effects arising from the vulnerability of the Project to Major Accidents and Disasters, be considered within the EIA assessment. With regards to Major Accidents and Disasters, the EIA Regulations state that the EIA assessment should include:

> "*A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU law such as any law that implemented Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or UK environmental assessments may be used for this purpose provided that the requirements of any law that implemented*

this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies."

Whilst a standalone chapter on the topic of major accidents and disasters is not proposed, the relevant aspects of the EIAR will consider the risk of environmental disasters to the Project and any associated control measures to prevent or mitigate any potential accidents or events. The Project will be designed to operate within its environment, including during extreme environmental conditions such as flooding or storm events. As the Project will be designed to withstand the environment in which is it located, the likelihood of a natural disaster damaging infrastructure and leading to consequential significant environmental effects is negligible.

4.6.2 Approach to HRA

The Council Directive 92/43/EEC ('the Habitats Directive') on the Conservation of Natural Habitats and of Wild Fauna and Flora was adopted in 1992 and provides for the conservation and restoration of natural habitats and wild species listed on the Annexes at a favourable conservation status, including in offshore areas. The European Directive (2009/147/EC) on the conservation of wild birds applies to the conservation of all species of wild birds where protection occurs through the identification and designation of Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), which are collectively known as European sites. The Directives were transposed into Scottish Law by various regulations and are known collectively as the Habitats Regulations. Those of relevance to the 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.

Under the Habitats Regulations, 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'; this process is known as HRA. The HRA process comprises 4 stages, which includes screening, Appropriate Assessment (AA), Assessment of Alternative Solutions and Imperative Reasons of Overriding Public Interest (IROPI) and Compensatory Measures. NatureScot must be consulted as part of any AA process, and plans may only be taken forward if the AA concludes there would be no adverse effect on the integrity of any European site.

The HRA Screening Report will be undertaken separately to this Scoping Report and is planned to be issued in Q4 2023.

4.6.3 Approach to NC-MPA Assessment

As noted by NatureScot (2023), Nature Conservation Marine Protected Areas (NC-MPAs) are designated under Section 126 (s.126) of the Marine and Coastal Access Act (MCAA) 2009 where The Marine Directorate is the regulatory authority (acting on behalf of Scottish Ministers – as per S.20-64, s.82-86, and s.91 of the Marine (Scotland) Act 2010). The MCAA 2009 (the Marine (Scotland) Act 2010) and assessment process is outlined below.

The NC-MPA Risk Assessment process considers the potential risk (the 'Likely Significant Risk' (LSR)) for adverse effects associated with a project which may affect NC-MPA protected features, and the methodology is based on guidance as provided by the MMO for the completion of MCZ Assessments within English waters (MMO, 2013). This methodology can also be applied to NC-MPAs.

This process has three sequential stages:

- Screening;
- Stage 1 Assessment;
- Stage 2 Assessment.

Screening

A risk-based approach can be applied when determining the 'connectivity' of an activity. All marine licence applications are screened to determine whether s.126 of MCAA 2009 should apply to the application, where it will apply if it is determined through the process of screening if:

- The licensable activity is taking place within or near an area being put forward or already designated as an NC-MPA;
- The activity is capable of affecting (other than insignificantly) either:
  - The protected features of an NC-MPA; or
  - Any ecological or geomorphological process on which the conservation of any protected feature of an NC-MPA is (wholly or in part) dependent.

Where it is has been determined through screening, that s.126 should apply, further assessments are required to determine which subsection of s.126 should apply; and this will be done in two stages.

Stage 1 Assessment

Stage 1 Assessment considers the extent of the potential impact of the plan or project on the NC-MPA in more detail. Stage 1 looks at the risk (LSR) of activities associated with the plan or project and whether they may cause an effect on:

- The protected features of an NC-MPA; or
- Any ecological or geomorphological process on which any protected feature is dependant.

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

Stage 2 Assessment

Stage 2 Assessment considers the socioeconomic impact of the plan or project together with the risk of environmental damage. 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 NC-MPA features?"*.

The MPA Screening Report will be undertaken separately to this Scoping Report and is planned to be issued in Q4 2023.

5 Consultation

5.1 Consultation Overview

Effective stakeholder consultation is an important pillar of the development of any project, from inception and throughout the project lifecycle. Consultation allows for regulator, stakeholder and public feedback to be incorporated into the project decision-making process and for the Applicant to communicate project milestones. The Applicant will adhere to all statutory consultation requirements, including The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013.

This chapter of the Scoping Report details consultation which has occurred to date and an overview of future consultation activities planned once this Scoping Report has been submitted.

5.2 Stakeholder Identification

Stakeholder identification was an essential step to ensuring the Project is responsive to the needs of the community and the environment and is following the latest guidance from Statutory Nature Conservation Body's (SNCB's) and other government and non-government bodies, particularly through engagement via the Scoping Workshops (see section 5.3.1). Identified stakeholders include, but are not limited to:

- NatureScot;
- Marine Scotland Licensing Operations Team (MS-LOT); now referred to as the Marine Directorate Licensing Operations Team (MD-LOT) as of June 2023;
- Marine Directorate Science;
- Scottish Environment Protection Agency (SEPA);
- Historic Environment Scotland (HES);
- Comhairle nan Eilean Siar;
- Hebridean Whale and Dolphin Trust;
- Outer Hebrides Fisheries Trust;
- Fisheries Management Scotland;
- Western Isles Salmon Board;
- Royal Society for the Protection of Birds (RSPB) Scotland.

5.3 Consultation to date

5.3.1 Scoping Workshops

Following MD-LOT guidance, the Applicant held formal scoping workshops in May and June 2023 to inform this Scoping Report. A total of five Scoping Workshops were held covering 17 technical topics. Once stakeholders had been identified and invited, a briefing pack for each technical topic was circulated in advance of each workshop summarising:

- Proposed study area(s);
- Baseline data sources;
- Baseline environment;
- Impacts proposed to be scoped in and out of the assessment;
- Proposed mitigation measures;
- Proposed Environmental Impact Assessment (EIA) methods and further site specific surveys (if applicable).

Alongside the topic specific briefing pack, a project overview briefing pack was also circulated. Once the workshops were complete, meeting minutes were circulated to all attendees for agreement.

Table 5.3-1 summarises the Scoping Workshops including topics, stakeholders and outcomes.

Table 5.3-1 Scoping Workshop Summary

Workshop (date)	Technical Topics	Stakeholder Organisations	Key Comments	Status
1 (31st May 2023)	Physical and Coastal Processes Marine Sediment and Water Quality Benthic and Intertidal Ecology	***Attendees:*** Marine Directorate Science MD-LOT NatureScot ***Invited but unavailable:*** SEPA	NatureScot noted the Northwest Coast of Lewis Geological Conservation Review (GCR) site was not included within the briefing pack. NatureScot noted briefing pack mentioned other priority marine features (PMFs) were located nearby but not added to the mapping provided.	Consultee shared information on the Northwest Coast of Lewis GCR site, which is now included in relevant topics. Additional PMFs added to the scoping report of the relevant topics.
2 (23rd May 2023)	Marine Mammals and Other Megafauna Fish and Shellfish Ecology Underwater Noise	***Attendees:*** Marine Directorate Science MD-LOT NatureScot Hebridean Whale and Dolphin Trust Outer Hebrides Fisheries Trust ***Invited but unavailable:*** Fisheries Management Scotland Western Isles Salmon Board	NatureScot noted clarification needed whether direct effects from noise cause disturbance and/or auditory injury. Outer Hebrides Fisheries Trust: Spawning of Atlantic Salmon should be November/December time. Dates stated in the briefing pack are for when adults return. NatureScot noted that ghost fishing had been scoped into the Fish and Shellfish ecology assessment yet scoped out of Marine Mammals. NatureScot are due to provide advice on diadromous fish related to the Langavat SAC and North Harris SAC, and how they should be considered within the (Habitat Regulations Appraisal (HRA) and EIA.	Clarity provided within relevant scoping chapter on whether direct noise effects cause disturbance or injury. Scoping Chapter corrected to state Salmon in Langavat Special Area of Conservation (SAC) spawn November/December. Correction made; ghost fishing is scoped out of both Fish and Shellfish Ecology (Chapter 6.5: Fish and Shellfish Ecology) and Marine Mammals and Other Megafauna (Chapter 6.6: Marine Mammals and Other Megafauna). The Langavat SAC and North Harris SAC are considered within the Fish and Shellfish Ecology chapter (Chapter 6.5: Fish and Shellfish Ecology). Specific advice from NatureScot was not available at the time of writing.

Workshop (date)	Technical Topics	Stakeholder Organisations	Key Comments	Status
3 (13th June 2023)	Marine and Nearshore Ornithology Onshore and Intertidal Ornithology	***Attendees:*** MD-LOT NatureScot Comhairle nan Eilean Siar ***Invited but unavailable:*** RSPB Scotland NatureScot topic expert for Ornithology	Note from several consultees that the Zone of Theoretical Visibility (ZTV) was large and difficult to load. Recommendation from NatureScot to review case number 21-00646 as a potential data source for Marine and Nearshore Ornithology. Feedback received from Marine Directorate to ensure it is clear what mitigation is embedded at this stage. Marine Directorate noted there is an ongoing ScotMER project that should be used when available.	ZTV to be provided in more legible format. Data source added following review of case number 21-00646 (which related to the Spaceport 1 Environmental Statement). Embedded mitigation specified within individual chapters. ScotMER project to be referred back to once available and where relevant.
4 (13th June 2023)	Landscape and Visual Impact Assessment (LVIA) Onshore Archaeology and Cultural Heritage Marine Archaeology and Cultural Heritage Seascape, Landscape and Visual Impact Assessment (SLVIA)	***Attendees:*** MD-LOT HES NatureScot Comhairle nan Eilean Siar	Comhairle nan Eilean Siar recommended to use HES Managing Change Series document on setting, rather than UK Gov guidance, in Marine Archaeology assessment. Comhairle nan Eilean Siar: Consistency in terms of setting and clarity on significant non-designated sites to be included. Noted once again from several consultees that the ZTV was difficult to read. Comhairle nan Eilean Siar: If above-ground infrastructure should be required for the project, clarity should be provided on	Guidance document updated to 'Managing Change in the Historic Environment Guidance Series: Setting (Historic Environment Scotland, 2020b (revised))' within scoping chapter. Both designated and significant non-designated sites included within Onshore Archaeology and Cultural Heritage assessment. ZTV to be provided in more legible A3 format Above ground infrastructure considered and scoped into the LVIA assessment.

Workshop (date)	Technical Topics	Stakeholder Organisations	Key Comments	Status
			whether this will be scoped into the assessment for LVIA. Clarity required regarding definitions of settings within the Onshore Archaeology chapter based on recommendations from HES and NatureScot. HES noted to expand on proactive management measures as mitigation within the Scoping Report.	More nuanced consideration of setting provided within the relevant topic. Onshore proactive management removed from offshore chapter for Archaeology and Cultural Heritage and further detail added to the offshore mitigation.
5 (15th May 2023)	Onshore Ecology Hydrology and Hydrogeology Peat, Geology, Soils and Contaminated Land	***Attendees:*** NatureScot Comhairle nan Eilean Siar ***Invited but unavailable:*** SEPA	Engagement with consultees to continue, including providing updates regarding potential changes to project design, and slides and meeting minutes from the workshops to be provided to all attendees. Comhairle nan Eilean Siar to provide list of compiled renewables projects, quarry consents, overhead lines to aid cumulative assessment.	No changes required.

5.3.2 Post-workshop Feedback

Further feedback was received post-workshops, which is summarised along with how it has been considered below:

- NatureScot Scoping Workshop 3 – Marine and Nearshore Ornithology further feedback:
  - The mean max +1standard deviation as defined in Woodward et al. (2019) should be used to determine foraging ranges;
  - Clarified that the requirement for population viability analysis (PVA) should be triggered where a change in baseline mortality exceeds 0.02 percentage points and not as is detailed in the briefing note "0.02% change". This small change in terminology is significant in the correct application of our guidance;
  - Advised that kittiwake is considered sensitive to displacement and should be assessed as such;
  - Further details of planned mitigations should be provided, for example the development and adherence to a Project Environmental Monitoring Plan (PEMP), minimum blade tip clearance above sea level, vessel management plans, etc;
  - Specific advice relating to stochastic collision risk modeling (sCRM) parameters were provided in relation to fulmar, cormorant and shag;
  - Provided specific recommendations related to the use of the SeabORD and the use of displacement matrices;
  - Confirmed there are no changes or additions to the Marine Protected Area (MPA) network for bird species at present;
  - Confirmed the avoidance rates presented are appropriate, however, as above, they may change imminently due to the recent publication of the Ozanlav-Harris (2023) report. We are developing our stance on this report and may update our advice regarding avoidance rates imminently.
- Consideration of feedback:
  - Technical feedback relating to CRM, displacement matrices and PVA have been amended within the assessment methodology section of Chapter 6.7: Marine and Nearshore Ornithology;
  - Planned mitigation measures relating to this topic have also been provided within the chapter.
- NatureScot Scoping Workshop 3 – Onshore and Intertidal Ornithology further feedback:
  - Noted 2023 is a national hen harrier survey year, which includes the Isle of Lewis;
  - Noted this spring has been particularly dry which may affect divers breeding attempts;
  - Clarified the breeding season for moorland birds tends to begin in April with some species not fledging until August. Moorland Breeding Bird surveys need to account for the entire season, but can be achieved in three visits;
  - Confirmed intertidal bird surveys are unlikely to be necessary;

- Noted raptor roost surveys and wintering Greenland white-fronted goose surveys will be required;
- Provided the following further data sources for inclusion within the Scoping Report chapter:
  - Lewis Tidal Array project data;
  - Outer Hebrides Bird Reports;
  - Lewis Greenland White-fronted goose wintering report;
  - NatureScot's terrestrial Natural Heritage Zone level spreadsheets (Natural Heritage Zone 3 & 14 specifically) which provide cumulative, primarily collision, risks across a range of relevant species;
  - Bird Track data;
- Noted additional cumulative impacts from terrestrial wind farms need to be considered, especially for Greenland White-fronted Goose;
- Noted that if overhead lines became the preferred option, it would significantly change the survey requirements;
- If the cable is undergrounded, pre-construction surveys to identify any bird distributional change since the original survey will be essential. NatureScot strongly recommend that the route avoids running through either Ness & Barvas Special Protected Area (SPA) or Lewis Peatlands SPAs as much as possible.

- Consideration of feedback:
  - Survey type and methodology feedback has been reflected within the project specific surveys section of Chapter 7.3: Onshore and Intertidal Ornithology;
  - Additional data sources have been used to inform the baseline environment section and will be considered whilst developing the Environmental Impact Assessment Report (EIAR) chapter;
  - Should overhead lines become a preferred project design choice, survey designs will be revisited.
- SEPA Scoping Workshop 5 – Peat Geology, Soils and Contaminated Land, Hydrology and Hydrogeology further feedback:
  - SEPA provided a copy of their interim EIA guidance following the release of National Planning Framework 4, highlighting the following information:
    - In relation to peat, it must be reused or reinstated and the outline Peat Management Plan and Habitat Management Plan will be required with sufficient detail to identify sites for reuse and reinstatement in support of any application. Also suggested discussing these measures with Scottish and Southern Electricity Networks (SSEN);
    - In relation to engineering activities which may have adverse effects on the water environment, if a minimum buffer of 50m around each loch or watercourse cannot be achieved each breach must be numbered on a plan with an associated photograph of the

location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works;
- In relation to disruption to groundwater dependent terrestrial ecosystems and existing groundwater abstractions, a National Vegetation Classification survey should be submitted.

- Consideration of feedback:
  - The Applicant will continue consulting with SSEN on how potential cumulative project impacts to peat can be mitigated;
  - Feedback on engineering activities potential effects on watercourses is noted and will be considered as the project design is refined;
  - A National Vegetation Classification survey will be undertaken to inform the EIAR.
- SEPA Scoping Workshop 1 – Marine Sediment and Water Quality further feedback:
  - SEPA directed the Applicant to SEPA's standing advice on marine consultations.
- Consideration of feedback:
  - SEPA's standing advice has been considered in developing Chapter 6.3: Marine Sediment and Water Quality.

5.3.3 Additional Consultation

The Applicant has held regular meetings with MD-LOT and NatureScot since Project inception and plans on continuing these at regular intervals throughout the EIA process.

5.3.4 Community Consultation

In May 2022 the Applicant undertook a series of three introductory public information events, in order to introduce the Project to the local community. These events were generally well received given the very early stage of the Project, although it became apparent that there was limited knowledge and understanding of the ScotWind Leasing Round and the Sectoral Marine Plan by the general public.

On 20th and 21st June 2023 the Applicant held a second round of introductory public information events at four locations, Stornoway, Barvas, Carloway and Great Bernera, with 115 members of the community attending. These information events were designed to provide the community with an update of activities prior to this Scoping Report being published. Feedback from the public information events is summarised on the Applicant's website[7], with key areas for further consideration being identified as; benefits to the local

[7] https://northlandpowerscotwind.co.uk/public-information-events-update/

communities; visual impacts; responsible environmental management and delivering low cost electricity. Alongside the public information events the first of the community newsletters was published, which is also available on the Project Website.

Further events, including consultations, are planned in 2024 as key Project milestones are reached. The most current and real-time information can be accessed and tracked on the Project Website[8].

5.4 Future Consultation

5.4.1 Pre-Application Consultation

The Applicant is committed to meeting all statutory consultation requirements as applicable under the consenting regime for the Project. This will include meeting the Pre-Application Consultation (PAC) requirements to undertake public consultation prior to the submission of licence application(s).

5.4.2 Post-Application Consultation

Beyond application submission, engagement will continue to address feedback received during the determination stage and during the discharge of consent conditions ahead of construction. The Applicant will hold additional consultation and public events as the Project progresses, including other means of communication to reach a wider audience, such as press releases, printed material (e.g. newsletters, fact sheets, display boards) and through the Project website.

[8] https://northlandpowerscotwind.co.uk/spiorad-na-mara/news/

6 Offshore Chapters

6.1 Physical and Coastal Processes

6.1.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Physical and Coastal Processes within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

Physical and coastal processes include water levels, currents, waves, underlying geology and surficial sediment distribution and transport, and geomorphology of the seabed and coast. These are discussed within the baseline section 6.1.3. The Physical and Coastal Processes topic specific receptors are discussed within this section; however, it must be noted that the physical processes listed above are not, themselves, receptors, but possible pathways that result in a receptor effect. Potential changes as a result of the Project that may affect the pathways will be considered by other topic receptor impact assessments.

6.1.2 Study Area

The Physical and Coastal Processes Chapter will assess receptors identified to occur below Mean High Water Springs (MHWS) and the topic-specific study area will vary dependent on the nature and scale of each receptor or pathway that could results in a receptor effect.

The Array Area and Offshore Cable Corridor Area of Search will be considered as the primary (or near-field) footprint for potential direct physical impacts on Physical and Coastal Processes receptors and forms the Physical and Coastal Processes Study Area. 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 with input from stakeholders for the EIA. Together, the primary and secondary zones will form the Wider Physical and Coastal Processes Study Area (hereafter the 'Wider Study Area').

6.1.3 Baseline Environment

6.1.3.1 Data Sources

The data sources that have been used to inform this Physical and Coastal Processes section of the Scoping Report are presented within **Table 6.1-1**. These data sources will also be used to inform the main

Environmental Impact Assessment (EIA) process, alongside any additional site-specific data that are collected for the Project (see section 6.1.6.1 for details of proposed surveys).

Table 6.1-1 Summary of key publicly available datasets for Physical and Coastal Processes.

Source	Spatial Coverage (over Physical and Coastal Processes Study Area)	Year	Summary
ABPmer UK Renewables Atlas	Full; UK	2008	Mean Spring Tidal Range, tidal currents
ABPmer – SEASTATES Wave Hindcast Model	Full; UK	2018	Significant wave height and direction
British Geological Survey (BGS) Geology of Britain viewer and Offshore GeoIndex Viewer	Full; UK	2014	Solid Geology, Quaternary thickness, Seabed Sediment
Cefas Wavenet site	UK	Variable	Significant waves height and maximum wave height
Cefas Suspended Sediment Climatologies around the UK	Regional	2016	Regional variations in suspended sediment concentrations
Climate Econometrics	Full	2016	Rise in Mean Sea Level
Dynamic Coast (Coastal Cell 9a)	Scotland	2021; 2017	Coastal erosion and sea level rise monitoring and predictions
EMODnet	Full; Europe	2019 2020	European Nature Information System (EUNIS) Seabed Classification Bathymetry 4" resolution (approx. 60 metres (m) x 120 m)
General Bathymetric Chart of the Oceans (GEBCO)	Full	2022	Bathymetry 100 m resolution
IHE Delft - Institute for Water Education, Coastal Futures (CoFu).	Full	2018	Rise in Extreme Sea Level
Lewis Tidal Array	Partial, Nearshore	2012	Data acquired for the Lewis Tidal Array, including technical appendices of site specific metocean data and walkover surveys
Marine Directorate Data Portal	Scotland	2023	Bathymetry
National Tidal and Sea Level Facility	National only	2023	Tides and sea level across the UK, closest location Stornoway
Strategic Environmental Assessment Data Portal and Reports	UK	Variable	Topic specific reports on SEA7 and portal for data access

Source	Spatial Coverage (over Physical and Coastal Processes Study Area)	Year	Summary
United Kingdom Hydrographic Office (UKHO)	Partial; UK	2010	Bathymetry 3 m resolution

6.1.3.2 Overview of Baseline Environment

An initial desk-based review of literature and available data sources (see **Table 6.1-1**) has been undertaken to support this Scoping Report. The findings are presented below to provide an understanding of the baseline environment for physical and coastal processes, and to inform the Scoping process.

6.1.3.3 Bathymetry

Figure 6.1-1 provides an overview of regional bathymetry. Water depths off the north coast of Scotland, and to the west of the Hebrides, are typically between 100 m to 150 m, (Baxter *et al.*, 2011) deepening to the northwest, with a gentle averaged gradient <1°. Within the Array Area, the current publicly available bathymetry data indicate water depths generally range from 37.1 m to 67.2 m, with the deepest depths of 72.2 m in the southwest corner. Gradients are generally gentle <2°, but localised slopes up to 8° are present, associated with rock outcrops. Rock outcrops are seen along the coast, extending into the southeast edge of the Array Area, as shown in **Figure 6.1-2**. There are limited publicly available, high resolution, swath data for the Physical and Coastal Processes Study Area and, therefore, the exact detail of the seabed morphology is difficult to establish at this time.

6.1.3.4 Geology

The Isle of Lewis, and the area covered by the Array Area, lies on the Outer Hebrides Platform, which is bounded to the east by the Outer Hebrides Fault Zone (OHFZ), and demarks the eastern coastline of the Outer Hebrides (**Figure 6.1-3**). The northwest coast of the Isle of Lewis, and the immediate offshore area, is comprised of Precambrian (Archaen to Proterozoic) quartzo-feldspathic gneisses (Campbell *et al.*, 2021). Further offshore, yet still within the Outer Hebrides Platform and the Array Area, is the Flannan Trough, composed of Permian to Triassic sediments, primarily of the New Red Sandstone Group (Fyfe *et al.*, 2021), and Palaeocene flood basalts (Fettes *et al.*, 1992) (**Figure 6.1-3**). The majority of the Array Area is founded on these Palaeocene flood basalts, with the Offshore Cable Corridor Area of Search being dominated by the Precambrian gneisses inshore.

The area 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 ka 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 in the northwest sector between ~28–25 ka BP, indicated by ice-retreat features and ice-marginal sediments deposited close to the present-day coastline (**Figure 6.1-3**) (Bradwell *et al.*, 2021).

Figure 6.1-1 Overview of regional bathymetry. (Source: EMODNET, 2020)

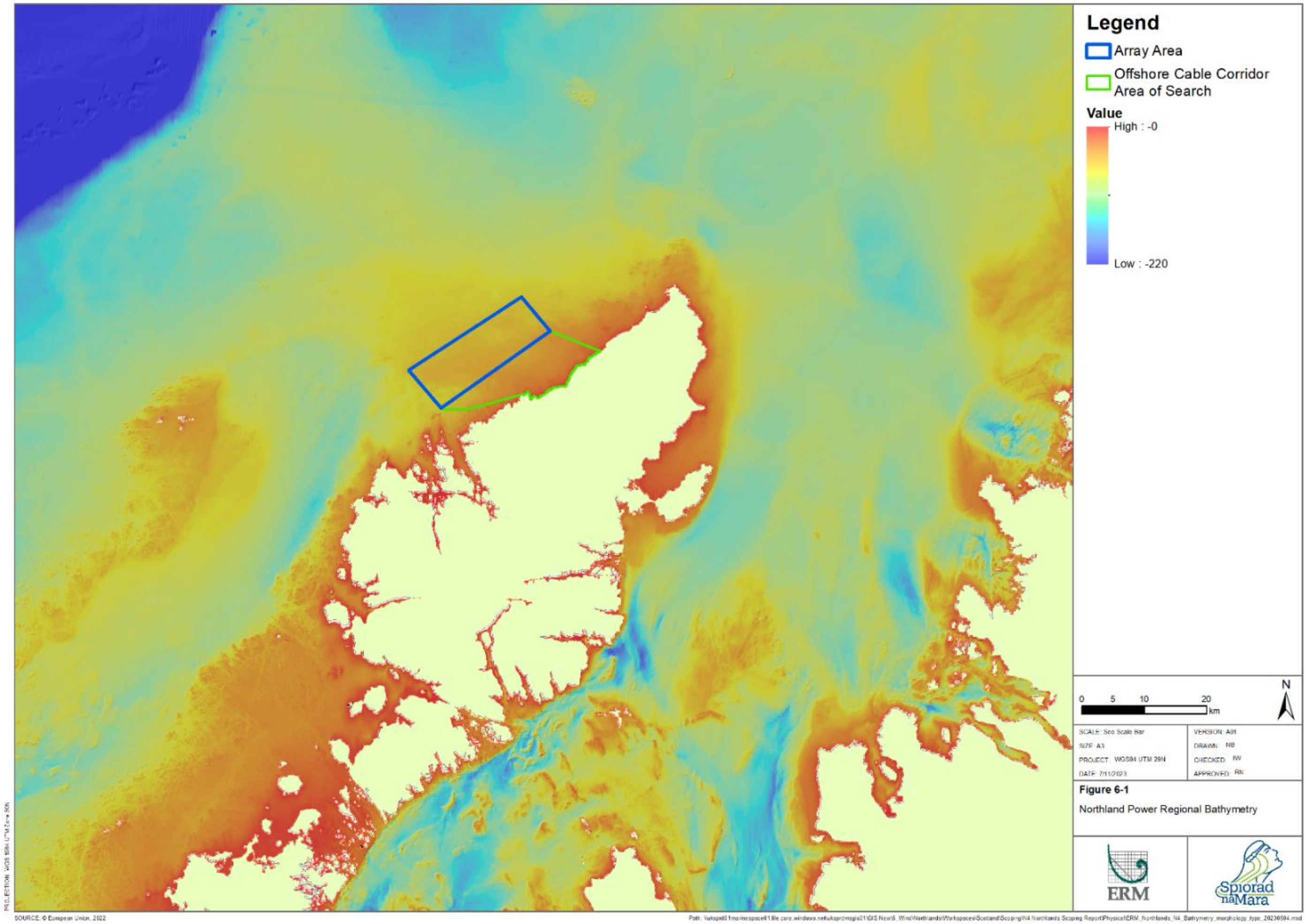


Figure 6.1-2 Bathymetry and seabed imagery showing outcrops. (Source: Marine Directorate, 2023; EMODNET, 2020)

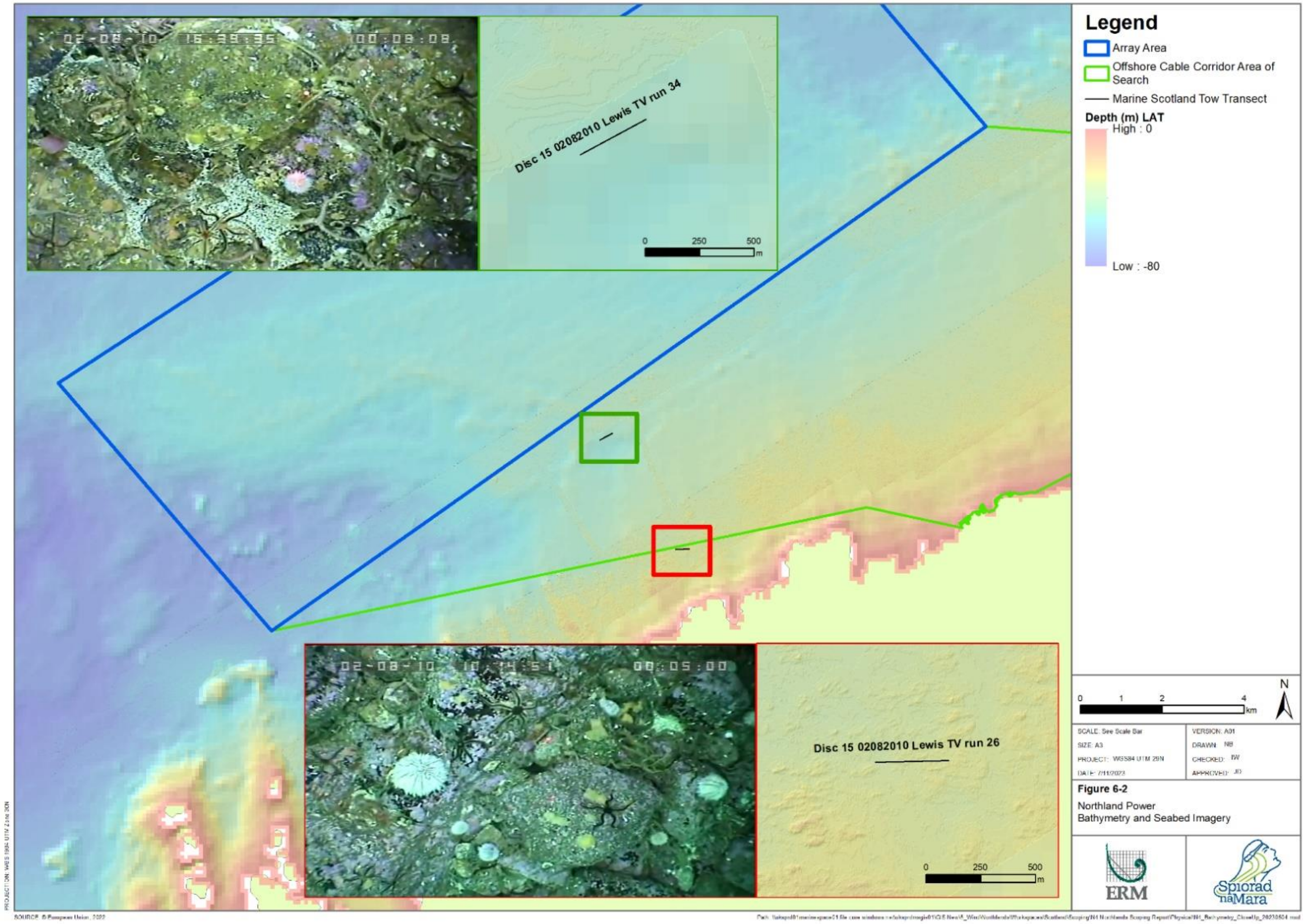
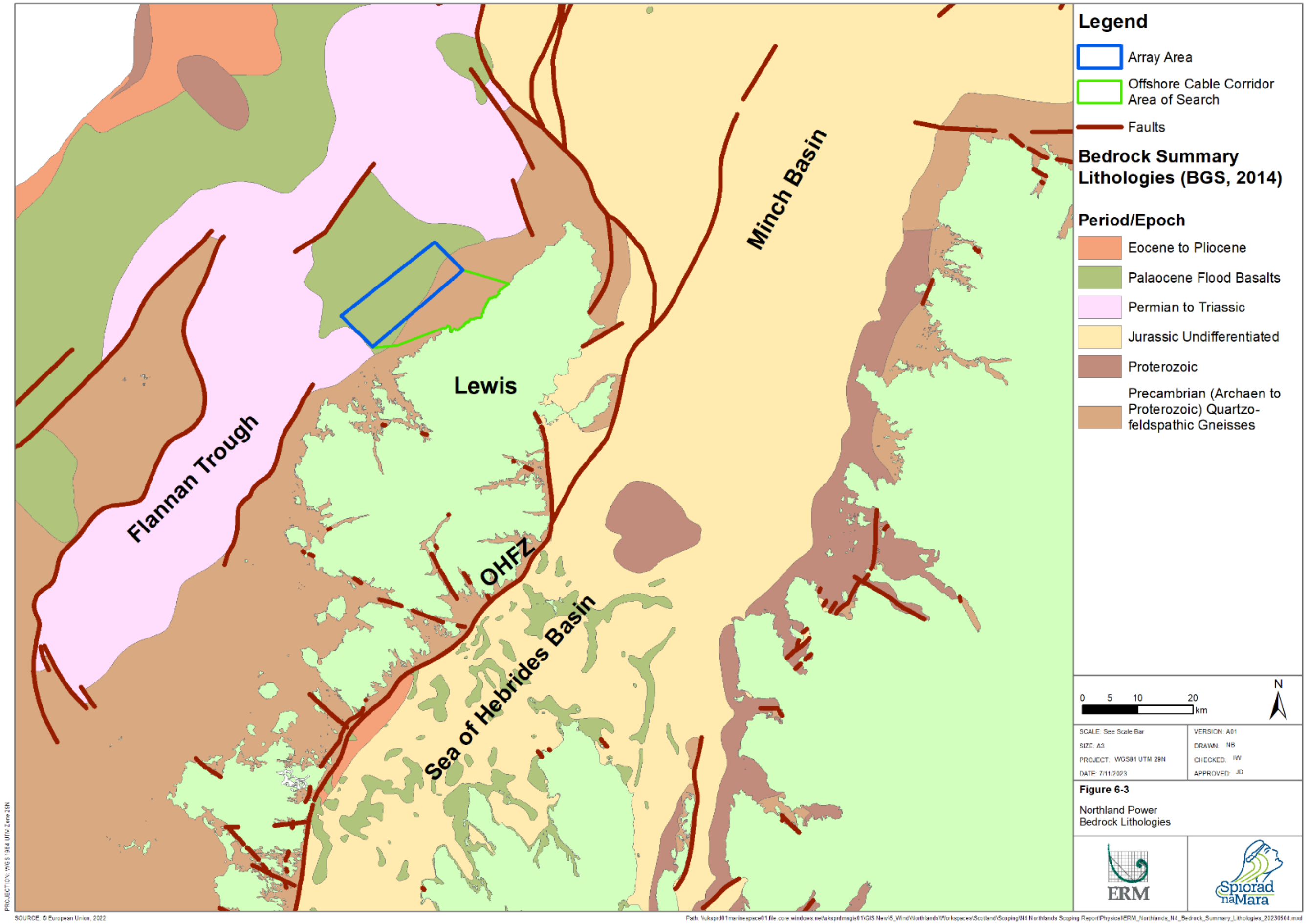


Figure 6.1-3 Overview of regional solid geology. (Source: BGS, 2014; Fyfe et al., 2021)



Northwest of the Isle of Lewis was the first substantial area of present-day Scotland to deglaciate, at a time of reduced sea-level (c. 26 ka BP). An independent Isle of Lewis ice cap became established, albeit fluctuating in size, ~19.5-18.5 ka BP. The final glacier retreat and disappearance on the Isle of Lewis occurred by ~16-15 ka BP (Bradwell *et al*., 2021).

The Late Quaternary sediments deposited by these glacial and pro-glacial systems, and which overlie the metamorphic basement, comprise either acoustically structureless glacial diamicton, or strongly layered glaciomarine sediments (Bradwell and Stoker, 2015). The Quaternary cover present on the continental shelf around the Isle of Lewis is described by the BGS simply as "*undifferentiated Quaternary deposits*" (BGS, 2015; BGS, 2020). This unit encompasses both glacial, glaciomarine, and nonglacial marine Pleistocene sediments, and exclusively nonglacial, marine Holocene sediments. Bradwell *et al*. (2019) separated these two main components; mapping the glaciomarine sediments deposited during ice-stream retreat (including moraines), and Holocene sediment deposited during nonglacial marine conditions as 'deglacial' sediments (**Figure 6.1-4**).

As shown in **Figure 6.1-5**, bedrock lies close to, or at, the seabed, with <5 m Quaternary cover across most of the Array Area and Offshore Cable Corridor Area of Search. A discrete increase of the Quaternary thickness (>50 m) is seen in the centre of the Array Area (**Figure 6.1-5**, between Fixes 5 – 8 on Line 5). The associated seismic profile, presented in **Figure 6.1-6**, shows a depression with well layered infill deposits. This feature is approximately 62-65 m deep and extends approximately 3.5 km along the single line of publicly available seismic data (BGS, 2015; BGS, 2020). No further data are currently available, so the extent of this thick sedimentary infill, to the southwest and northeast, is unknown. The well layered structure and location suggests the infill comprises Pleistocene glaciomarine sediments (Bradwell and Stoker, 2015; Bradwell *et al*., 2019).

Figure 6.1-4 Morphological map of glacial landforms and simplified geological substrate offshore NW Scotland (From: Bradwell et al., 2021)

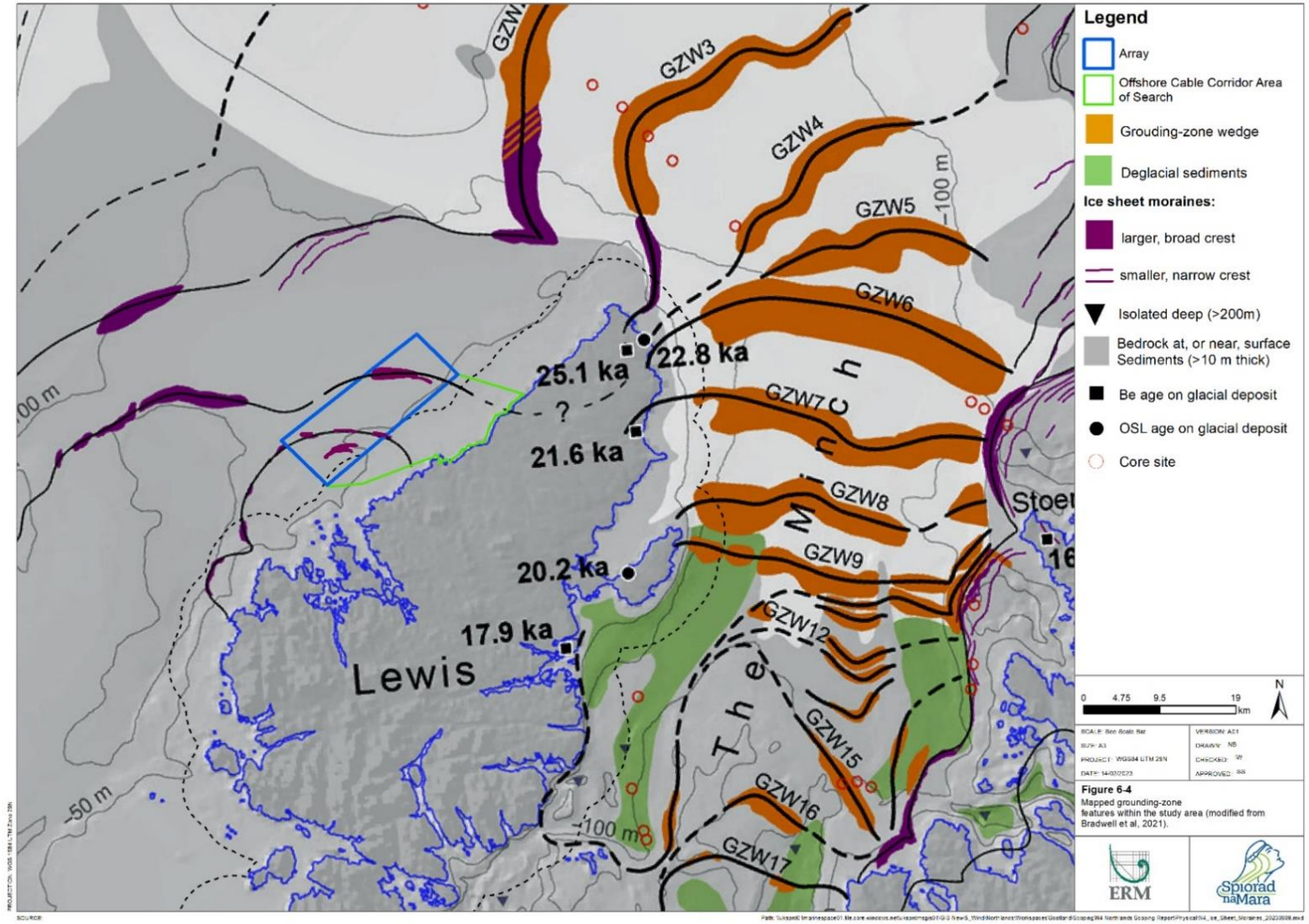


Figure 6.1-5 Quaternary thickness showing seismic profile location (Source: BGS, 2014)

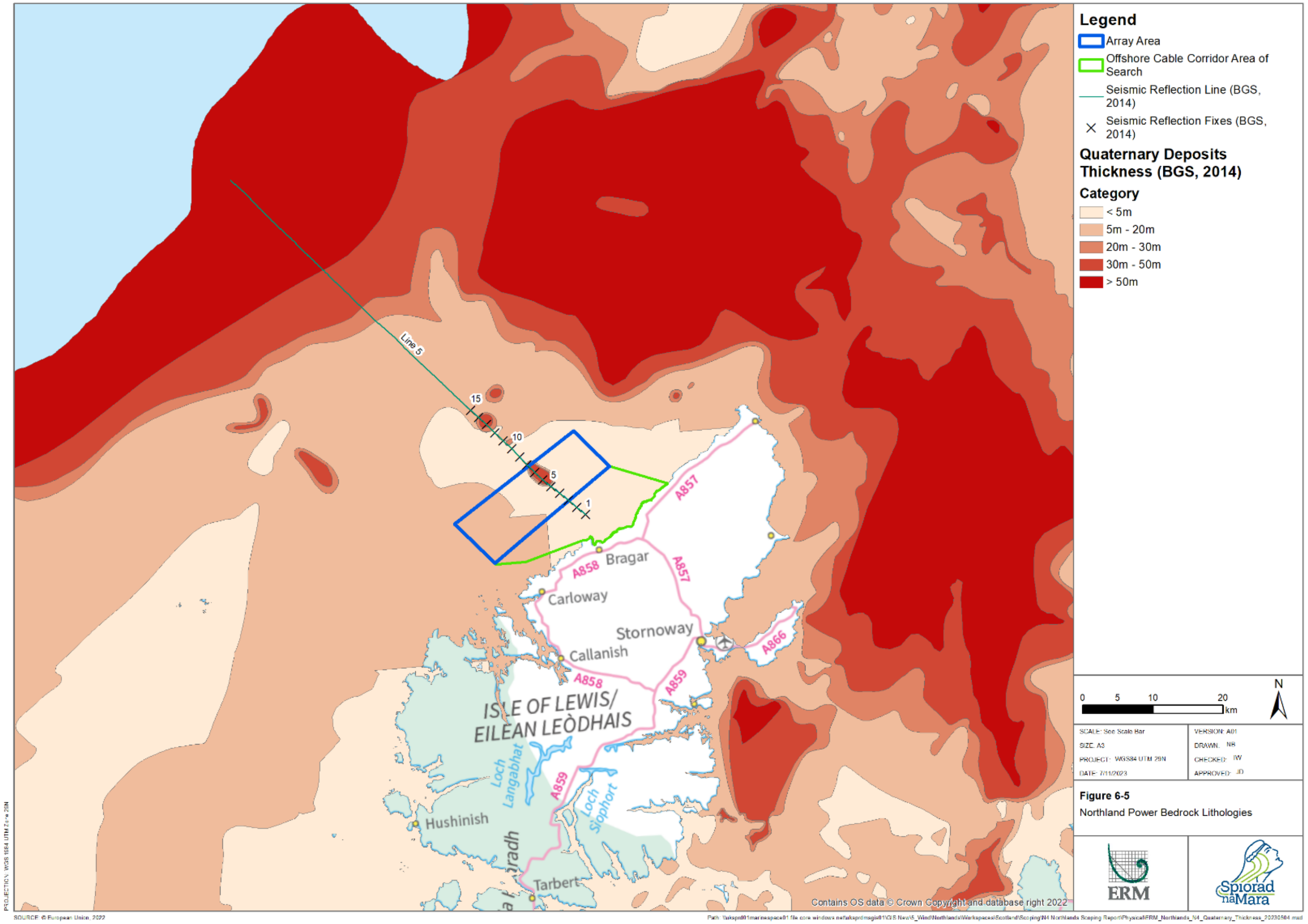
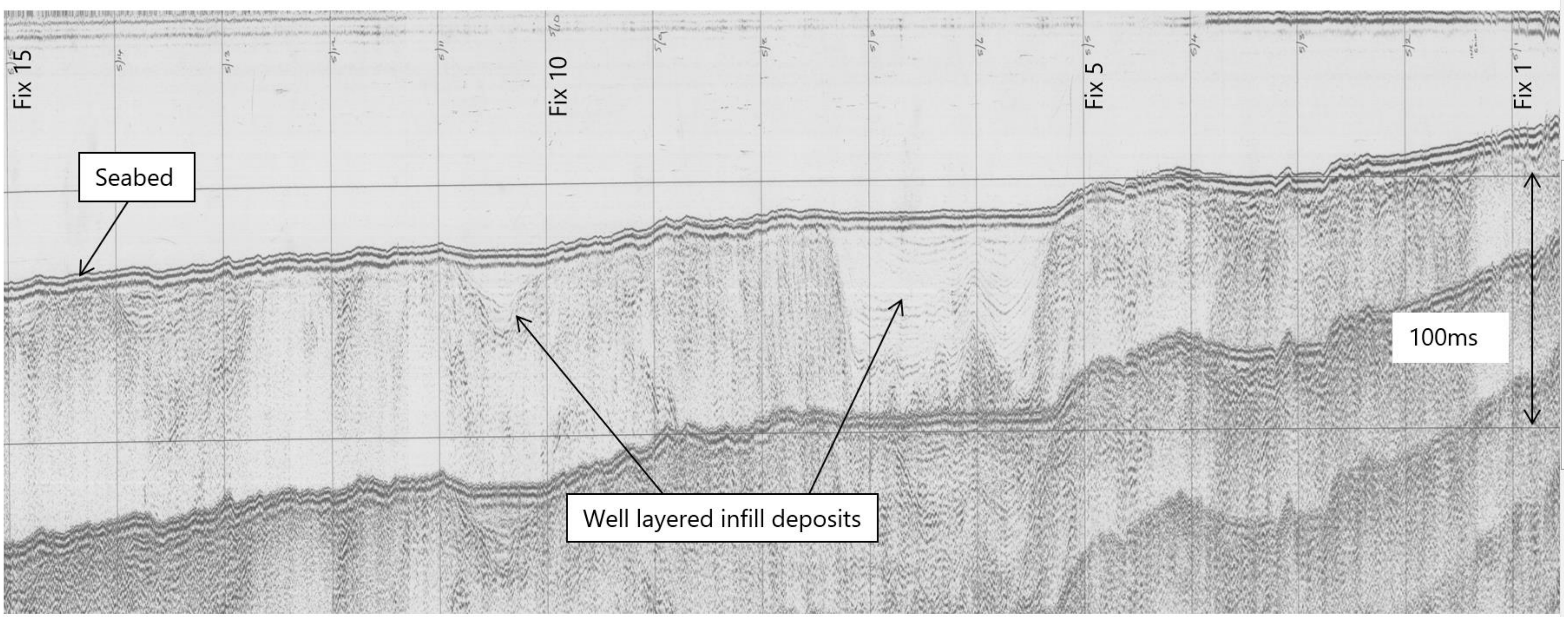


Figure 6.1-6 Seismic profile, northwest to southeast, showing subsurface geology. Location of this profile is marked on Figure 6.1 5. (From: BGS, 1984; sparker data survey line 5; survey line ID 100413)



6.1.3.5 Seabed Sediments

As discussed in section 6.1.3.4, seabed sediments around the Western Isles are derived mainly from reworking of glacial and glaciomarine Quaternary sediments (Bradwell *et al*., 2019; BGS and Threadgold, 1997). The nearshore environment is a generally rocky, high-energy environment, with some areas of coarse sand, gravel and shingle in pockets between rock outcrops and boulders. Inshore, an exposed shingle band may be present at low tide between the mid and low foreshore, the presence and extent of which is variable dependent on the recent weather and wave conditions (Royal Haskoning, 2011). The beaches display a marked transition between lower and upper shoreface sediments, typical conditions indicating rounded clasts in the lower shore and angular in the upper where less frequent storm events reach. The Quaternary cliffs, comprising raised beach deposits, till deposits and occasionally peat (MacTaggart, 1998), are notably eroded where there is limited outcropping bedrock, leading to a substantial accumulation of lag deposits different to the marine derived sediment (Royal Haskoning, 2011).

Reworking of the cliff deposits, widely identified as glacial till deposits, is common, with the finer, mud, component being winnowed away, leaving gravels. The finer material, combined with muddy sands from outwash deposits, accumulates in glacially excavated- hollows, such as those identified in the centre of the Physical and Coastal Processes Study Area (BGS and Threadgold, 1997) or around the southern edges of open extents of the coastline (Royal Haskoning, 2011).

Within the Array Area and Offshore Cable Corridor Area of Search, seabed sediments range from gravelly sand in the west to gravel in the east (EMODnet, 2019; BGS, 2015; BGS, 2020) (**Figure 6.1-7**). Outcropping bedrock is present at seabed, from the southern edge of the Array Area to the coast, i.e. within the Offshore Cable Corridor Area of Search (BGS, 2015; BGS, 2020). Preferential erosion along discontinuity planes creates channels and grooves where small amounts of sand and gravel can accumulate. Examples of seabed imagery close to the Offshore Cable Corridor Area of Search are shown in **Figure 6.1-2,** which confirm rock is present at the surface, with some cobble-boulder sized material present. This is confirmed by the drop-down video survey conducted for Lewis Wave Power (Envision, 2011).

To the southwest of the Isle of Lewis, local glaciogenic sediments, augmented by offshore shelly sands, form the source sediments for beach and dune development at several, mainly sheltered, bays along the coast; whilst to the northwest of the Isle of Lewis, short gravel barriers are nourished by glaciogenic gravels and wave erosion of local rock impound lagoons (Ballantyne and Gordon, 2021). In the Outer Hebrides, offshore sediment sources were progressively augmented during the Holocene by calcareous shelly sands (Ballantyne and Gordon, 2021). Burrows *et al*. (2014) in a partial review of the sediment composition of marine sands across Scotland, highlight this increase in biogenic carbonate. The source of the carbonate is commonly local and reflects the local communities of shell-building organisms. Carbonate percentages range from 30–90% and potentially reach these values further south towards Harris and Uist, although beaches proximal to the Physical and Coastal Processes Study Area may achieve levels up to 20–30% (Burrows *et al*., 2014).

6.1.3.6 Sediment Transport Pathways

Due to the very coarse nature of the seabed sediments in the Physical and Coastal Processes Study Area, storm wave conditions are required for much of the sediment to undergo active transport (Bradwell *et al*., 2019; BGS and Threadgold, 1997). Sediment availability is low, both within the Array Area and Offshore Cable Corridor Area of Search, due to the thin cover of Quaternary material available for reworking, meaning inputs for sediment transport are limited. Erosion of the bedrock is slow and provides little material (Royal Haskoning, 2011). The potential deposition centre of glaciomarine sediments in the centre of the Array Area, at present only identified within a single line of 2D seismic data, could provide a source of finer material, if actually exposed at the seabed.

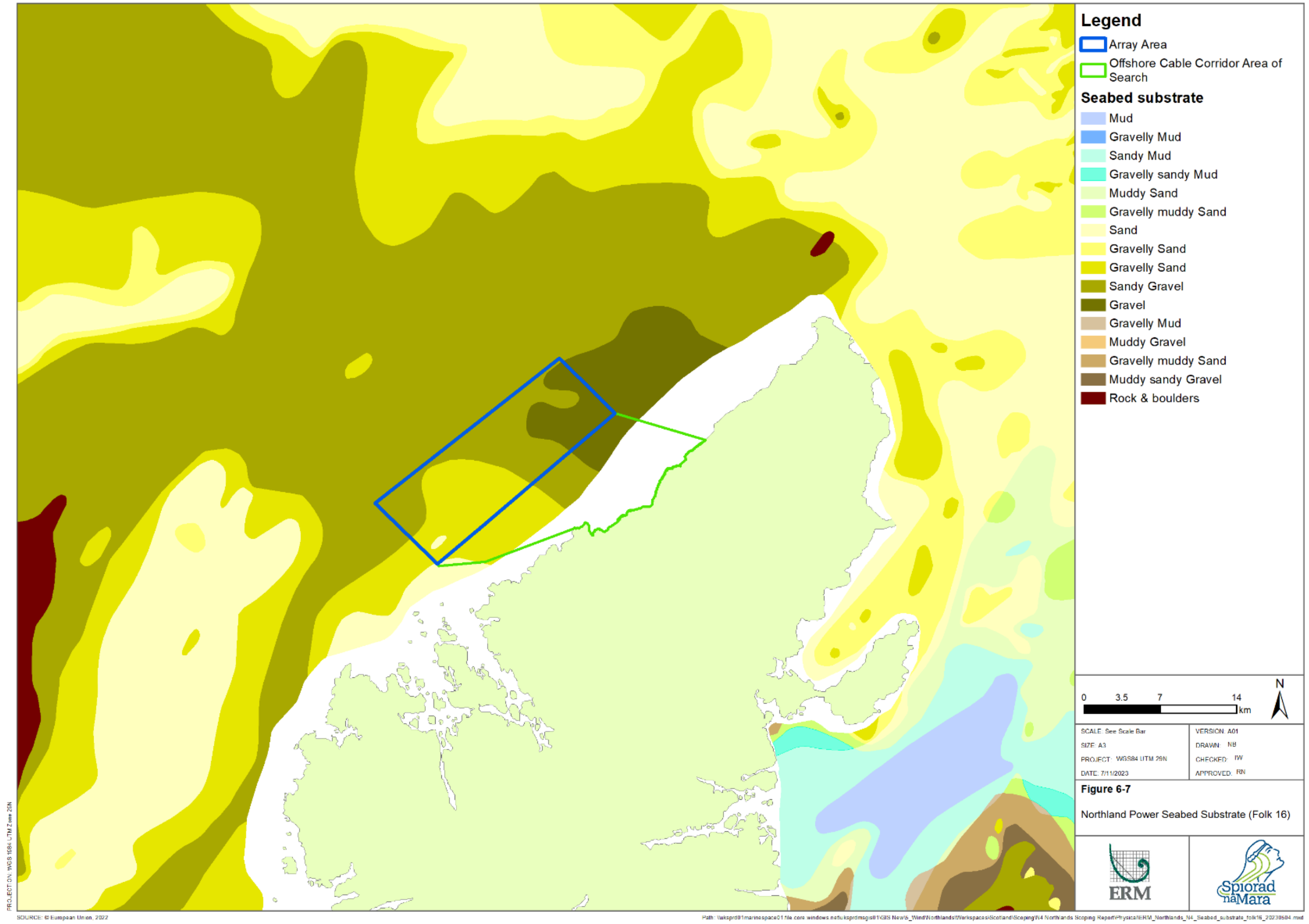
Offshore, there are limited means for resuspending and transporting any available sediment, due to the weak tidal currents and water depths (for wave action), limiting resuspension and transportation of sediment to storm events (discussed in the following sections). This is confirmed by the low levels of suspended sediment identified within the Minches and Western Scotland throughout the seasons (<5 mg/l) (Cefas, 2016).

This coastline contains numerous small coastal cells, segregated by headlands, with little sediment exchange between them. The main source of the material present on the beaches is from the Quaternary cliffs, with minor fluvial inputs (Royal Haskoning, 2011), rather than offshore supply. Erosion of the Quaternary cliffs occurs where the beach composition and profile allow, the presence of bedrock outcrop significantly reduces this erosion. The sediment composition of the cliffs differs in part to the more rounded marine derived sediment and contains coarse sediment (lag material) with angular clasts and limited finer sediment.

Hansom *et* al. (2017a) found that in general there has been a slight reduction in the extent of erosion and increase in stability within Cell 8 and 9 (Barra, Harris and Lewis) since 1970 (to 2017). This is in line with a pattern, comparable with other rocky dominated coastal cells seeing more modest changes, in part due to an increased level of protection offered by the surrounding rock-dominated shore (Hansom *et* al., 2017a). Nevertheless, the rate of erosion is increasing in the vicinity of the Project (section 6.1.3.11), where opportunity arises.

Physical and Coastal Processes are dominated by wave and wind action (Ramsay and Brampton, 2000), with only storm wave action leading to an offshore sediment transport. Net sediment transport is generally downslope, northwards, driven by residual currents (Ramsay and Brampton, 2000).

Figure 6.1-7 Overview of seabed substrate by Folk (1954) classification. (Source: EMODnet, 2019)



6.1.3.7 Tides

Tides in the Outer Hebrides are dominated by two semidiurnal constituents; the M2 and the S2 constituents. Both constituents follow the same distribution, with the S2 constituent having a tidal amplitude of 40% that of the M2 constituent, which falls between 1.1–1.2 m throughout the Array Area (Inall and Sherwin, 2006).

ABPmer (2008) modelled the mean tidal range in the Array Area as 3.3 m during the spring tide, and 1.5 m during the neap tide. A measured tidal range, at Carloway, at the south of the Offshore Cable Corridor Area of Search, was 3.6 m during the spring tide and 1.6 m during the neap tide (Ramsay and Brampton, 2000). Lewis Wave Power Limited (2012) (via Npower renewables and RWE Group, 2007) confirmed this range (modelled) applied to the topic specific study area[9]. Between 2008 and 2026, the predicted highest astronomical tide at Stornoway is 5.53 m, with the lowest astronomical tide being 0.01 m; though, typically, mean high and low water springs fall between 4.86 m and 0.72 m (NTSLF, 2023).

The direction of flow for tidal currents is northeast during the flood tide and southwest during the ebb tide (Lewis Wave Power Limited, 2012; Ramsay and Brampton, 2000). The currents are highly elliptical and the eccentricity has a magnitude consistently below 0.25 m/s (Inall and Sherwin, 2006). Currents are known to be weak along the west coast of the Isle of Lewis, except for around the Butt of Lewis, (Lewis Wave Power Ltd, 2012), with a modelled mean speed of 0.28 m/s during the spring tide and 0.13 m/s during the neap tide across the Array Area (ABPmer, 2008). Lewis Wave Power Ltd (2012) indicates similar values for the neap tide (0.13 m/s), but with a slight increase to 0.36 m/s during the spring tide. Along the Offshore Cable Corridor Area of Search, ABPmer (2008) modelled the current speed between 1-3 km offshore from landfall, at the Bruce Shore Crossing, to be between 0.09-0.11 m/s (neap), and 0.20-0.25 m/s (spring).

6.1.3.8 Non-tidal Influences

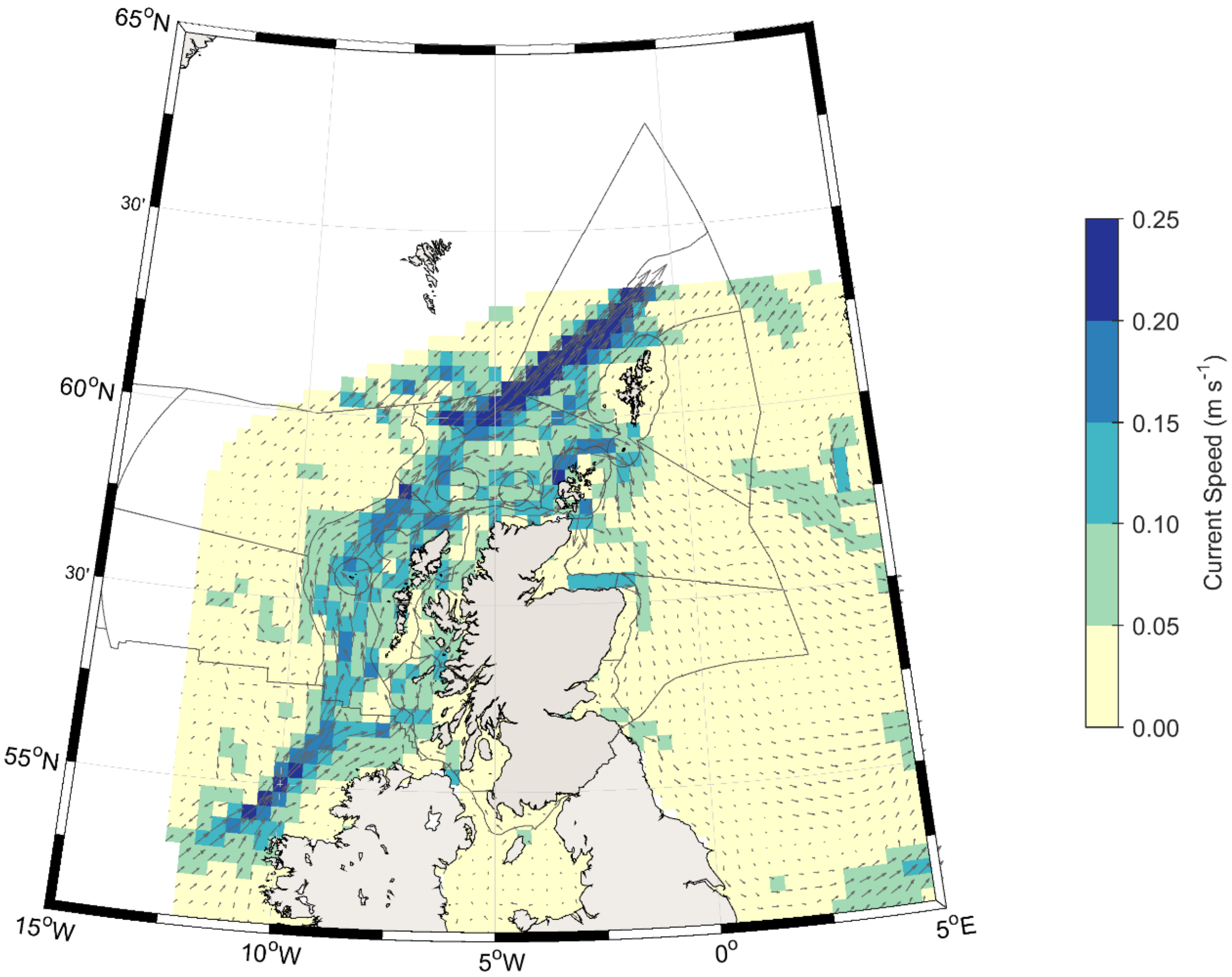
The direction of the non-tidal (residual currents) through the Array Area is predominantly northwards (Lewis Wave Power Ltd, 2012), as they form part of the Scottish Coastal Current (SCC) (Inall and Sherwin, 2006). Coastal currents are confirmed to flow north, as evidenced by the asymmetry of shingle beaches in the area (Royal Haskoning, 2011). The SCC is derived from the mixing of Irish and Clyde Sea waters with a landward projection of the European Slope Current. The SCC is relatively fast flowing, 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. It is formed by strong westward winds in the region driving water towards the coastline, combined with the influence of the

[9] Modelling undertaken for the consented 4MW Voith Hydro WaveGen development at Siadar and reported in the Lewis Oyster Wave Power Environmental Statement (Lewis Wave Power Ltd, 2012) approximated a tidal range at Siadar of 3.6 m during spring tides, and 1.6 m during neap tides (Npower renewables and RWE Group, 2007).

Coriolis force (Inall and Sherwin, 2006). Current speeds through the Array Area vary from 0.05 m/s at its northeastern end, to 0.15 m/s at its southwestern end (**Figure 6.1-8**) (MarineScotland, 2020a).

Storm surges, formed by rapid changes in atmospheric pressure, can lead to extreme high-water events as well as extreme currents. This effect can be further impacted by the wind strength and direction. In the UK the dominant driver of storminess is the North Atlantic storm track. This is in turn 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 Outer Hebrides are also prone to stormy weather originating in low pressure systems near the Great Lakes in Canada. These low-pressure regions also produce swell capable of reaching the Hebrides (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 current speed of 0.6 m/s (Inall and Sherwin, 2006).

Figure 6.1-8 Mean residual current speed around the Scottish Coast (MarineScotland, 2020a). Using the Scottish Shelf Model. (From: De Dominicis et al., 2018)



6.1.3.9 Waves

Waves on the Scottish coastline are primarily driven by the predominant northwesterly winds. The period (usually between 4 and 20 seconds in Scotland), and size, of these waves is determined by wind speed, wind duration and by the fetch, or distance of unobstructed ocean over which the waves have travelled (Ramsay and Brampton, 2000). Due to the exposed nature of the Western Isles, there tends to be a long fetch (Lewis Wave Power Ltd, 2012) leading to large "*fully formed*" long period "*swell waves*" propagating from distant locations in the Atlantic, with a maximum size determined solely by wind speed (Ramsay and Brampton, 2000).

Significant Wave Height (Hs), the mean height of the top 33% highest waves (when measured from trough to crest), has an annual mean of 2.29 m within the Array Area (ABPmer, 2008). The mean Hs seasonal variation was projected as ranging from 3.02 m in winter to 1.57 m in summer (2.18 m in spring and 2.42 m in autumn; ABPmer, 2008).

The ABPmer SEASTATES model (ABPmer, 2018) estimates mean wave height (all waves) at 2.6 m in the centre of the Array Area (**Figure 6.1-9**), and 2.1 m within the Offshore Cable Corridor Area of Search. In the Array Area, ABPmer (2018) indicates the dominant direction of origin for all waves is westerly (45%), Lewis Wave Power Ltd (2012) also indicated the dominant wave incident being between southwest (230°N) to west (270°N). Within the centre of the Offshore Cable Corridor Area of Search, the dominant wave direction is also west (40% of waves), with 30% originating from the northwest (**Figure 6.1-10**) (ABPmer, 2018).

Figure 6.1-9 Distribution of wave heights in m and direction at the centre of the Array Area. (From: ABPmer, 2018))

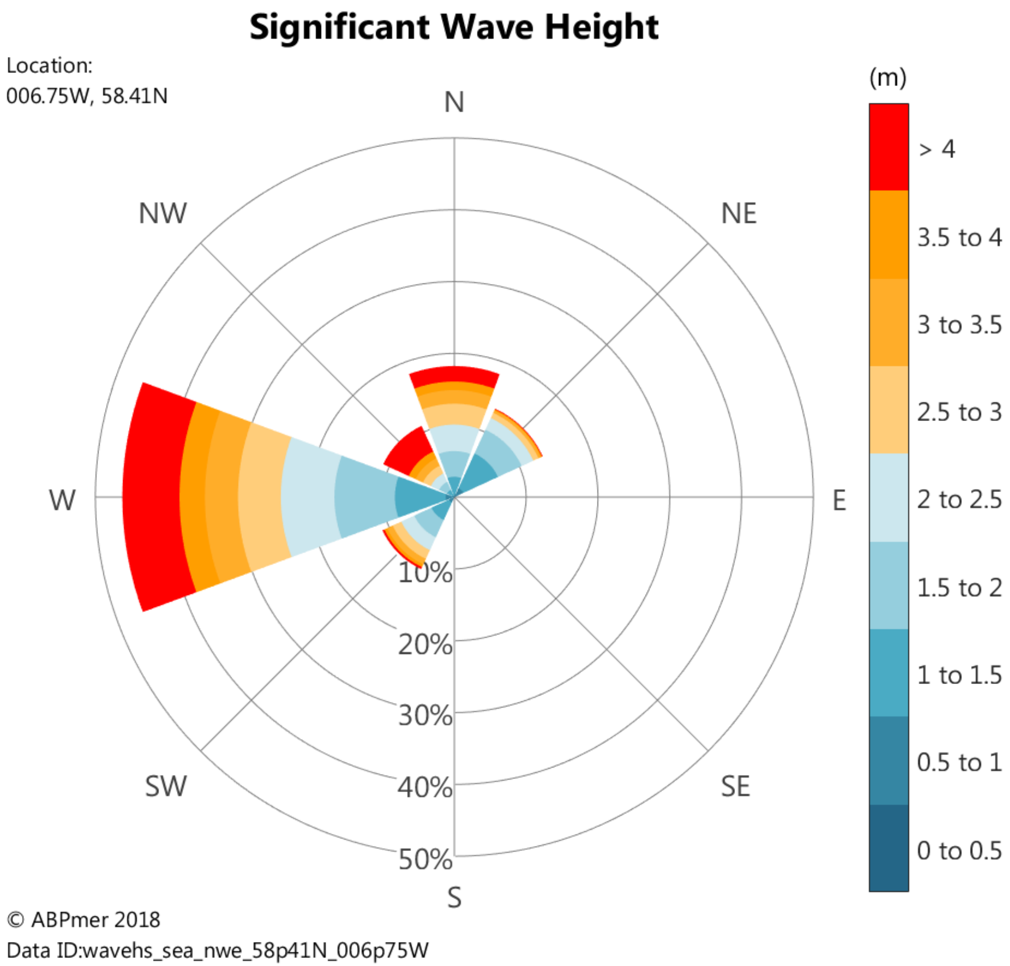
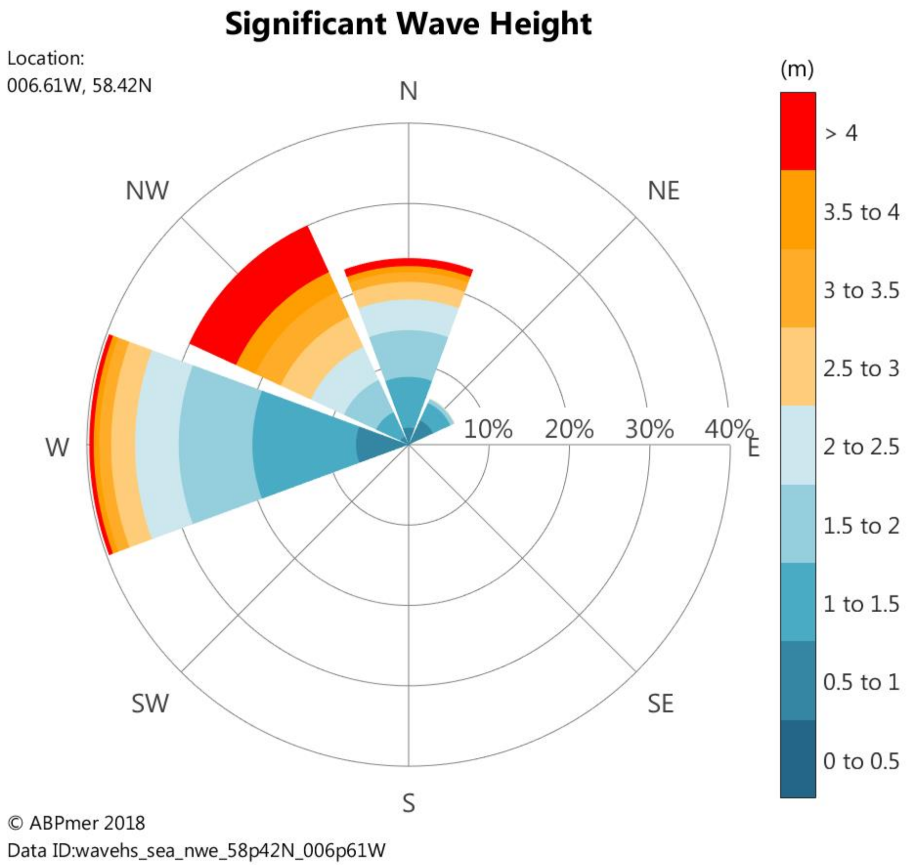


Figure 6.1-10 Distribution of wave heights in m and direction adjacent to cable landfall. (From: ABPmer, 2018))



Extreme value analysis predicts total sea Hs waves in the region reaching a height 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[10] (Lewis Wave Power Ltd, 2012; Ramsay and Brampton, 2000). The predicted extreme heights for swell waves are 8.1 m with a 100 year return period, 6.9 m with a 10 year return period, and 5.7 m with a 1 year return period (Lewis Wave Power Ltd, 2012; Ramsay and Brampton, 2000). Waves with a height above 8 m can occur from any direction except for the southeast (Ramsay and Brampton, 2000). Similar results were obtained at the northeastern end of the Array Area, 600 m from the shoreline, by Lewis Wave Power using MIKE21 Spectral Waves software (Lewis Wave Power Ltd, 2012). During a 12 years hindcast model, significant wave heights of 7.7 m, with a period of 7.38 seconds were observed, reducing to 5.26 m with a period of 6.68 seconds in summer (21 March to 21 September). The dominant direction was northwesterly (294° +95°/-42°) in winter and from a more westerly direction in the summer (286° +101°/-34°) (Lewis Wave Array Ltd, 2012). In general, long fetches account for significant wave action from every direction except from onshore (Lewis Wave Array Ltd, 2012).

Historic significant and maximum wave height, and wave direction data, are available, from 3 buoys located 20 km offshore of the Array Area (HebMarine_1_Roag, HebMarine_2_Bragar, and HebMarine_3_Siadar). The southernmost of the 3, HebMarine_1_Roag, provided data between October 2011 and September 2012, while the other 2 provided data between March 2011 and March 2013. Data were not able to be downloaded for analysis[11], but time series graphs can be viewed online. Lewis Wave Array Ltd (2012) was able to review and analyse data for the Lewis Wave Array Environmental Statement, for the period October-December 2011. During this period, 6 storm events (>10 m) were captured, with a maximum- wave height of 21 m, with a dominant wave incident from the north, particularly from the northwest (240-300°) (Lewis Wave Array Ltd, 2012).

6.1.3.10 Frontal Zones and Stratification

Stratification is a naturally occurring seasonal hydrodynamic feature, related to the distribution of sea water temperature and salinity. Frontal zones mark boundaries between water masses, including tidally mixed and stratified areas, and are numerous on the European continental shelf (BEIS, 2022). Fronts play an important role in enabling the circulation and transport of nutrients and heat, and frequently reoccurring fronts (e.g. spatially and/or seasonally) are widely recognised as supporting enhanced biological activity (NatureScot, 2019).

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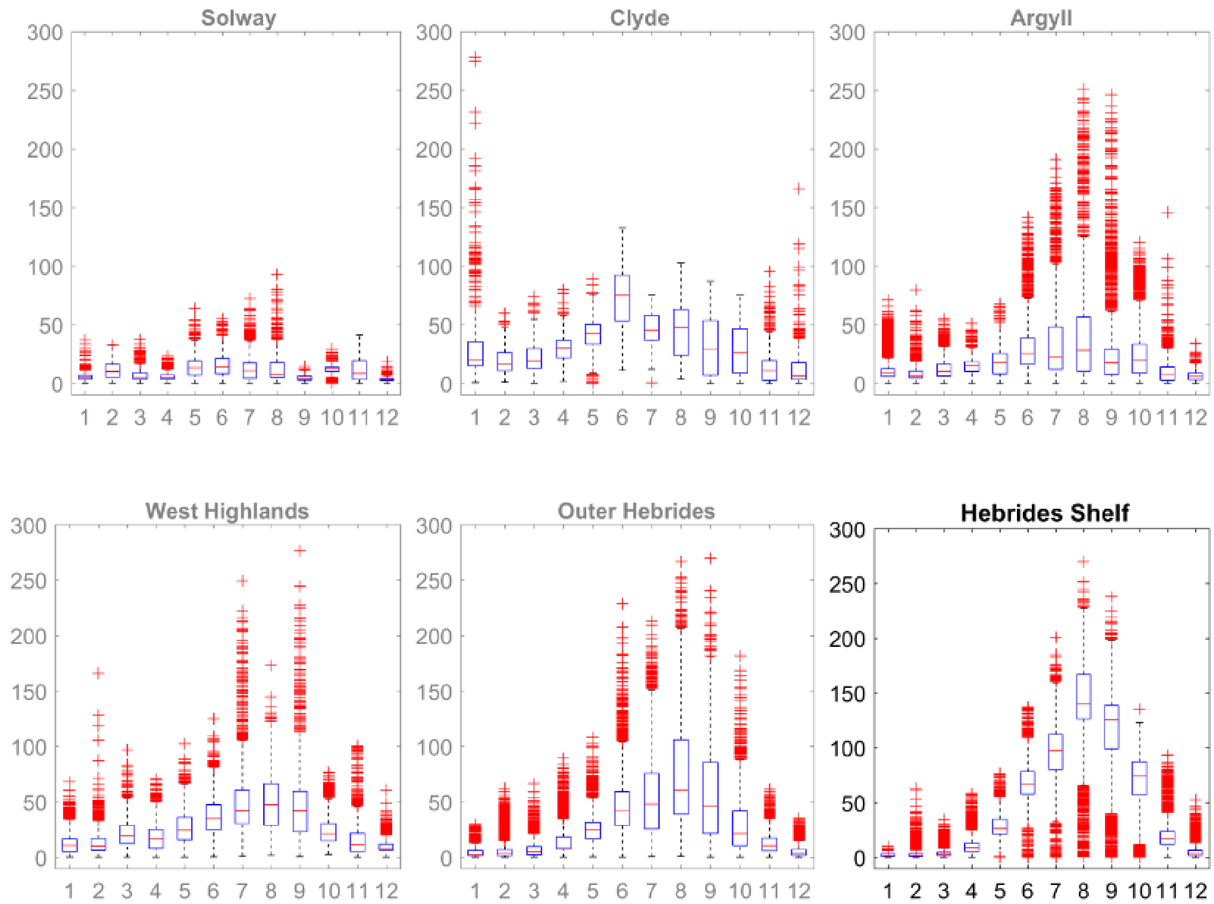
[10] Wave and swell extreme value analysis is from the Met Office Wave Model gridded at 0.25° grid cells over an area within 20 km of the coast, covering the Array Area and extending to the Butt of Lewis 19 km to the northeast (Ramsay and Brampton, 2000).

[11] Under category 2, "*Data downloadable for non-commercial uses only*" in Cefas's data policy (CEFAS, 2023)

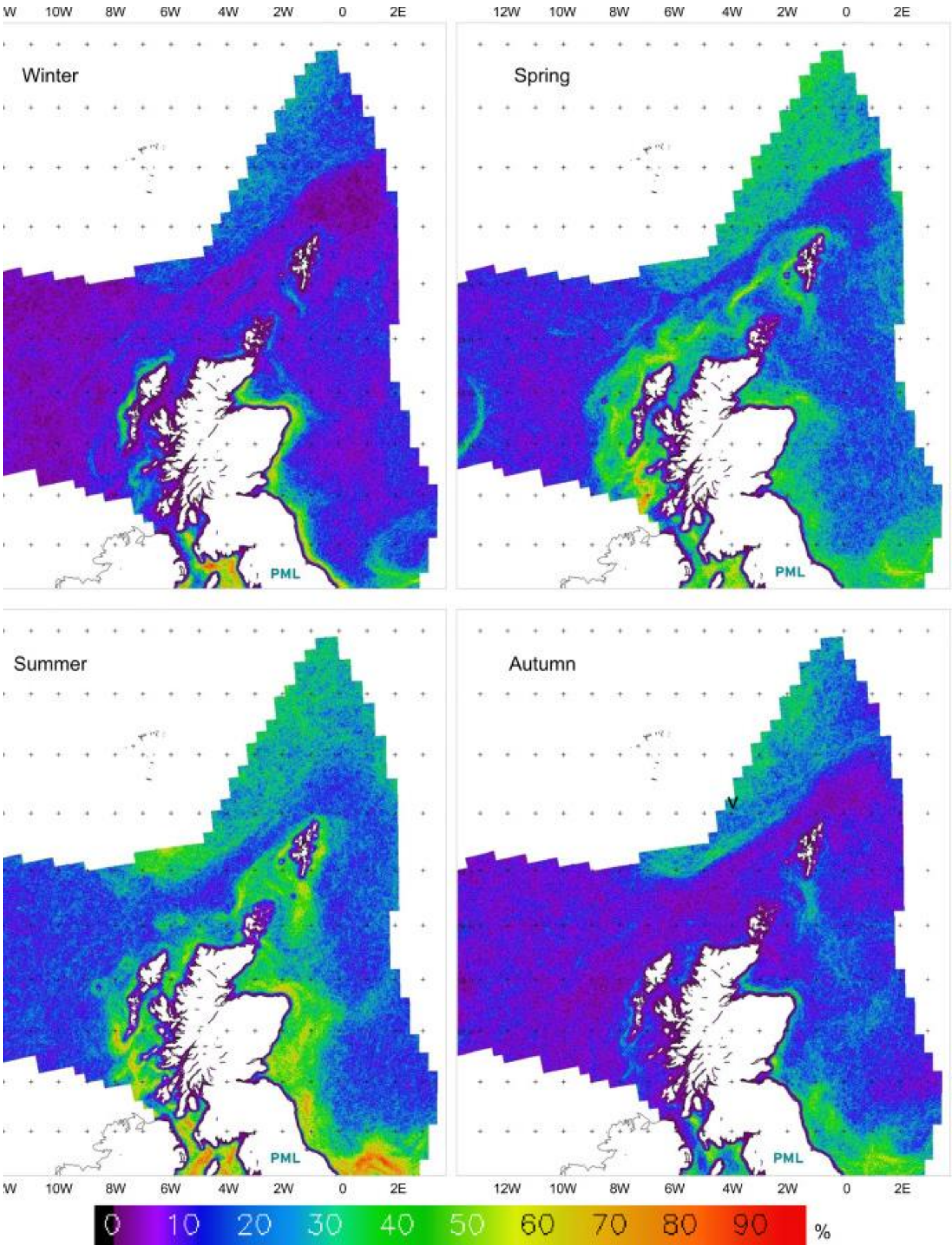
In Scotland, stratification occurs in regions where tides are sufficiently weak to prevent tidal mixing from breaking down stratification. They may also be amplified by salinity driven stratification, in regions with significant riverine input. This can, in some cases, lead to winter stratification (MarineScotland, 2020c). In the Outer Hebrides, tidal forcing is weak, and freshwater input is low (MarineScotland, 2020b). The region, therefore, experiences moderate thermal stratification between June and September (**Figure 6.1-11**). August is the month with the greatest degree of stratification, with the majority of potential energy anomalies between 50-100 J/m (MarineScotland, 2020c).

Figure 6.1-11 Boxplots of the strength of stratification in the Outer Hebrides, in contrast to other regions in the west of Scotland (Potential Energy Anomaly in J/m3) throughout the year. Boxplots show mean (red line), 25th and 75th percentiles (blue rectangle). (Source: MarineScotland, 2020b)



Thermal Fronts may occur with 40% frequency from 10 km offshore from the Hebrides, including in the Array Area, in winter and spring (**Figure 6.1-12**). The frequency decreases in summer, and to less than 10% (**Figure 6.1-12**) (Miller *et al.*, 2015).

Figure 6.1-12 Seasonal analysis of ocean thermal front frequency, derived from Advanced Very High Resolution Radiometer (AVHRR) 1-km sea surface temperature data 2000–2009 (From: Miller et al., 2015)



6.1.3.11 Future Changes

While the influence of global sea level rise in Scotland is partially offset by local land (isostatic) uplift, though less apparent on Lewis, from tidal gauge data, Relative Sea Level Rise (RSLR), incorporating this uplift, has been shown to be occurring on every Scottish coast. This trend is expected to accelerate in the future, with anticipated erosion and projected RSLR across the northwest coast of Lewis to be up to 1.05 m by 2100, according to a study using 95% probability predictions under UK Climate Projection 2009 high emissions scenario (Representative Concentration Pathway (RCP) 8.5) (Dynamic Coast, 2021). For the Project, RSLR is projected to be 0.40 m, with a median probability by 2100 (RCP2.6) (rapid emission reduction) scenario (Dynamic Coast, 2021). In Edinburgh, these changes are slightly less at 0.91 m (RCP8.5, 95%) and 0.24 m (RCP2.6, 50%) (Dynamic Coast, 2021).

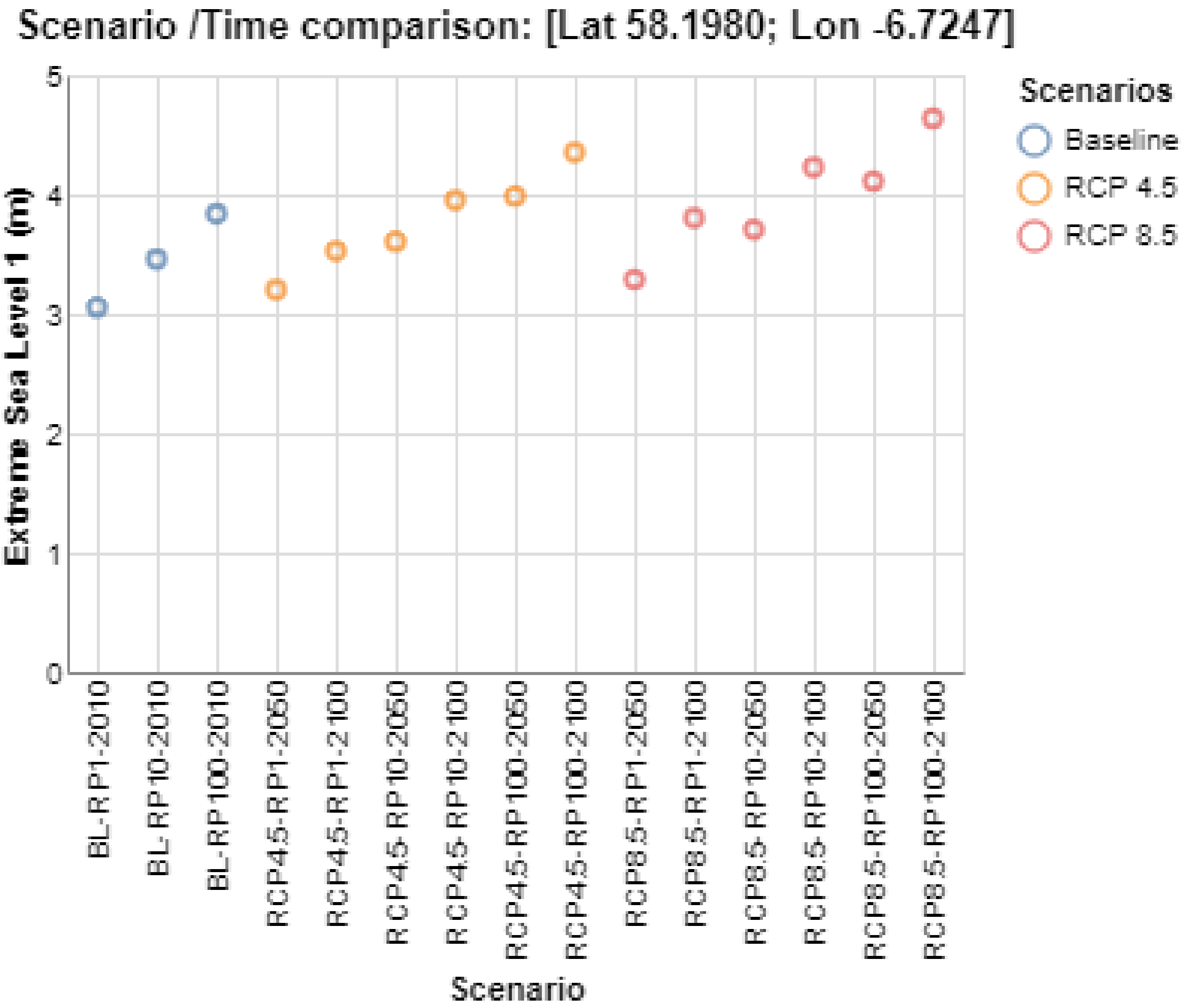
The rise in mean sea level will also affect extreme sea levels. In 2017, these ranged between 3.1 m (1 year return period), 3.5 m (10 year return period), and 3.8 m (100 year return period) (Hansom *et al.*, 2017b). Under the medium emissions scenario (RCP4.5) these are each predicted to increase by 0.5 m, while under the high emission scenario (RCP8.5) the predicted increase for both the 1 and 10 year return period is 0.7 m, and the predicted increase is 0.8 m for the 100 year return period[12] (**Figure 6.1-13**; Vousdoukas *et al.*, 2018).

There is much uncertainty in predictions of storminess and extreme wave height. A slight poleward shift in the North Atlantic Storm Track is likely by 2100, and it is possible by 2035 under the high emission scenario. This may result in reduced storm frequency and intensity, while the height of the most extreme waves is actually expected to increase. However, at the regional level, predictions cannot be made with more than a low confidence (Wolf *et al.*, 2020). The predictions that do exist for the Array Area show a very small increase in storminess (0.02 m for 50 year return period extreme surges) (UKCP09, 2009) and no change in wave height by 2100 under RCP 8.5 (Vousdoukas *et al.*, 2018).

An increase in stratification is also predicted, with stratification beginning an average 7 days earlier throughout the Array Area by 2085 under a medium emissions scenario (UKCP09, 2009). This is likely due to an increase in the sea surface temperature, which has been rising by an average of 0.19°C per decade since 1988 (MarineScotland, 2020b).

[12] Projections were made for a point 12 km to southwest of the Array Area (58.1980N, 6.7247W) with median probability, using data from Vousdoukas, *et al.* (2018) using coastal-futures.org.

Figure 6.1-13 Predicted rise in extreme sea level in 2050 and 2100 comparing baseline (current), medium and high emissions scenarios at 1, 10 and 100 year return periods. (Source: Vousdoukas et al. (2018) visualized through https://coastal-futures.org/sealevel)



6.1.3.12 Designated Sites

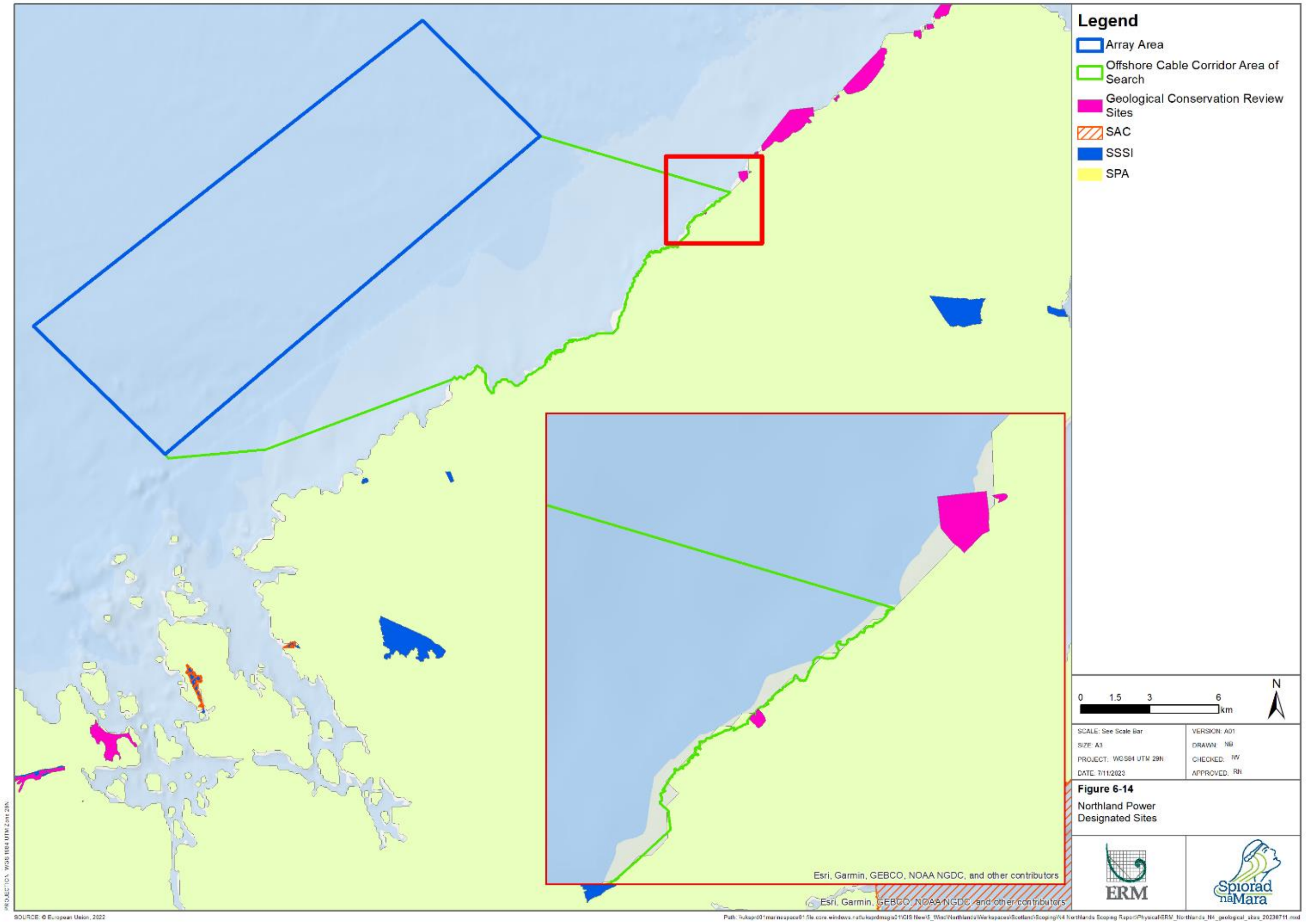
No marine or coastal designated sites, with features of geological interest, nor designated habitats (such as high confidence Annex I Sandbanks or bedrock reef[13]) were identified within, or in close proximity to, the Array Area or Offshore Cable Corridor Area of Search.

The Geological Conservation Review (GCR) is a register of known nationally and internationally important Earth science (geological and geomorphological) sites in Great Britain. Although many of the GCR sites do not have any formal statutory protected status they are unnotified but are still locally classed as sites of significance and are treated as 'candidate Sites of Special Scientific Interest' (SSSIs) (NatureScot, 2023).

One GCR sub-site (approx. 100 m in length) of the wider 'Northwest coast of Lewis' (ID 1450) overlaps with the Offshore Cable Corridor Area of Search (**Figure 6.1-14**). The next delineated section of the 'Northwest coast of Lewis' GCR site is more than 700 m northeast, along the coastline. Along the northwest coastline of the Isle of Lewis, areas of significance were identified in association with the Quaternary deposits (raised beaches, tills and peat). These deposits are noted to be of crucial importance in terms of reconstructing the extent and dynamics of the Late Devensian Scottish (mainland) ice sheet and interactions with locally generated ice caps (south Lewis and Harris), as well as potential for further evidence of sea level change and palaeoenvironmental conditions (MacTaggart, 1998).

[13] No high confidence Annex I bedrock reef are present, however there is the potential for undesignated medium confidence bedrock reef. Further investigation into the status will be confirmed through site specific geophysical and environmental surveys as part of the EIA.

Figure 6.1-14 Designated Sites and Geological Conservation Review sites in relation to the Array Area and Offshore Cable Corridor Area of Search (Source: NatureScot, 2022)



6.1.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Physical and Coastal Processes assessment, which have been incorporated into the current design of the Project (**Table 6.1-2**).

Table 6.1-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.1	Avoidance of sensitive areas	The outputs of the project-specific geophysical and environmental surveys will be reviewed as part of a Layout Plan to ensure that the final design and location of key project infrastructure takes full account of the physical environment. Any sensitive areas identified will be avoided, as far as is possible, by micrositing wind turbine generators (WTG) and cables.
6.2	Long-term changes in physical processes	A Cable Installation Plan will be produced 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 project-specific geophysical surveys will be used to identify the preferred route, with the use of natural crevasses or channels within the bedrock proposed, where feasible, and areas of thicker Quaternary sediments identified (to maximise opportunities for cable burial). Cables will be buried in soft sediment, where possible, with the use of external cable protection on rocky outcrops, where deemed required.
6.3	Development of a Construction Environmental Management Plan (CEMP)	A Construction Environmental Management Plan will be developed and adhered to in compliance with legislative requirements and best practice standards and guidance. Where site specific mitigation is required, these will be identified as part of the impact assessment.

6.1.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.1.5.1 Likely Significant Effects

Table 6.1-3 outlines the potential likely significant effects on Physical and Coastal Processes receptors which may arise within the Physical and Coastal Processes Study Area via the proposed Project. The approach to how these potential likely significant effects will be assessed is set out in section 6.1.6.

The key receptors for Physical and Coastal Processes are:

- The seabed and coastline adjacent 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 effect 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 EIAR Chapter will describe the source of such effects, and the pathways which may lead to an effect on that type of receptor.

Pathways to effect on Physical and Coastal Processes receptors and those other receptor groups listed above may include:

- Changes in seabed sediments;
- Changes to tidal currents;
- Changes to waves regime (including storms);
- Changes to sediment transport and suspended sediment;
- Changes to stratification.

The 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.

Table 6.1-3 EIA Scoping Assessment for Physical and Coastal Processes

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Potential changes in morphology at the coast	6.1, 6.2, 6.3	In	The effects from installation/decommissioning of project infrastructure (including ploughing /jetting /trenching /coring) will be assessed to identify any changes that may create a pathway to impact the coast.	Assessment of worst-case scenario to identify potential changes, using methods described below (section 6.1.6).
Potential changes in morphology of offshore morphological features (including moraines)	6.1, 6.2, 6.3	In	The effects from installation/decommissioning of project infrastructure (including ploughing / jetting / trenching / coring) will be assessed to identify any changes that may create a pathway to impact the morphological feature.	Assessment of worst-case scenario to identify potential changes, using methods described below (section 6.1.6).
Changes affecting designated sites	6.1	In	No designated sites identified for geology, however, overlap of the Offshore Cable Corridor Area of Search with GCR site. Designated sites for ecological features will be assessed within the relevant chapters, i.e. Chapter 6.4: Benthic and Intertidal Ecology; Chapter	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			6.5: Fish and Shellfish Ecology; Chapter 6.6: Marine Mammals and Other Megafauna; Chapter 6.7: Marine and Nearshore Ornithology; and also within the HRA.	
Operation and Maintenance				
Potential changes in morphology at the coast	6.1, 6.2, 6.3	In	The effects from the offshore infrastructure and associated protection (e.g. turbines/rock protection/scour protection) will be assessed to identify any changes that may create a pathway to impact the coast. Also, effects from remedial/repair works, similar to installation effects but on a reduced scale.	Assessment of worst-case scenario to identify potential changes, using methods described below (section 6.1.6).
Potential changes in offshore morphological features (including moraines)	6.1, 6.2, 6.3	In	The effects from the offshore infrastructure and protection (turbines/rock protection) will be assessed to identify any changes that may create a pathway to impact offshore morphological features.	Assessment of worst-case scenario to identify potential changes, using methods described below (section 6.1.6).

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			Also, effects from remedial/repair works, similar to installation effects but on a reduced scale.	
Changes affecting designated sites	6.1	In	No designated sites identified for geology, however, overlap of the Offshore Cable Corridor Area of Search with GCR site. Designated sites for ecological features will be assessed within the relevant chapters, i.e. Chapter 6.4: Benthic and Intertidal Ecology; Chapter 6.5: Fish and Shellfish Ecology; Chapter 6.6: Marine Mammals and Other Megafauna; Chapter 6.7: Marine and Nearshore Ornithology; and also within the HRA.	

6.1.6 Proposed Approach to EIA

6.1.6.1 Relevant Data Sources

Desktop data sources will include those listed in **Table 6.1-1,** with further data provided via hindcast numerical models, where appropriate, and secondary sources including published and unpublished papers, journals and reports. These sources may be supplemented by any additional sources identified during stakeholder consultation.

Further site-specific surveys will also supplement the desk-based data sources, where available[14]. Data from these surveys will enable the Physical and Coastal Processes Study Area to be characterised for EIA purposes and will also inform the assessment. These will include:

- Geophysical Survey (proposed 2023):
  - Covering the Array Area and Offshore Cable Corridor Area of Search;
  - Multibeam bathymetry, side scan sonar, magnetometer and seismic data;
- Environmental Survey (proposed 2023):
  - Covering the Array Area, Offshore Cable Corridor Area of Search;
  - Grab samples (sediment type and faunal), drop down video, water quality sampling, (including suspended sediment concentrations), sediment quality sampling;
- Geotechnical Survey (proposed 2023):
  - Covering the Array Area and Offshore Cable Corridor Area of Search;
  - Vibrocore and CPT;
- Metocean Survey (proposed to commence 2023):
  - Covering the Array Area;
  - Offshore Floating Lidar system.

6.1.6.2 Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. It is important that collaboration between the Project team and external stakeholders is robust and ongoing

[14] Site specific data, where available, will be utilised to support the baseline and assessments as part of the EIA. It is understood that not all surveys may be complete, such as the Metocean survey (2 year time scale); however, any site specific data that are able to be used, will be incorporated at the time of the assessment.

over the lifetime of the Project. Organisations that will be consulted with respect to this specific EIA topic include, but are not limited to:

- Marine Directorate Licensing and Operating Team;
- Marine Directorate Science;
- NatureScot;
- Scottish Environmental Protection Agency (SEPA);
- Joint Nature Conservation Committee (JNCC);
- Local council: Comhairle nan Eilean Siar.

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 6.1-4 Legislation, Policy and Guidance Relevant to the Physical and Coastal Processes assessment

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Directorate Act, 2010
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2009
Scotland's National Marine Plan, 2015
Sectoral Marine Plan (North)
Regional Marine Plan – Outer Hebrides Local Development Plan (Onshore only)
Blue Economy Vision
Habitats Regulations (Annex I features)
Marine Strategy Framework Directive and Good Environmental Status
Guidance
Potential effects of offshore wind developments on coastal processes (ABPmer and Metoc, 2002)
C584 Coastal and Marine Environmental Site Guide (CIRCA, 2003)
Offshore Windfarms: Guidance note for EIA in Respect of Food and Environmental Protection Act (FEPA) and Coastal Protection Act (CPA) requirements, Version 2 (Cefas, 2004a)
Review of Round 1 Sediment process monitoring data –lessons learnt (Sed01) (ABPmer *et al.*, 2007)
Dynamics of scour pits and scour protection –Synthesis report and recommendations (Sed02) (HR Wallingford *et al.*, 2007)
Guidelines in the use of metocean data through the lifecycle of a marine renewable development (Cooper *et al.*, 2008)

Relevant Legislation, Policy and Guidance
Review of Cabling Techniques and Environmental Effects applicable to the Offshore Wind farm Industry. Department for Business Enterprise and Regulatory Reform in association with Defra (BERR, 2008a)
Coastal Process Modelling for Offshore Wind Farm EIA; Best Practice Guide (COWRIE) (Lambkin *et al.*, 2009)
OSPAR Assessment of the Environmental Impacts of Cables (OSPAR, 2009)
Further review of sediment monitoring data (COWRIE ScourSed-09) (ABPmer *et al.*, 2010)
Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2011)
General advice on assessing potential impacts of and mitigation for human activities on Marine Conservation Zone (MCZ) features, using existing regulation and legislation (JNCC and Natural England, 2011)
Review of environmental data associated with post-consent monitoring of licence conditions of offshore wind farms. MMO Project No: 1031 (Fugro-Emu, 2014)
EIA for offshore renewable energy projects (BSI, 2015)
Marine Directorate Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications (M\d-LOT, 2018)
National Resources Wales (NRW) Monitoring Evidence Report No: 243 Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects (Brooks *et al.*, 2018)
Offshore Wind Energy in Scottish Waters; Regional Locational Guidance (ABPmer, 2020)
Best Practice Advice for Evidence and Data Standards for offshore renewables projects (Natural England, 2022)

6.1.6.4 Assessment Methodology

The assessment methodology will follow the general approach outlined in Chapter 4: Proposed Approach to EIA, of this Scoping Report. Further refining of the methodology and Wider Study Area will be undertaken prior to the chapter being written as part of the baseline and Stakeholder Engagement.

The main aim of the Physical and Coastal Processes assessment is to further characterise and understand the baseline environment in the Physical and Coastal Processes Study Area, particularly with respect to the metocean regime and any associated sediment transport regimes. A greater understanding of the current pathways and confirmation of the key receptors identified will assist in providing a firm baseline for any potential effects from the Project.

Conceptual understanding of the marine physical processes baseline will be informed by a range of project and non-project specific, measured and modelled (hindcast) data, including:

- Geophysical, geotechnical, environmental and metocean site survey;

- Semi-quantitative assessments of wave and sediment transport blockages and influence on scour from the offshore infrastructure, with reference to sediment transport pathways from a high-resolution regional-scale model;
- Spreadsheet based tools for extent and concentration of any sediment plumes produced via Project installation activities and associated changes in bed level;
- Standard empirical equations describing (for example) the potential for scour development around vertical structures (e.g. foundation components) where present, and cables and/or berms (e.g. Whitehouse, 1998), where applicable;
- Analytical assessments of Project-specific data (such as metocean modelling report);
- Evidence from analogous projects including other OWFs and subsea cables, and qualitative assessments using available literature.

Once reviewed, this understanding of the processes and pathways will then be used to inform the following topic specific assessments:

- Chapter 6.3: Marine Sediment and Water Quality;
- Chapter 6.4: Benthic and Intertidal Ecology;
- Chapter 6.5: Fish and Shellfish Ecology;
- Chapter 6.6: Marine Mammals and Other Megafauna;
- Chapter 6.9: Commercial Fisheries;
- Chapter 6.12: Offshore Infrastructure, Other Sea Users, Tourism and Recreation.

The Physical and Coastal Processes assessment will consider the magnitude and duration of the impact, the reversibility of the impact and the timing and frequency of the activity. An assessment of the potential likely significant effects of the Project will be undertaken through application of the Evidence Base, alongside outputs from numerical modelling activities (as discussed above). The significance of any changes will be evaluated against the likely naturally occurring variability in, or long-term changes to, the marine physical environment within the Project's lifetime due to natural cycles, for example storm events, and/or climate change. Any cumulative effects may be identified within the chapter, but the assessment will only include Physical and Coastal Processes receptors within the Physical and Coastal Processes EIAR chapter. Where identified pathways overlap with sensitive receptors not included within the Physical and Coastal Processes EIAR chapter, they will be addressed within the appropriate topic-specific EIAR chapters.

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

6.1.7 Scoping Questions for Consultees

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

1. Do you agree that the data sources identified, and surveys proposed are sufficient to inform the Physical and Coastal Processes baseline for the EIA?
2. Have all receptors and potential likely significant effects that could result from the Project been identified? (Noting that the majority of effects discussed within the chapter will be pathways that will be used to inform other chapters).
3. Do you agree with the proposed approach to assessment, and the methods specified are acceptable for the Project?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Project on key receptors? Are there any additional mitigation measures you would include?

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6.2 Underwater Noise

6.2.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Underwater Noise within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

6.2.2 Study Area

The Underwater Noise Study Area per se 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). More generally, it will cover the entire Offshore Development Area of Search as a minimum, as presented within Chapter 2: Site Selection and Project Description.

The ultimate extent of the Underwater Noise Study Area will be determined by the calculated propagation of underwater noise, especially during the construction phase of the Project as part of the Environmental Impact Assessment (EIA), as it is relevant to the species sensitive to underwater noise.

6.2.3 Baseline Environment

6.2.3.1 Data Sources

No baseline underwater noise surveys are proposed for Spiorad na Mara. Assessments of underwater noise are based on absolute noise thresholds, which are not dependent on the background noise levels. As such, detailed, local baseline underwater noise studies are not typically undertaken for offshore wind farms. General information on baseline underwater noise is given in the following section.

6.2.3.2 Overview of Baseline Environment

Background or "ambient" underwater noise is generated by several natural sources, such as rain, breaking waves, wind at the surface, seismic noise, biological noise and thermal noise. 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 boats, cargo ships, industrial noise, seismic surveys, and leisure activities.

The vast majority of research relating to both physiological effects and behavioural disturbance due to noise on marine species is based on determining the absolute noise level for 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 very limited.

6.2.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Underwater Noise assessment, which has been incorporated into the design of the Project. As part of the Project design process, a number of best practice and designed-in mitigation measures (referred to collectively as embedded mitigation) have been proposed to reduce the potential for effects relating to Underwater Noise. These will evolve over the development process, as the Environmental Impact Assessment Report (EIAR) progresses, and in response to stakeholder consultation activities.

Embedded mitigation for specific identified receptors that will be affected (e.g. marine mammals, fish) are discussed and presented in individual chapters and should be referred to for more information, however an example for marine mammals is presented below.

Mitigation measures associated with Underwater Noise will be defined in a Marine Mammal Mitigation Protocol (MMMP), which will be developed prior to construction to control the potential likely significant effects. Mitigation for piling noise is expected to include, as a minimum, soft start and ramp-up sequences to control the underwater noise emissions.

6.2.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.2.5.1 Likely Significant Effects

Potential likely significant effects as a consequence of underwater noise have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 6.2-1**. These impacts are specific to key marine mammal and fish receptors potentially present in the vicinity of the Project and will be defined in their dedicated chapters:

- Chapter 6.5: Fish and Shellfish Ecology;
- Chapter 6.6: Marine Mammals and Other Megafauna.

Table 6.2-1 EIA Scoping Assessment for Underwater Noise

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Underwater noise from piling for turbine foundation and offshore substation platform foundations (if required)	Embedded mitigation for specific receptors that may be affected are discussed and presented in Chapter 6.6: Marine Mammals and Other Megafauna and Chapter 6.5: Fish and Shellfish Ecology	In	High underwater noise levels generated by piling (monopile or jacket piles) has the potential to injure or disturb key receptors over a wide area	Desktop modelling using the INSPIRE underwater noise model, assessment thresholds based on Southall *et al*. (2019) (marine mammals) and Popper *et al*. (2014) (fish).
Underwater noise from the detonation of unexploded ordnance (UXO)		In	High underwater noise levels generated by UXO clearance has the potential to injure or disturb key receptors over a wide area	Desktop assessment of noise propagation based on Soloway and Dahl (2014) and above thresholds.
Underwater noise from construction activities (e.g. vessel noise, dredging) or decommissioning activities (e.g. cutting)		In	Underwater noise levels will be present over extended periods that have the potential to disturb key receptors, or lead to Permanent Threshold Shift (PTS) or Temporary Threshold Shift (TTS)	Modelling of noise using SPEAR model and above thresholds.
Cumulative underwater noise impacts from piling at neighbouring offshore wind farm (OWF) sites		In	There is a potential cumulative effect from multiple OWF (e.g. Havbredey, Talisk Offshore Wind Farm) driving foundations or anchors simultaneously	Where found to be relevant, desktop modelling using the INSPIRE underwater noise model, assessment thresholds as above.
Effect of seabed vibration on benthic and demersal species		**Out**	While the input of vibration from piling into the seabed will occur during construction,	

Potential Likely Significant Effect	**Relevant Embedded Mitigation**	**Scoping Result**	**Justification**	**Assessment Method**
			there is no practical methodology available to calculate or assess this potential impact.	
Operation and Maintenance				
Continuous operational underwater noise from turbines	Embedded mitigation for specific receptors that may be affected are discussed and presented in Chapter 6.6: Marine Mammals and Other Megafauna and Chapter 6.5: Fish and Shellfish Ecology	In	Long term turbine operation over a wide area could lead to disturbance of sensitive receptors	Underwater noise levels and propagation calculated using the principles of Tougaard *et al*. (2020).
Vessel noise		In	Underwater noise levels will be present over extended periods that have the potential to disturb key receptors	Modelling of underwater noise using SPEAR model and above thresholds.
Effect of seabed vibration on benthic and demersal species		**Out**	While the input of vibration may occur during operation and maintenance activities, there is no practical methodology available to calculate or assess this potential impact.	

6.2.6 Proposed Approach to EIA

6.2.6.1 Relevant Data Sources

The INSPIRE and SPEAR models that form the basis of the majority of the underwater noise assessment are based on empirical noise data recorded or acquired by Subacoustech over the last 15 years, primarily from OWF installation activities.

The UXO assessment is based on calculations using techniques published by Soloway and Dahl (2014) and the operational wind turbine assessment uses data from Tougaard *et al*. (2020).

Other assessment methodologies are based on the papers and guidance cited in **Table 6.2-2** below.

Table 6.2-2 Key Sources of Underwater Noise data

Source	Title
Popper, *et al*., (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.
Solway & Dahl, (2014)	Peak sound pressure and sound exposure level from underwater explosions in shallow water.
Southall, *et al*., (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?

6.2.6.2 Consultation

It is proposed to undertake stakeholder consultation relating to Underwater Noise early on in the process, and throughout the EIA process. No significant concerns are expected relating to the Underwater Noise assessment methodology, which is generally in line with the other recent assessments undertaken in Scotland by Subacoustech (e.g. Pentland Firth and West of Orkney) however input from stakeholders will be sought to agree the most appropriate representative locations for modelling to ensure a robust assessment. Consultation will also relate to receptor specific (e.g. marine mammal and fish) impacts in respect of Underwater Noise. Consultation on Underwater Noise will align with the activities proposed in the individual chapters.

6.2.6.3 Policy, Legislation and Guidance

Relevant legislation, policy and guidance to the Underwater Noise assessment is detailed in **Table 6.2-3**.

Table 6.2-3 Legislation, Policy and Guidance relevant to the Underwater Noise assessment

Relevant Legislation and Policy
European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC)
Marine Strategy Regulations 2010
Marine Environment (Amendment) (EU Exit) Regulations 2018
Scottish National Marine Plan 2015
Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects (Southall *et al.* 2019)
Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al.* 2014)

6.2.6.4 Assessment Methodology

The following section outlines the proposed assessment methodology that will be used within the EIAR to assess potential effects of the Project on Underwater Noise receptors. The assessment of potential likely significant effects will be established using the standard Source-Pathway-Receptor (S-P-R) approach. The relevance of these potential likely significant effects will be considered against the receiving environment conditions which would be expected to occur if no development took place. This methodology follows the structure used by Subacoustech at other Scottish OWF sites, including West of Orkney and Pentland Firth in the north of Scotland.

A selection of piling and environmental parameters contribute to the underwater noise levels produced via piling (the source). The INSPIRE modelling will consider the following:

- Size of the pile;
- Hammer energy (including the effect of soft start);
- Duration of piling;
- Strike rate;
- Bathymetry at and around the foundation pile.

INSPIRE calculates the propagation of underwater noise with range based on environmental parameters, especially associated with depth of water (the pathway).

Critically, INSPIRE will also consider the sensitivities of key species of fish (e.g. herring, salmon, and mackerel) and marine mammal (e.g. common dolphin, harbour porpoise and Risso's dolphin) present at and in the surrounding region of the 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 (the receptor). 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 (PTS and TTS) for affected individuals are expected based on the guidelines. Disturbance because of any underwater noise produced will also be fully considered.

The locations where modelling will be undertaken will be identified in relation to zones of receptor sensitivity (e.g. Marine Protected Areas (MPAs) or Special Areas of Conservation (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. As modelling will not be undertaken at every single potential piling location, consultation will be undertaken with key stakeholders, i.e. Marine Directorate and NatureScot, to agree the most appropriate representative locations that ensure a robust assessment.

It is recognised (Popper and 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 are available for the level of particle motion that is generated by any of the potentially significant noise sources, and little data are available to predict effect thresholds in respect of particle motion for relevant fish species. Popper and Hawkins (2019) refer to this issue, and state:

> "*since there is an immediate need for updated criteria and guidelines on potential effects of anthropogenic sound on fishes, we recommend … that the criteria proposed by Popper et al. (2014) should be used*."

The availability of any new data will be monitored.

High intensity sources such as impact piling that directly affects the seabed will also generate 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 has the same limitations as those for particle motion in fish, where little is known of the quantitative influence of the vibration source, or of the sensitivity of relevant species to it. Roberts and Howard (2022) state:

> "*the aquatic research is far behind the terrestrial, with the detection abilities of most benthic species unknown and the extent to which vibrational cues are used being largely neglected to date*."

For lower-level noise sources such as dredging, cable laying, additional shipping, or wind turbine generator (WTG) operational noise, a simpler modelling methodology (the SPEAR model) will be utilised, which will provide sufficient detail to predict effects on marine mammals and fish. The SPEAR modelling approach does not take bathymetry or other environmental conditions into account, and as such can be applied to any location in or around the Offshore Development Area of Search.

There is the potential for UXO to be present at the Offshore Development Area of Search. 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 which 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.

Results of the underwater noise modelling will be reported in a Technical Appendix to the EIAR rather than a dedicated chapter and referenced in specialist topics that rely on the data, such as the Fish and Shellfish Ecology and Marine Mammals and Other Megafauna chapter (Chapter 6.6: Marine Mammals and Other Megafauna and Chapter 6.5: Fish and Shellfish Ecology).

6.2.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Underwater Noise include:

1. 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?
2. 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

Popper, A., & Hawkins, A. (2019). An overview in fish bioacoustics and the impacts of anthropogenic sounds on fishes. Journal of Fish Biology. *Journal of Fish Biology*, 1-22. doi:10.111/jfp.13948

Popper, A., Hawkins, A., Fay, R., Mann, D., Bartol, S., Carlson, T., . . . Tavolga, W. (2014). Sound exposure guidelines for Fishes and Sea Turtles. *Springer Briefs in Oceanography*. doi:10.1007/978-3-319-06659-2

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Solway, A., & Dahl, P. (2014). Peak sound pressure and sound exposure level from underwater explosions in shallow water. *The Journal of the Acoustical Society of America 136*, EL218. doi:10.1121/1.4892668

Southall, B., Finnerman, J., Reichmuth, C., Nachtingall, P., Ketten, D., Bowles, A., . . . Tyack, P. (2019). Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. *Aquatic Mammals, 45*(2), 125-232. doi:10.1578/AM.45.2.2019.125

Tougaard, J., Hermannsen, L., & Madsen, P. (2020). How loud is the underwater noise from operating offshore wind turbines? *The Journal of the Acoustical Society of America, 148*(5). doi:10.1121/10.0002453

6.3 Marine Sediment and Water Quality

6.3.1 Introduction

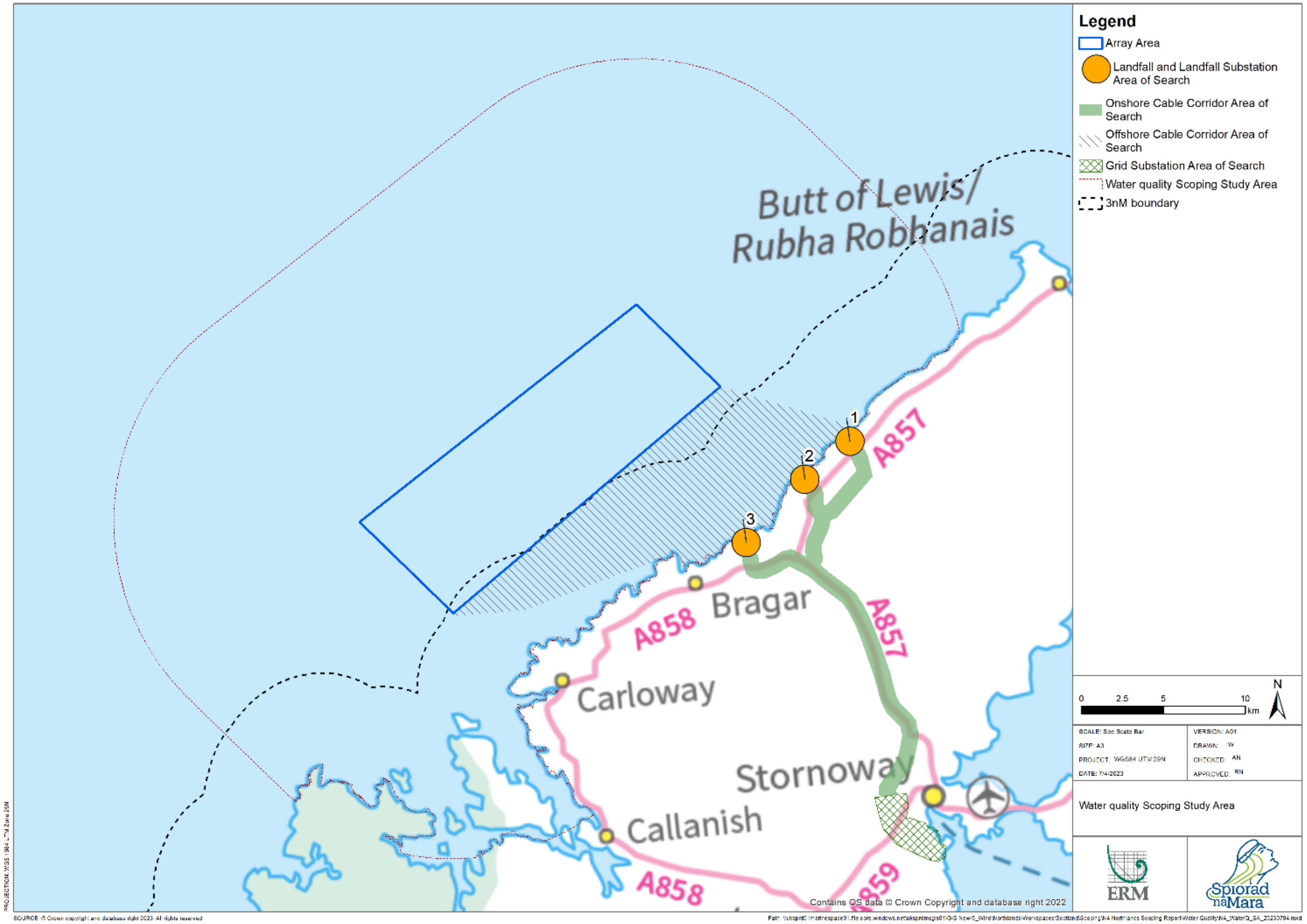
This chapter of the Scoping Report provides an overview of the baseline environment for Marine Sediment and Water Quality within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

The Marine Sediment and Water Quality topic specific receptors are discussed within this section; however, it must be noted that changes in water and sediment quality are also pathways that could result in a receptor effect. Potential changes as a result of the Project that may affect the pathways will be considered by other topic receptor impact assessments.

6.3.2 Study Area

The Marine Sediment and Water Quality Study Area shown in **Figure 6.3-1** has been defined as the Offshore Development Area of Search, buffered to a discretionary 15 km up to the mean high water springs boundary to consider the potential extent of Physical and Coastal Process impact pathways and the preliminary tidal excursion length (to be measured *in-situ*). The topic-specific study area includes the 3 nautical mile (NM) (Scotland) designated boundary of the Water Framework Directive (WFD) 2000/60/EC. The current Array Area covers an area of 161 km^2 whilst the Offshore Cable Corridor and landfall is still to be finalised and currently proposed as a wider Offshore Cable Corridor Area of Search.

Figure 6.3-1 Marine Sediment and Water Quality Study Area



6.3.3 Baseline Environment

6.3.3.1 Data Sources

The data sources used to inform this Marine Sediment and Water Quality Chapter of the Scoping Report are presented within **Table 6.3-1**. These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA). Site-specific surveys are planned for Q3 of 2023 and data on water and sediment quality collected during the environmental baseline survey, will be used to inform the Environmental Impact Assessment Report (EIAR).

Table 6.3-1 Summary of key publicly available datasets for Marine Sediment and Water Quality

Source	Spatial Coverage	Year	Summary
ABPmer/NOC Atlas of Marine Energy Resources	Full coverage	2017	Tides, winds and waves
BODC - Clean Seas Environmental Monitoring Programme	North Atlantic	1989 to present	Temperature and salinity data
British Geological Survey	UK	2022	Seabed morphology and bathymetry (INFOMAR), sediment types, Sediment Quality
Centre for Environment, Fisheries and Aquaculture Science (Cefas) - Suspended sediment climatologies around the UK	UK continental shelf	2016	Suspended sediments concentrations and distribution
Cefas - Silva 2016. Monthly average non-algal Suspended Particulate Matter concentrations on the UK shelf waters	UK	2016	Survey data on suspended solids around the UK
Cefas - Scottish Sanitary Survey Programme. Sanitary survey report Loch Roag.	Loch Roag	2012	Environmental survey and water quality data of Loch Roag
EMODnet - EMODnet broad-scale seabed habitat map for Europe 2019 (EUSeaMap)	Full coverage	2021	Modelled distribution of EUNIS substrate types
ICES - Oceanographic data	Full coverage	2021	Temperature and salinity data
JNCC - Coasts and seas of the United Kingdom. Regions 15 & 16: North-west Scotland	Western Isles	1997	Overview of environment, geology and ecology
Marine Directorate - Scotland's Marine Atlas: Information for The National Marine Plan	Scotland	2011	Hazardous substances in Scottish seas

Source	Spatial Coverage	Year	Summary
Marine Directorate - Annual Cycles of Physical, Chemical and Biological Parameters in Scottish Waters 1960-2010. Shelf waters - West coast - West of Hebrides.	West Hebrides	2014	Oceanographic data
Marine Directorate - Monthly average sea surface temperatures for 13 Scottish Sea Areas.	Scotland	2016	Average sea temperatures
Marine Directorate - Sedimentary organic carbon quality and reactivity	3 stations offshore the Isle of Lewis and the Isle of Harris	2022	Carbon and organic matter content
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
SEPA - Bathing Waters https://informatics.sepa.org.uk/BathingWaters/	Scotland	2023	Designated bathing water locations and status
SEPA - Shellfish Waters	Scotland	2023	Designated shellfish waters location and status
SEPA - Atlas of Coastal Classification and Environmental Data	Scotland	2020	Charts and data queries on water bodies and marine environment
UKHO	Scotland	2023	Hydrographic surveys

Data from the publicly available literature have been used to inform the baseline, which comprise the Project, Marine Sediment and Water Quality Study Area and the wider area of the Western Isles and the northeast Atlantic Ocean basin.

6.3.3.2 Overview of Baseline Environment

The Isle of Lewis is the largest and most northerly island in the Outer Hebrides (Western Isles). The west of the island is directly exposed to North Atlantic currents and, therefore, is influenced by the Gulf Stream, which carries warmer waters, originating from a subtropical gyre, northwards into the northeast Atlantic and the Western Isles. This creates a relatively mild and wet climate, with strong prevailing southwesterly winds (Neill *et al*. 2017).

The shelf sea waters east of the Isle of Lewis and the Isle of Harris are generally well mixed but can be seasonally stratified. They are influenced by enhanced wind-driven turbulence (affected by seasonal variation in atmospheric influence), strong tidal currents, and high wave energy driven by the waves propagating from the North Atlantic (JNCC, 1997; Neill *et al*., 2017; ABPmer, 2017). Wave monitoring offshore of the Isle of Lewis, has measured peak wave heights of ≥10 m, in 60 m water depths (Vogler and Morrison, 2013; Neill *et al*., 2017).

The northeastern Atlantic Ocean is characterised by semidiurnal tides. Tides propagate northwards, up the western edge of the continental shelf, then turn eastwards across the northern extent of Scotland (Neill *et al*., 2017). The mean tidal range around the Isle of Lewis is typically ~4 m, and tidal currents travel at ~1 m/s (JNCC, 1997; Neill *et al*., 2017).

The northeast Atlantic waters around the Western Isles are characterised by yearly average Sea Surface Temperatures (SST) ranging between 6-15°C, and an average Sea Surface Salinity (SSS) of ~35 ppt (season dependent) (Lozier *et al*., 1995; JNCC, 1997; OSPAR, 2000; Marine Directorate, 2016).

6.3.3.3 Water Quality

Chemical monitoring data from the Scottish Environmental Protection Agency (SEPA), and Cefas, are available for the Loch Roag water body area (~5 km southwest of the Array Area); however, currently there are no monitoring sites located within the Project, nor in the marine environment nearshore and offshore the northwest Isle of Lewis. There is, therefore, no site-specific information on water quality. Some publicly available data, discussed below, are available for the wider, North Atlantic, shelf sea basin.

Satellite imagery of estimated monthly average chlorophyll-α (ChL-α) concentration around the UK continental shelf (Ghohin, 2011; OSPAR, 2017), shows that during the productive season (spring bloom April-June data), within the Offshore Development Area of Search, ChL-α reaches a maximum of 5 mg/m^3 in coastal areas, below the excess concentrations found during peak eutrophication events in the southern North Sea (Ghohin, 2011; OSPAR, 2017a). Similarly, for non-algal Suspended Particulate Matter (SPM) and turbidity (in Nephelometric Turbidity Unit (NTU)), concentrations at the Offshore Development Area of Search (Ghohin, 2011; Silva, 2016), peak in the winter months (atmospheric turbulence induced); however, values remain low ≤5 g/m^3 and ≤3 NTU respectively.

Time series data (1960-2010), of physical and chemical parameters collected from the west coast of the Hebrides (Marine Directorate, 2014) show shelf sea surface waters are generally oxygen rich, with concentration averaging 6-8 ml/l (Lozier *et al*., 1995), corresponding to 90-106% saturation, and affected by seasonal variation in temperature and salinity influencing oxygen solubility (Marine Directorate, 2014).

Nutrient and contaminants data are scarce; however, the water quality of the sea around the Isle of Lewis is generally excellent, due to the limited land-based anthropogenic influence with low urbanisation and limited industrial and farming development. The location of the island on the margin of the North Atlantic, is also beneficial to water quality, as the high energy environment facilitates the dispersion and dilution of any nutrient enrichment (confirmed by consistently low average ChL-α concentrations) or anthropogenic compounds discharged in the area (NatureScot, 2004; Marine Directorate, 2010).

6.3.3.4 Water Framework Directive

Marine surface waters are classified under a River Basin Management Plan (RBMP) under the Water Environment and Water Services (Scotland) Act 2003. The key objectives of the WFD are to employ the RBMP to protect and, where necessary, restore water bodies to reach good status, and to prevent deterioration. Five classifications of water status are defined under the WFD: High, Good, Moderate, Poor, and Bad. Good status means both good chemical and good ecological status (DGfE, 2023). Potential impacts to onshore surface and groundwaters are covered within Chapter 7.7: Hydrology and Hydrogeology.

The southwest corner of the Array Area, the Offshore Cable Corridor Area of Search and landfall are located within the territory of a WFD designated water body as shown in **Figure 6.3-2.** The coastal water body is:

- Gallan Head to Butt of Lewis, ID 200476, Water Classification Status: High.

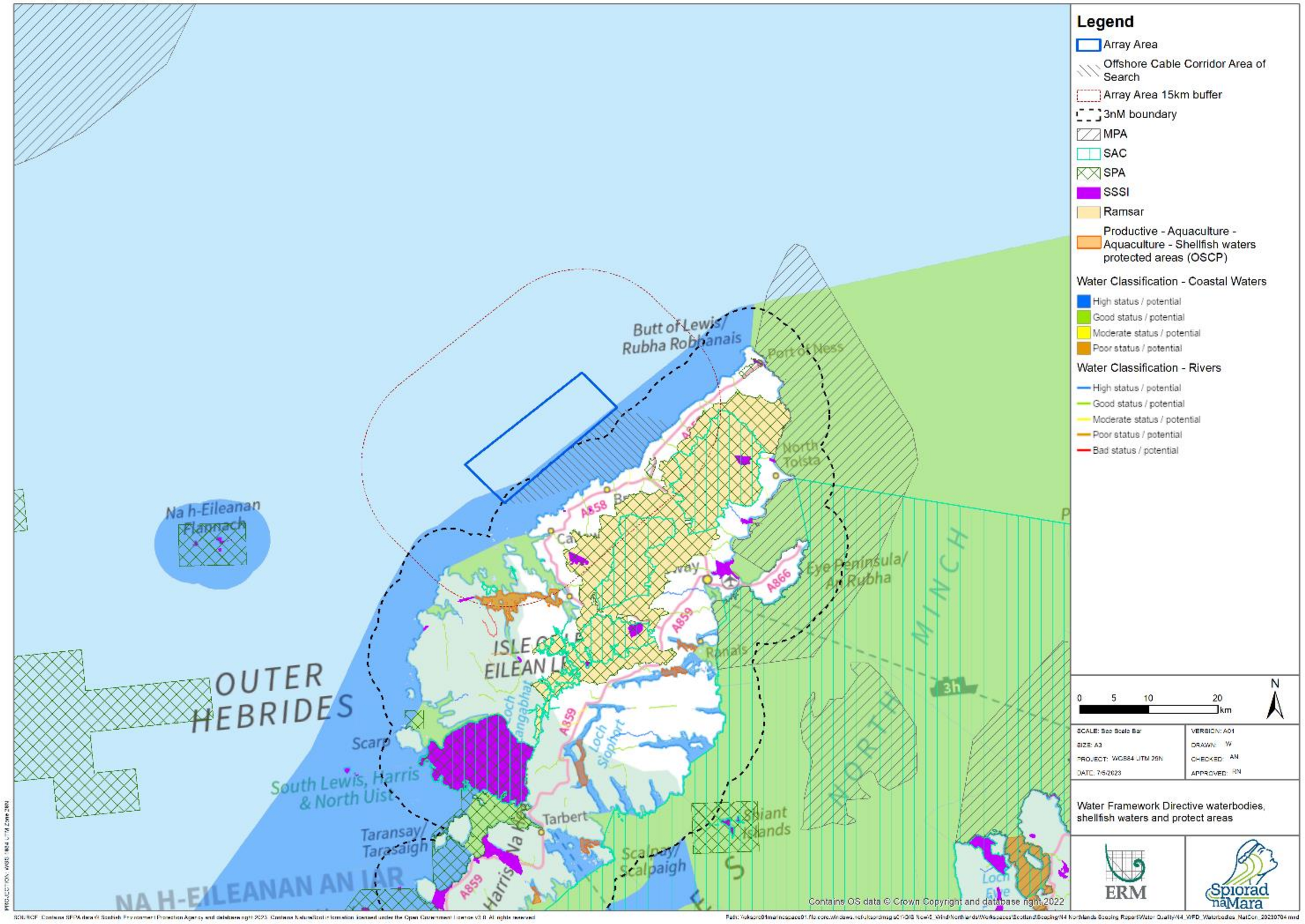
The Array Area is located in the proximity (~5 km southwest) of an additional water body, namely:

- Loch Roag, ID 200205, Water Classification Status: Good.

There are no WFD designated Bathing Waters within the vicinity of the Project. The closest designated site is located over 80 km from the Project, at Achmelvich, on mainland Scotland.

The closest Shellfish Water protected area is located within Loch Roag, 12.5 km from the Project and therefore included within the discretionary 15 km buffer area. Upon metocean data review (tidal excursion length data), the protected area will be assessed as a potential receptor in the EIAR.

Figure 6.3-2 Water Framework Directive Protected Areas, Water Bodies and Marine Protected Areas



6.3.3.5 Sediment Quality

A detailed geomorphological baseline is discussed in Chapter 6.1: Physical and Coastal Processes and is summarised below.

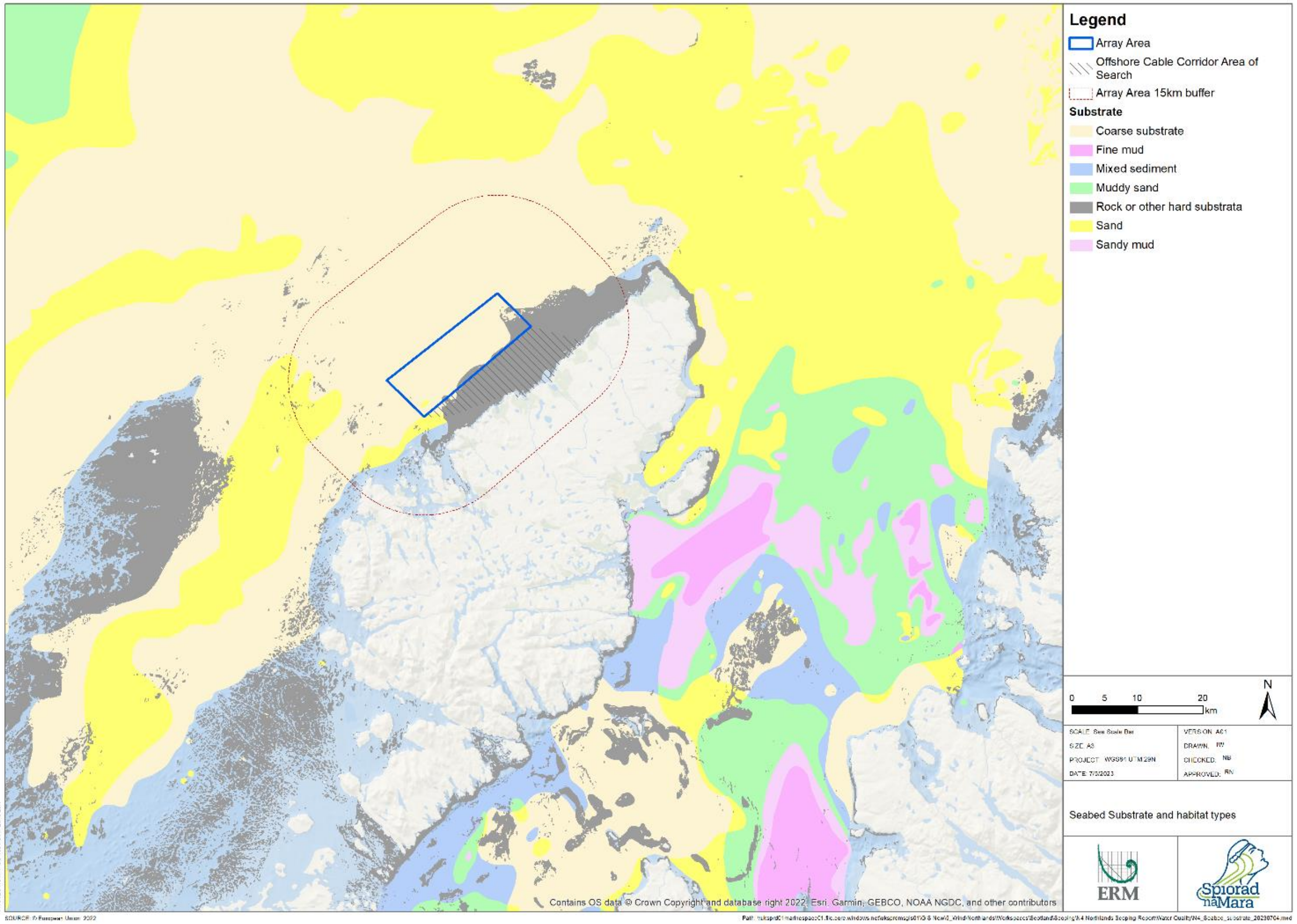
Seabed sediments within the northern and central areas of the Offshore Development Area of Search predominantly consist of coarse substrate with a small area of sandy sediments located in the southwest corner of the Array Area. The nearshore seabed within the Offshore Cable Corridor Area of Search, and along the southeast boundary of the Array Area, are characterised by exposed consolidated bed rock as shown in **Figure 6.3-3.**

In-situ sediment quality data are scarce; however, sediment quality at the Offshore Development Area of Search is expected to be high, due to excellent water quality and the limited land-based anthropogenic influence (low urbanisation and limited industrial and farming developments).

Some sediment quality data are available from Marine Directorate (2022), with a small number of locations, offshore of the Isle of Lewis and the northern area of the Isle of Harris, being sampled for a small range of parameters. Data indicate that the percentage of organic Carbon (C) in these sediments ranged from 0.27% in sandy, deeper stations (~94 m), to 1.37% in mud to muddy sand sediments in stations ~50 m deep. The percentage of Total Organic Matter (TOC) ranged from 0.7% in sandy sediments (depth ~40 m) to 9.9% in sediments composed of mud to muddy sand (depth ~50 m) (Marine Directorate, 2022).

Additional data collected from OSPAR, on hazardous substances in the Irish and Scottish West Coast area (OSPAR, 2017b), show mean concentrations of Polycyclic Aromatic Hydrocarbons (PAH) in sediments to be significantly below Background Assessment Concentrations (BAC) (concentrations close to zero for man-made substances - OSPAR Hazardous Substances Strategy’s aim). Additionally, OSPAR (2017c) data show concentrations of Polychlorinated Biphenyls (PCB) below the Environmental Assessment Criteria (EAC) (levels should not cause chronic effects in sensitive marine species) but above the BAC. In addition, mean heavy metal concentrations (Cadmium, Mercury and Lead) were found to be below BAC levels (OSPAR 2017d).

Figure 6.3-3 Seabed and habitat types from EMODnet



6.3.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Marine Sediment and Water Quality assessment, which has been incorporated into the design of the Project (**Table 6.3-2**).

Table 6.3-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.4	Accidental release of contaminants through sediment disturbance	Adherence to industry best practice (adherence to a Drilling Fluid Detection and Response Plan).
6.5	Accidental release of pollutants from vessels	Development of a Construction Environmental Management Plan (CEMP) - this would include adherence to requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78/. Best practice techniques employed through all phases of the Project, and measures provided in a Marine Pollution Contingency Plan (MPCP), will form part of the CEMP. All vessels associated with the Project will comply with IMO/MCA codes for prevention of oil pollution and, where appropriate, will have onboard Shipboard Oil Pollution Emergency Plans (SOPEPs) (i.e. vessels over 400 gross tonnes (GT)).
6.6	Accidental release of construction material and/or litter	Development of procedures to retrieve dropped objects.
6.7	Increase of suspended sediments	Best practice techniques for seabed excavations, employed through all phases of the Project, and suspended solids monitoring to aid responsible management of dredging and excavation activities.
6.8	Introduction of Invasive Non-native Species Management Plan (INNS)	Adherence to Invasive Non-native Species Management Plan to reduce the risk of introducing or spreading invasive species in line with WFD requirements to prevent the deterioration of marine surface waters

6.3.4.1 Stakeholder advice and considerations

SEPA standing advice, relevant to the Marine Water and Sediment Quality topic, for the Department for Business, Energy and Industrial Strategy and Marine Directorate on marine consultations (SEPA, 2022) details important consideration and mitigation measures to be included in the Project assessment and application process, notably:

- SEPA recommend that marine licence and Electricity Consent applicants be encouraged to submit information detailing how proposed developments will **contribute to sustainable development**. Opportunities to enhance marine habitats in line with Water Framework Directive and The Nature Conservation (Scotland) Act 2004 objectives and Scottish Planning Policy guidance should be explored.

- The **accidental introduction of Marine Non-Native Species** (MNNS) has been highlighted as a risk for water body degradation and the River Basin Management Plan states that "We will take a zero tolerance approach to actions that could result in the introduction of [these] invasive species". Given that there has been no successful eradication of any MNNS, we recommend that controls should be included in marine licensing for MNNS in line with Water Framework Directive and Marine Strategy Framework Directive objectives, as well as EU Biodiversity Strategy targets. The Scottish Government has produced a Code of Practice on Non-Native Species that clarifies the Wildlife and Natural Environment (Scotland) Act's amendments to the Wildlife and Countryside Act (Scotland). This code clarifies organisational responsibilities and obligations, the use of Control Orders as well as the "polluter pays" principle. Under the Water Framework Directive, the presence of MNNS within a water body can constitute a significant pressure on the biological elements. Good status is usually the maximum a water body can achieve if MNNS are detected, and this can fall to moderate status if MNNS are present above certain thresholds or impact on ecological receptors. We support the Great British Non-Native Species Secretariat (GBNNSS) recommendation to put in to place effective biosecurity measures to prevent introduction and to stop their spread;
- **Bathing Waters**: Any operation should be cross checked to see if the proposed site is in or adjacent to a designated bathing water (within 2 km). If so, all physical operations should be done outwith the Bathing Water Season (1 June to 15 September). If works to be done within Bathing Water Season, a strong case should be made as to why a particular operation would not present a risk to Bathing Waters;
- Pollution prevention: Many operations could potentially give rise to risk of pollution through silt mobilisation, silt suspension or chemical or oil spillages. To prevent pollution and safeguard marine ecology interests it is vital that good working practice is adopted, and appropriate steps taken to prevent water pollution and minimise disturbance to sensitive receptors. Measures need to be in place to minimise the release of sediment plumes and to contain and prevent construction and waste materials e.g. paint from falling from a structure into the water body beneath. Where appropriate, mitigation measures should be sought within method statements and onsite compliance should be confirmed through site visits (refer to SEPA GPP 5, 2018);
- **Dredge spoil**: Dredged material should be disposed of at an offshore sea disposal site and that work must be carried out in line with best dredging practices. Material should be deposited on the beach below mean high water springs (MHWS) and allowed to disperse naturally. If any dredged material accumulates above MHWS, disposal operations must cease until the material has dispersed;
- **Waste material (includes dredge spoil) above the low water mark**: Waste material, which includes dredge spoil, deposited above the low water mark is subject to Waste Management Licensing controls regulated by SEPA unless it is subject to a licence issued under Part 4 of the Marine (Scotland) Act 2010 (which can extend to MHWS Tide including within estuaries, rivers and channels), in which case it is excluded from such controls. However, if the waste deposition could

constitute a landfill, then PPC not Waste Management Licensing would apply, and in this situation no Marine Licence exclusion is provided for;

- **Decommissioning:** While MD-LOT consult on Marine Licence applications for decommissioning, the applicant will consult Department for Energy Security and Net Zero on the Decommissioning Programme (as per Energy Act 2004) required to be submitted as part of the s.36/Marine Licences issued for renewables construction. SEPA does not require to be consulted and will provide no comments on the Decommissioning Programme. Please ensure that conditions cover decommissioning where appropriate and the removal of all devices and as much of the support infrastructure/cabling is removed and all waste materials are removed and reused, recycled or disposed of at a licensed onshore site.

6.3.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.3.5.1 Likely Significant Effects

Potential likely significant effects on Marine Sediment and Water Quality receptors within the Offshore Development Area of Search, which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project, have been identified. These impacts are outlined in **Table 6.3-3**.

As water and sediments are considered pathways to other receptor groups, the potential likely significant effects of changes in their quality, on receptors such as fish and shellfish, benthic habitats, ornithology and, where applicable, water quality in protected Natura 2000 sites (Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)), will also be assessed in the EIAR.

Table 6.3-3 EIA Scoping Assessment for Marine Sediment and Water Quality

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Accidental release of pollutants from vessels leading to deterioration of water and sediments quality	6.5	**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, an environmental monitoring plan (e.g. a Construction Environmental Management Plan CEMP)), which complies with requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and Shipboard Oil Pollution Emergency Plans (SOPEPs), will reduce the likelihood and minimise the impact of any accidental release of pollutants from construction vessels and equipment. Therefore, this impact has been scoped out of the EIA assessment.	
Accidental release of sewage and domestic waste from vessels leading to deterioration of water quality	6.6, 6.7	**Out**	Likely increase of inorganic and organic nutrients in water and sediments, due to accidental release of sewage and domestic waste from vessels during transit and operations. Likely increase of eutrophication events associated with nutrient enrichment. Compliance with requirements and best practices stated in a CEMP and compliance with the International Convention for the	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			Prevention of Pollution from Ships (MARPOL), will reduce the likelihood and minimise the impact of any accidental release of waste material from vessels during transit and operations. Therefore, this impact has been scoped out of the EIA assessment.	
Accidental release and loss of debris, materials and/or litter from vessels leading to deterioration of water and sediments quality	6.6	**Out**	Likely input of solid material, litter and debris discarded from vessels (e.g. construction/decommissioned engineering waste). Leads to seabed habitat deterioration and water column contamination e.g. microplastics remain suspended, causing chemical leaching and physical damage to biology through ingestion, toxic bioaccumulation, smothering and entanglement. Compliance with requirements and best practices stated in a CEMP and compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL), will reduce the likelihood and minimise the impact of any accidental release of waste material from vessels during transit and operations. Therefore, this impact has been scoped out of the EIA assessment.	
Remobilisation of sediments causing potential resuspension of contaminated	6.4, 6.7	In	Direct seabed disturbance during construction (substrate preparation and installation of infrastructure), releases potentially contaminated sediments into the water column causing deterioration of water quality. Reductions in water quality may negatively impact the	The assessment will be informed by the environmental baseline survey, which will determine the spatial distribution, and concentration of sediment contaminants within the Array Area and Offshore Cable Corridor Area of Search and expected area of

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
sediments into the water column leading to deterioration of water and sediment quality			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. Assessment to include WFD designated water bodies and other statutory receptors where applicable.	disturbance. In addition, findings of the physical processes study will predict the extent of any sediment plumes and expected sediment deposition that may occur within the Marine Sediment and Water Quality Study Area.
Remobilisation of sediments causing increased suspended solids concentration in the water column leading to deterioration of water quality	6.4, 6.7	In	Direct seabed disturbance during construction (substrate preparation and installation of infrastructure), temporarily increases suspended sediment into the water column, which are transported and dispersed in suspension by currents and deposited over various distances (tidal excursion and sediment granulometry dependent). Increased Suspended Solids Concentration may lead to smothering and decrease water clarity, negatively impacting the habitat and health of benthos, plankton and nekton. The timing and scale of direct seabed habitat disturbance associated with construction and decommissioning will determine the significance of this impact. Assessment to include WFD designated water bodies and other statutory receptors where applicable.	The assessment will be informed by the environmental baseline survey that will determine the spatial distribution, and concentration of sediment contaminants within the Array Area and Offshore Cable Corridor Area of Search and expected area of disturbance. In addition, findings of the Physical Processes study will predict the extent of any sediment plumes and expected sediment deposition that may occur within the Marine Sediment and Water Quality Study Area.
Release of drilling fluid mud, drilling arisings or bentonite	6.4	In	Trenchless techniques are a method of installation for the export cable, such as Horizontal Directional Drilling (HDD) to transition the export cable to the onshore grid at the landfall area during the construction phase. This	The assessment will be informed following the findings of the predictive modelling of the extent of any plumes in the Marine Sediment and Water Quality Study Area,

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			activity can release drilling fluid muds, increasing fine sediment resuspension and release very low levels of bentonite into the water column, which may impact water and sediment quality. Assessment to include WFD designated water bodies and other statutory receptors where applicable.	and thus the expected transport of any generated discharges of drilling muds.
Introduction of Invasive Non-Native Species (INNS)	6.8	In	Statutory WFD receptor. Likely introduction of INNS organisms, larvae, and plankton from the untreated ballast water of foreign ships, or from their hulls. Survival, establishment and out competition by INNS in the new environment could drive native plants and animals to extinction, leading to habitat loss and reduced biodiversity, potentially impacting the status of marine surface waters as classified under the WFD. The risk of this is greatest with the use of installation vessels such as jack-up barges, which are used at a number of locations internationally.	The assessment will be informed by a desktop study on the presence of INNS in the region, and likelihood of spread of INNS by Project related activities.
Cumulative effects		In	There is the potential for cumulative effects to arise from the Project and a number of proposed nearby development e.g, N2 (Havbredey) and N3 (Talisk) (awarded leases) and potentially other infrastructure present in the area from gas and oil developments.	Consideration for other projects present or planned in the area and risks assessment
Transboundary effects		**Out**	The Offshore Development Area of Search resided within Scottish territorial waters and there is no	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			potential for transboundary impacts to Marine Water and Sediment Quality receptors as a result of construction, operation (and maintenance) and decommissioning activities. Therefore, this impact has been scoped out of the EIA assessment.	
Operation and Maintenance				
Remobilisation of sediments causing potential resuspension of contaminated sediments into the water column leading to deterioration of water and sediment quality	6.4, 6.7	In	Direct seabed disturbance during maintenance and remedial work has the potential to release potentially contaminated sediments and introduce contaminants into the water column. Sediment quality baseline data, the timing and scale of direct seabed habitat disturbance associated with maintenance will determine the significance of this impact. Assessment to include WFD designated water bodies and other statutory receptors where applicable.	The assessment will be informed by the environmental baseline survey that will determine the spatial distribution, and concentration of sediment contaminants within the Array Area and Offshore Cable Corridor Area of Search and expected area of disturbance. In addition, findings of the physical processes study will predict the extent of any sediment plumes and expected sediment deposition that may occur within the Marine Sediment and Water Quality Study Area.
Remobilisation of sediments causing increased suspended solids concentration in the water column leading to deterioration of water quality	6.4, 6.7	In	Direct seabed disturbance during maintenance and remedial work temporarily increases suspended sediment into the water column, which are transported and dispersed in suspension by currents and deposited over various distances (tidal excursion and sediment granulometry dependent). It may lead to smothering and poor visibility, and negatively impact the health of benthos, plankton and nekton. Sediment quality	The assessment will be informed by the environmental baseline survey that will determine the spatial distribution, and concentration of sediment contaminants within the Array Area and Offshore Cable Corridor Area of Search and expected area of disturbance. In addition, findings of the Physical Processes study will predict the extent of any sediment plumes and expected sediment deposition that may

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			baseline data, the timing and scale of direct seabed habitat disturbance associated with construction and decommissioning will determine the significance of this impact. Assessment to include WFD designated water bodies and other statutory receptors where applicable.	occur within the Marine Sediment and Water Quality Study Area.
Release of drilling fluid mud, drilling arisings or bentonite	6.4	In	Trenchless techniques are a method for the export cable repair/replacement at landfall during the operational and maintenance phase. This activity can release drilling fluid muds, increasing fine sediment resuspension and release very low levels of bentonite into the water column, which may impact water and sediment quality. Assessment to include WFD designated water bodies and other statutory receptors where applicable.	The assessment will be informed following the findings of the predictive modelling of the extent of any plumes in the Marine Sediment and Water Quality Study Area, and thus the expected transport of any generated discharges of drilling muds.
Accidental release of pollutants from vessels leading to deterioration of water and sediments quality	6.5	**Out**	The presence of vessels, and plant machinery operating during maintenance and remedial works, introduces the risk of accidental release of pollutants from leaks or spills of fuels and lubricants. However, an environmental monitoring plan (e.g. a CEMP)), which complies with requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and Shipboard Oil Pollution Emergency Plans (SOPEPs), will reduce the likelihood and minimise the impact of any accidental release of pollutants from vessels and equipment. Therefore, this impact has been scoped out of the EIA assessment.	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Accidental release of sewage and domestic waste from vessels leading to deterioration of water quality	6.6, 6.7	**Out**	Likely increase of inorganic and organic nutrients in water and sediments, due to accidental release of sewage and domestic waste from vessels during transit and maintenance operations. Likely increase of eutrophication events associated with nutrient enrichment. Compliance with requirements and best practices stated in a Construction Environmental Management Plan CEMP and compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL), will reduce the likelihood and minimise the impact of any accidental release of waste material from vessels during transit and operations. Therefore, this impact has been scoped out of the EIA assessment.	
Accidental release and loss of debris, materials and/or litter from vessels leading to deterioration of water and sediments quality	6.6	In	Likely input of solid material, litter and debris discarded from vessels during transit, maintenance, and remedial work. Can lead to seabed degradation and water column contamination e.g. microplastics remain suspended, causing chemical leaching and physical damage to biology through ingestion, toxic bioaccumulation, smothering and entanglement.	The assessment will be informed by a desktop study looking at the risk of accidental release of debris, materials and litter for vessels in the region.
Changes to sediment transport system and scouring leading to		**Out**	Likely localised changes in sediment siltation rates and standard background sediment resuspension concentration, due to the presence of subsea	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
changes in physical processes potentially deteriorating sediment and water quality			infrastructure affecting hydrodynamics (e.g. current speed and direction, wave regime). Effects on sediment and water quality are negligible, therefore, this impact has been scoped out of the EIA assessment.	
Changes to waves and current regime: changes in physical processes potentially deteriorating sediment and water quality		**Out**	Likely long-term changes in water flow dynamics occurring due to the placement of subsea infrastructure. Can lead to hydrodynamic changes within the Marine Sediment and Water Quality Study Area through modification of the wind fields, and oceanographic parameters, including turbulence, mixing, and vertical stratification which could in turn affect water quality e.g. nutrients distribution and flushing abilities potential causing increased eutrophication events. The Spiorad na Mara site is located within a high energy environment characterized by strong tidal wave mixing enhancing the receptors recoverability. Therefore, this impact has been scoped out of the EIA assessment.	
Increased seabed substrate and water column temperature due to subsea cable operation		**Out**	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 temperature associated with subsea cables is not expected to impact	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			receptors on or within the seabed substrate. Therefore, this impact has been scoped out of the EIA assessment.	
Cumulative effects		In	There is the potential for cumulative effects to arise from the Project and a number of proposed nearby development e.g, N2 (Havbredey) and N3 (Talisk) (awarded leases) and potentially other infrastructure present in the area from gas and oil developments.	Consideration for other projects present or planned in the area and risks assessment
Transboundary effects		**Out**	The Offshore Development Area of Search resided within Scottish territorial waters and there is no potential for transboundary impacts to Marine Water and Sediment Quality receptors as a result of construction, operation (and maintenance) and decommissioning activities. Therefore, this impact has been scoped out of the EIA assessment.	

6.3.6 Proposed Approach to EIA

6.3.6.1 Relevant Data Sources

The baseline characterisation of the Marine Sediment and Water Quality Study Area, to inform the EIA process, will be collated through an existing number of key sources from, public authorities monitoring data, WFD data, OSPAR data, peer reviewed literature (as shown in **Table 6.3-1**) and *in-situ* data. Additional site-specific data on the Offshore Development Area of Search will be collected through a planned geophysical and environmental baseline survey, collecting data on water and sediment quality, due to take place in Q3 of 2023.

6.3.6.2 Consultation

Several competent public authorities and advisory bodies are involved in Scottish water and sediment quality management. **Table 6.3-4** summarises the consultees proposed for the Marine Sediment and Water Quality topic.

Table 6.3-4 Summary of proposed consultees for the Marine Sediment and Water Quality topic

Proposed Consultee	Description
NatureScot	• Statutory advisor to Scottish Ministers regarding environmental and natural heritage considerations; previously called SNH.
Marine Directorate – Licensing Operations Team (MD-LOT)	• Department of Scottish Government responsible for marine licensing and consenting.
SEPA	• A non-departmental public body of the Scottish Government responsible for protecting the environment and human health. • During scoping workshops, SEPA were consulted and responded with a link to standing advice (SEPA, 2022) which was noted to apply to all development proposals except a development proposal of potentially significant impact on aspects of the environment directly regulated by SEPA which is not dealt with adequately by their standing advice or is novel or unusual.
Comhairle nan Eilean Siar	• Local planning authority with planning responsibilities to mean low water springs.

6.3.6.3 Policy, Legislation and Guidance

Table 6.3-5 and **Table 6.3-6** lists policies and guidance documents in Scotland, relevant to Marine Sediment and Water Quality scoping assessment. The policies include European Union (EU) directives (from EUR-Lex, 2022), which set out obligations for Scotland, pre-Brexit, to monitor and meet appropriate environmental and water quality standards to be considered in the EIA; and which have been transposed into Scottish law.

Table 6.3-5 Policy relevant to the Marine Sediment and Water Quality assessment

Legislation and Policy
Water Framework Directive
Bathing Waters Directive
Shellfish Waters Directive
Marine Strategy Framework Directive
Environmental Quality Standards Directive
Maritime Spatial Planning Framework Directive
Priority Substance Directive
Water Environment and Water Services (Scotland) Act 2003
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)
The Nature Conservation (Scotland) Act 2004 and Scottish Planning Policy
The Pollution Prevention and Control (Scotland) Regulations 2012
Environmental Authorisations (Scotland) Regulations 2018
The Bathing Waters (Scotland) Regulations 2008
The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013

Table 6.3-6 Guidance relevant to The Marine Sediment and Water Quality assessment

Guidance
Assessment of the environmental impacts of cables
Department for Business Enterprise and Regulatory Reform Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry
CIRCA C584 Coastal and Marine Environmental Site Guide
COWRIE Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guidance
Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects.
Guidance note on carrying out a Water Framework Directive assessment on Environmental Impact Assessment developments
Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects.
The International Convention for the Prevention of Pollution from Ships

Guidance
Regulation 37 of Annex I of MARPOL (requires that all ships of 400 GT or more carry an approved SOPEP)
Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters
SEPAs Guidance for Pollution Prevention

6.3.6.4 Assessment Methodology

The EIA methodology will follow the structure of the methodology presented in Chapter 4: Proposed Approach to EIA. A baseline section will identify the Marine Sediment and Water Quality receptors and pathways potentially present within the defined Marine Sediment and Water Quality Study Area, from which receptor groups will be determined.

The following Marine Sediment and Water Quality Study Area receptors will be considered during the detailed EIA phase:

- The Offshore Development Area of Search;
- Coastal areas within 3 NM (WFD protected area) assessed in a separate section of the EIAR;
- Designated water sensitive and protected areas such as Bathing Waters and Shellfish Waters assessed in a separate section of the EIAR;
- Natura 2000 sites (none identified in the proximity);
- Priority habitats potentially identified through in-situ surveys;
- A defined buffer zone taking into consideration the spatial and temporal variation of tidal influence (spring tidal excursion ellipse) around the Offshore Development Area of Search boundaries.

There is no specific guidance produced by SEPA for undertaking a WFD assessment in Scotland. Therefore, the assessment will follow the 3 staged approach in accordance with Environment Agency guidance for completing WFD assessments and the Planning Inspectorate's Advice Note Eighteen published in June 2017:

- Stage 1 (Screening) - Excludes any activities that do not need to go through the scoping or impact assessment stages;
- Stage 2 (Scoping) - Identifies the receptors such as morphology, habitats, fish, INNS and protected areas that are potentially at risk from the activities of the onshore elements of the Project and need impact assessment;
- Stage 3 (Impact Assessment) - Considers the potential likely significant effects of the activities taking into consideration embedded mitigation, identifies additional mitigation if required, and shows if the activities may cause deterioration or prevent the waterbody achieving good status.
- The direct impacts of the Project on water and sediment quality will be assessed in the EIA phase. Consideration will be given to the extent and duration of predicted direct impacts and the expected

sensitivity of the receptors. Water and sediment quality is considered a receptor, and a pathway that potentially impacts other receptors; therefore, the indirect impacts of the Project on the physical pathways and their receptors will be assessed in the appropriate sections of the EIAR. Other receptors assessed in this EIA Scoping report, affected by Marine Sediment and Water Quality, include:

  - Chapter 6.4: Benthic and Intertidal Ecology;
  - Chapter 6.5: Fish and Shellfish Ecology;
  - Chapter 6.6: Marine Mammals and Other Megafauna;
  - Chapter 6.9: Commercial Fisheries;
  - Chapter 6.12: Offshore Infrastructure, Other Sea Users, Tourism and Recreation.

The assessment of potential effects will be established using the standard Source-Pathway-Receptor (S-P-R) approach. The relevance of these potential effects will be considered against the receiving environment conditions which would be expected to occur if no development took place.

A number of marine physical processes affect the magnitude and the duration of the impacts on the receptors e.g. geomorphology and sediment transport and tidal excursion, therefore the proposed data will be reviewed in the EIAR:

- Metocean modelling report, detailing the hydrodynamic simulations, sediment transport dynamics, tidal excursion length prediction and identification of a defined buffer zone. The report will provide metocean information on the current baseline environment and model potential changes (including the wider area) that may originate from the Project (tidal influence, sediment transport, etc); and identify an appropriate buffer zone (currently set at 15 km);
- An environmental baseline report of the surveyed Offshore Development Area of Search, which will characterise of the physico-chemical environment of the seabed and water column. The site-specific field survey data, to be collected through geophysical and environmental surveys, is planned for Q3 of 2023.

6.3.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Marine Sediment and Water Quality include:

1. Do you agree that the data sources identified are sufficient to inform the Marine Sediment and Water Quality baseline for the EIA (and, therefore, that no further baseline data collection is merited)?
2. Have all Marine Sediment and Water Quality receptors, and potential likely significant effects that could result from the Project, been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Marine Sediment and Water Quality?

4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Project on Marine Sediment and Water Quality receptors?

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6.4 Benthic and Intertidal Ecology

6.4.1 Introduction

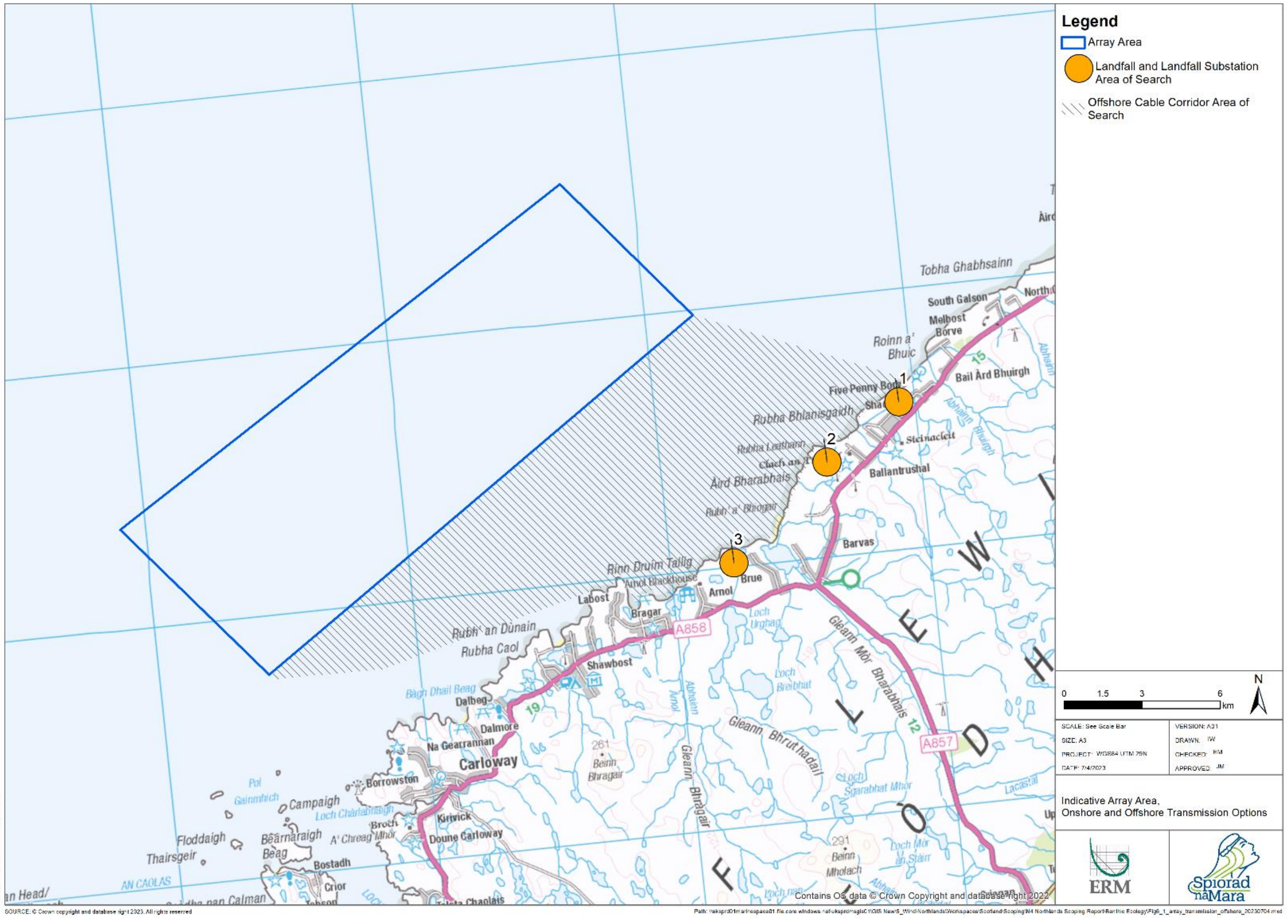
This chapter of the Scoping Report provides an overview of the baseline environment for Benthic and Intertidal Ecology within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

6.4.2 Study Area

The Benthic and Intertidal Ecology Study Area has been defined as the Array Area and Offshore Cable Corridor Area of Search (the area of search for the offshore cable infrastructure and landfall options) up to the mean high water spring (MHWS) (**Figure 6.4-1**). These are the areas currently under consideration for placement of the Project marine infrastructure and associated works.

There is expected to be a wider zone of influence (extent to be determined by Physical and Coastal Process study) around the Offshore Development Area of Search, and as such, the presence of features of conservation interest in the wider area were also considered.

Figure 6.4-1 Benthic and Intertidal Ecology Study Area



6.4.3 Baseline Environment

6.4.3.1 Site Specific Surveys

To provide site-specific and up to date information on which to base the impact assessment, a site-specific benthic ecology survey is planned for Q3 2023. A geophysical survey will occur first, which will be used to target areas of interest. The geophysical data will also be used to inform the assessment in terms of sediment and associated habitat types. The benthic ecology survey will include both drop-down video (DDV) and grab samples. Due to the rocky nature of the seabed, sediment sampling may not be possible at all locations and in this instance only DDV data will be acquired. The final survey scope will be discussed with Marine Directorate, NatureScot and other relevant stakeholders, prior to commencement of the surveys.

6.4.3.2 Data Sources

The data sources used to inform this Benthic and Intertidal Ecology Chapter of the Scoping Report are presented within **Table 6.4-1**. These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside site-specific survey data collected for the Project as discussed above.

Table 6.4-1 Summary of Key Publicly Available Datasets for Benthic and Intertidal Ecology

Source	Spatial Coverage	Year	Summary
European Marine Observation and Data Network (EMODnet) - EMODnet broad-scale seabed habitat map for Europe (EUSeaMap)	Full coverage	2021	Modelled distribution of European Union Nature Information System (EUNIS) biotopes
EMODnet - OSPAR threatened and/or declining habitats	Partial	2020	Known locations of OSPAR threatened and/or declining habitats
EMODnet – Annex I habitats	Partial	2019	Known locations of Annex I habitats
Geodatabase of Marine features adjacent to Scotland (GeMs) - Scottish Priority Marine Features (PMF)	Partial	2022	Known locations of PMF
Seabed habitats west of the Isle of Lewis in Scotland (Harrald et al., 2011)	Partial	2010	Marine Directorate Science surveyed 260 km^2 of coastline west of the Isle of Lewis using swath bathymetry and DDV. The bathymetry, backscatter data and ground truthing were used to interpret habitat maps of the seabed.

Source	Spatial Coverage	Year	Summary
Joint Nature Conservation Committee (JNCC) – Marine Recorder	Partial	2000-2019	Database of benthic sample data across the UK's offshore and inshore waters.
Scottish National Heritage (SNH) - Biological Analysis of underwater video from proposed Marine Protected Areas (MPAs), renewables energy sites, and spoil grounds around Scotland	Partial	2014	Biological analyses of underwater video from various surveys, including survey west of Lewis in 2013, which partially overlaps the Project.
Envision Mapping Ltd – Isle of Lewis Benthic Ecological Drop-down Video Survey	Partial	2011	Site-specific benthic survey using drop-down/towed video at two sites proposed for wave energy demonstration array off the west coast of the Isle of Lewis.
Royal Haskoning - Lewis Wave Array: Intertidal Survey Report	Partial	2011	Royal Haskoning was commissioned by Lewis Wave Power to conduct an intertidal survey.

6.4.3.3 Overview of Baseline Environment

Intertidal Benthic Ecology

The preferred landfall location has not yet been determined; however, 3 potential landfall locations have been shortlisted. A review of typical intertidal habitats within the Offshore Cable Corridor Area of Search, which includes the shortlisted landfall options, has been conducted and is presented in **Figure 6.4-1** and discussed below.

There is limited information available on the intertidal habitats along the Offshore Development Area of Search. However, information available on subtidal habitats suggests that the extensive subtidal rock bed within the Offshore Development Area of Search is likely to extend into the intertidal (EMODnet, 2023). In 2011 an intertidal survey was conducted between Siadar and Còig Peighinnean Bhuirgh by Royal Haskoning for the Lewis Wave Array Project (Royal Haskoning, 2011). The area of the 2011 intertidal survey overlaps the Offshore Cable Corridor Area of Search near landfall 1. In total, the survey identified 16 different biotopes across 23 target locations (**Table 6.4-2**). The intertidal was dominated by rock biotopes and as such these biotopes are expected to be representative of intertidal habitats within the Offshore Development Area of Search. Nonetheless, a baseline survey will be conducted to characterise the intertidal area within the Offshore Cable Corridor Area of Search to inform the EIA.

Table 6.4-2 Intertidal EUNIS Habitats Identified Between Siadar and Còig Peighinnean Bhuirgh (Royal Haskoning, 2011)

EUNIS Habitat	Description
High Energy Littoral Rock	
A1.111 *Mytilus edulis* and barnacles on very exposed eulittoral rock	On very exposed to exposed rocky shores the eulittoral zone, particularly the mid and lower shore, is typically characterised by patches of small individuals of the mussel *Mytilus edulis* interspersed with patches of the barnacle *Semibalanus balanoides* and individuals of the limpet *Patella vulgata*. Amongst the mussels, small individuals of red seaweeds including *Ceramium* spp., *Corallina officinalis* and *Mastocarpus stellatus* can be found. The foliose red seaweeds *Porphyra umbilicalis* and *Palmaria palmata* are commonly found as epiphytes on *M. edulis* where they can form luxuriant growths.
A1.1131 *Semibalanus balanoides*, *Patella vulgata* and *Littorina* spp. on exposed to moderately exposed or vertical sheltered eulittoral rock	Very exposed to sheltered mid to upper eulittoral bedrock and large boulders characterised by dense barnacles *S. balanoides* and the limpet *P. vulgata*. The community has a relatively low diversity of species, though occasional cracks and crevices in the rock can provide a refuge for small individuals of the mussel *M. edulis*, the winkle *Littorina* spp. and the whelk *Nucella lapillus*. Seaweeds are usually not found in high numbers, though fissures and crevices in the bedrock can hold a sparse algae community, patches of the red seaweed *Osmundea pinnatifida* can be present throughout the zone.
Moderately Energy Littoral Rock	
A1.21 Barnacles and fucoids on moderately exposed shores including: **A1.211** *Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock, **A1.213** *Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock, and **A1.2141** *Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock	Moderately exposed rocky shores characterised by a mosaic of fucoids and barnacles on bedrock and boulders, where the extent of the fucoid cover is typically less than the blanket cover associated with sheltered shores. Other species are normally present as well in this habitat including the winkle *Littorina littorea*, the whelk *N. lapillus* and the red seaweed *M. stellatus*. Beneath the band of yellow and grey lichens at the top of the shore is a zone dominated by the wrack *Pelvetia canaliculata*, scattered barnacles, while the black lichen *Vererrucaria maura* covers the rock surface (**A1.211**). Below, on the mid shore the wrack *Fucus vesiculosus* generally forms a mosaic with the barnacle *S. balanoides* and the limpet *P. vulgata* (**A1.213**). Finally, the wrack *Fucus serratus*, dominates the lower shore, while a variety of red seaweeds can be found underneath the *F. serratus* canopy. A number of variants have been described: lower shore bedrock and boulders characterised by mosaics of *F. serratus* and turf-forming red seaweeds (**A1.2141**).
Features of Littoral Rock	
A1.411 Coralline crust-dominated shallow eulittoral rockpools including **A1.4111** Coralline crusts and *Corallina officinalis* in shallow eulittoral rockpools	Shallow and smaller rockpools throughout the eulittoral zone in a wide range of wave exposures characterised by a covering of encrusting coralline algae on which *C. officinalis* often forms a dense turf. The bottom of these pools can be covered in coarse gravel and cobbles. These 'coralline' pools have a striking appearance as they are dominated by red seaweeds. Foliose red seaweeds found in these pools include *M. stellatus*, *Chondrus crispus* and the filamentous *Ceramium nodulosum*. The ephemeral green seaweeds *Cladophora rupestris*, and *Ulva lactuca* and *Enteromorpha* spp. (both now collectively belonging to *Ulva* spp.), can also occur in high abundance. The pools may

EUNIS Habitat	Description
	hold large numbers of grazing molluscs, particularly the winkle *L. littorea* (which often occur in exceptionally high densities in upper shore pools) and the limpet *P. vulgata*. Gastropods may graze these pools to such an extent that they are devoid of any foliose red seaweeds, and the flora are reduced to encrusting coralline algae and large numbers of gastropods. Large brown seaweeds are generally absent. Within the pools, pits and crevices are often occupied by the anemone *Actinia equina* and small individuals of the mussel *M. edulis*. The whelk *N. lapillus* can be found on the rock surface preying on the barnacles and mussels. A number of variants have been identified. Pools dominated by coralline algae and foliose red seaweeds with a distribution throughout the UK (**A1.4111**).
A1.421 Green seaweeds (*Enteromorpha* spp. And *Cladophora* spp.) in shallow upper shore rockpools	Rockpools in the littoral fringe or upper eulittoral zone subject to widely fluctuating temperatures and salinity are characterised by ephemeral green alga of the genus *Enteromorpha* (now *Ulva*), along with *Cladophora* spp. and *U. lactuca*. Due to the physical stress imposed on these upper shore pools, grazing molluscs such as the limpet *P. vulgata* and the winkles *L. littorea* and *Littorina saxatilis* are generally in lower abundance than eulittoral pools, allowing the green seaweeds to proliferate under reduced grazing pressures. The bright orange copepod *Tigriopus fulvus* is tolerant of large salinity fluctuations and may occur in large numbers in these upper shore pools, along with gammarid amphipods.
Littoral Coarse Sediment	
A2.11 Shingle (pebble) and gravel shores	Shores of shingle (mobile cobbles and pebbles) or coarse gravel, typically deposited as a result of onshore wave action and long-shore drift. The particle size tends to increase along the shore in the direction of the long-shore drift. As the sediment is very coarse and often quite mobile, it typically supports little marine life, other than opportunist amphipods and oligochaete worms. Summer growths of ephemeral green algae *Enteromorpha* spp. (*Ulva* spp.) may develop.
Littoral Sand and Muddy Sand	
A2.21 Strandline	The strandline is the shifting line of decomposing seaweed and debris which is typically left behind on sediment (and some rocky shores) at the upper extreme of the intertidal at each high tide. These ephemeral bands of seaweed often shelter communities of sandhoppers *Talitroidea*. A fauna of dense juvenile mussels may be found in sheltered firths, attached to algae on shores of pebbles, gravel, sand, mud and shell debris with a strandline of fucoid algae.
Littoral Mixed Sediments	
A2.4 Littoral mixed sediments	Shores of mixed sediments ranging from muds with gravel and sand components, to mixed sediments with pebbles, gravels, sands and mud in more even proportions. By definition, mixed sediments are poorly sorted. Stable large cobbles or boulders may be present which support epibiota such as fucoids and green seaweeds more commonly found on rocky and boulder shores. Mixed sediments which are predominantly muddy

EUNIS Habitat	Description
	tend to support infaunal communities which are similar to those of mud and sandy mud shores.
Infralittoral Rock and Other Hard Substrata	
A3.2111 *Laminaria digitata* on moderately exposed sublittoral fringe bedrock	Exposed to sheltered sublittoral fringe bedrock dominated by a dense canopy of *Laminaria digitata*, often with a wide range of filamentous and foliose red seaweeds beneath. The most frequently occurring red seaweeds are *P. palmata*, *C. officinalis*, *M. stellatus*, *C. crispus*, *Lomentaria articulata* and *Membranoptera alata*. Generally, the rocky substratum is covered by encrusting coralline algae, on which occasional limpets *P. vulgata* and topshells *Gibbula cineraria* (now called *Steromphala cineraria*) graze. A wide variety of fauna occurs with some of the most commonly occurring species being the sponge *Halichondria panicea* and the tube-building polychaete *Pomatoceros triqueter*.
A3.2112 *Laminaria digitata* and under-boulder fauna on sublittoral fringe boulders	This *Laminaria digitata* biotope is found predominantly on moderately exposed boulder shores and occasionally also on exposed or sheltered shores. Upper surfaces of the boulders are colonised by dense *L. digitata* though other kelp such as *Laminaria hyperborea* and *Laminaria saccharina* or the wrack *F. serratus* can be present at lower abundance. The kelp fronds can be colonised by the bryozoan *Membranipora membranacea*. Beneath the kelp canopy are a variety of red seaweeds such as *M. stellatus*, *C. crispus*, *P. palmata*, *M. alata*, *C. officinalis* and coralline crusts. Green seaweeds include *Cladophora rupestris* and *U. lactuca*. Where space is available beneath the boulders (i.e. they are not buried in sediment) there may be a rich assemblage of animals. Characteristic species include the crabs *Porcellana platycheles*, *Pisidia longicornis* and juvenile *Cancer pagurus*.
Supralittoral Rock (Lichen or Splash Zone)	
B3.11 Lichens or small green algae on supralittoral and littoral fringe rock including **B3.1132** *Verrucaria maura* on very exposed to very sheltered upper littoral fringe rock	Lichen communities typically form a distinct zone or band in a splash zone on most rocky shores. This splash zone occurs above the main intertidal zone (i.e. that subject to regular covering by the tide) and blends into angiosperm-dominated communities of coastal (terrestrial) habitats at its upper limits. The width of the splash zone varies considerably, depending on the degree of exposure of the shore to wave action. On very exposed coasts the zone is very wide, extending up cliffs by several metres, whilst in very sheltered sites it may be only a metre high. Several biotopes have been identified. Yellow and grey lichens such as *Xanthoria parietina*, *Caloplaca marina*, *Caloplaca thallincola* or *Ramalina* sp. dominate the supralittoral rock (B3.111) with the distinctive black band of *V. maura* occurring below in the littoral fringe (B3.1131, B3.1132). B3.1131 is usually found on more exposed coasts below the *V. maura* biotope B3.1132. In very sheltered areas there is not always a clear transition from one zone to the next and a mixed zone of B3.111 and B3.1132 is common.

An underwater video survey was conducted by Envision Mapping Ltd in 2011 on behalf of Lewis Wave Power Ltd at two sites off the northwest coast of the Isle of Lewis (Envision Mapping Ltd, 2011).

These sites were close to the most northern (landfall 1) and southern (landfall 3) proposed landfall sites. The following biotopes were recorded from the underwater video survey:

- A3.1151 *Laminaria hyperborea* forest with dense foliose red seaweeds on exposed upper infralittoral rock;
- A3.1152 *Laminaria hyperborea* park with dense foliose red seaweeds on exposed lower infralittoral rock;
- A3.116 Foliose red seaweeds on exposed lower infralittoral rock;
- A4.2144 Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock;
- A4.21 Echinoderms and crustose communities;
- A5.13 Infralittoral coarse sediment;
- A5.5213 *Laminaria saccharina* and filamentous red algae on infralittoral sand.

In August 2013, MSS conducted an underwater video survey to collect biological information on the seabed Electromagnetic fields (EMF) and heat emissions from subsea electrical cables on species and habitat features present (Moore, 2014). A total of 23 sites were investigated, of which 3 overlapped the west of the Array Area. These sites consisted of:

- A5.14 circalittoral coarse sediment;
- A5.25 circalittoral fine sand;
- A5.444 *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment;
- A5.445 *Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment.

Except for circalittoral mixed sediment, the observed biotopes were generally consistent with the EUSeaMap (EMODnet, 2023).

In terms of fauna, the 2013 MSS underwater video survey (JNCC, 2022) recorded the following taxa within the Array Area:

- Annelida (Chaetopterus variopedatus, Serpulidae);
- Bryozoa (Flustra foliacea and Parasmittina trispinosa);
- Cnidaria (Urticina sp. And Urticina felina);
- Echinodermata (Asteroidea (including Asterias rubens, Crossaster papposus, Luidia ciliaris, Porania (Porania) pulvillus, Stichastrella rosea), Echinus esculentus, and Ophiocomina nigra);
- Porifera (Polymastia boletiformis).

Figure 6.4-2 EUNIS Biotopes Present in The Vicinity of the Array Area and Offshore Cable Corridor Area of Search

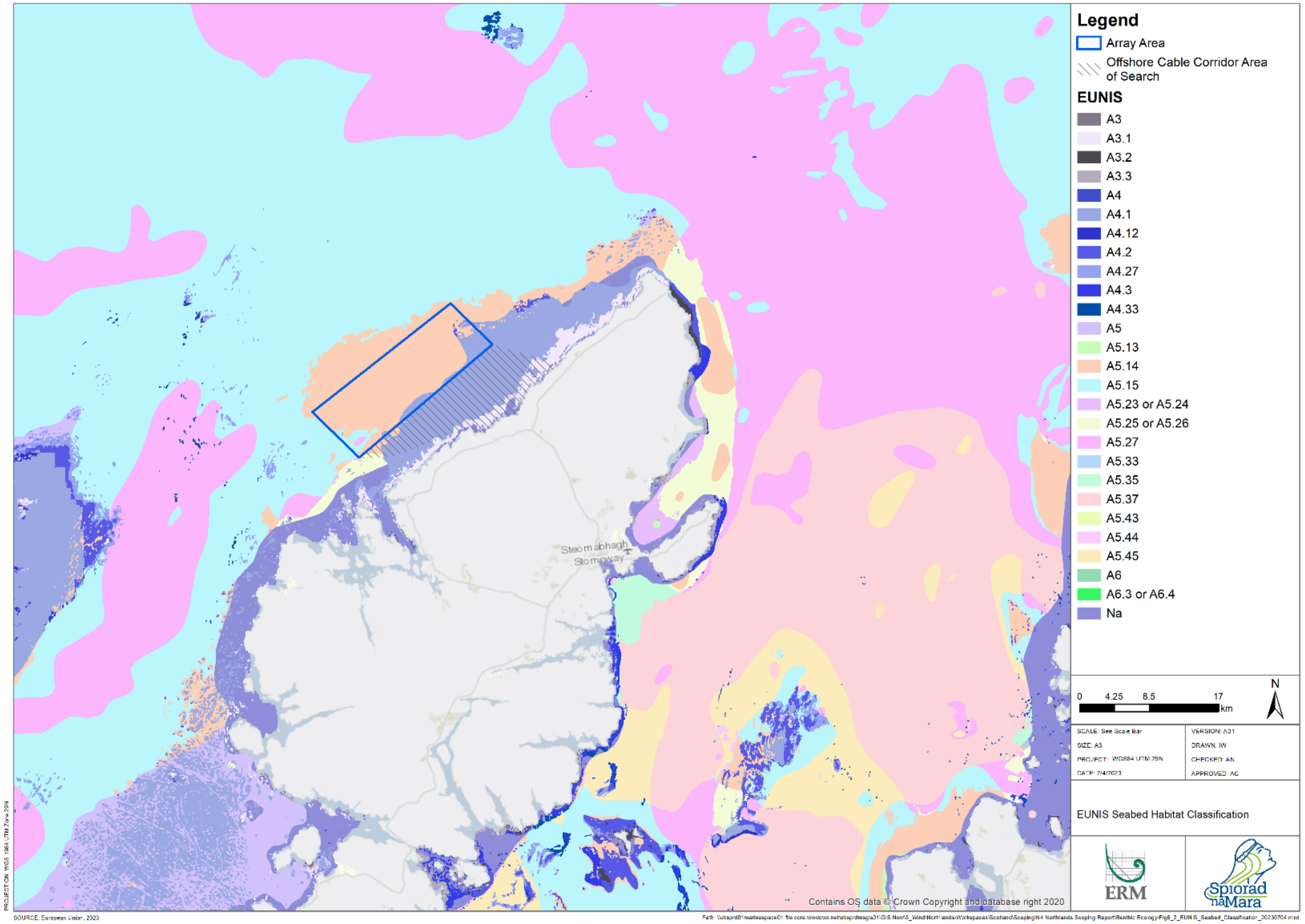


Table 6.4-3 EUNIS Habitats Present Within the Array Area (Source: EEA, 2023; EMODnet, 2023)

EUNIS Habitat	Description
Circalittoral Rock and Other Hard Substrata (high – moderate energy)	
A4.1 Atlantic and Mediterranean high energy circalittoral rock	Occurs on extremely wave-exposed to exposed circalittoral bedrock and boulders subject to tidal streams ranging from strong to very strong. Typically found in tidal straits and narrows. The high energy levels found within this habitat complex are reflected in the fauna recorded. Sponges such as *Pachymatisma johnstonia*, *H. panicea*, *Esperiopsis fucorum* (now called *Amphilectus fecorum*), and *Myxilla (Myxilla) incrustans* may all be recorded. Characteristic of this habitat complex is the dense carpet of the hydroid *Tubularia indivisa*. The barnacle *Balanus crenatus* is recorded in high abundance on the rocky substrata. On rocky outcrops, *Alcyonium digitatum* is often present.
A4.2 Atlantic and Mediterranean moderate energy circalittoral rock	Mainly occurs on exposed to moderately wave-exposed circalittoral bedrock and boulders, subject to moderately strong and weak tidal streams. This habitat type contains a broad range of biological subtypes.
Sublittoral Coarse Sediment	
A5.14 Circalittoral coarse sediment	Tide-swept circalittoral coarse sands, gravel, and shingle generally in depths of >15-20 m. Found in tidal channels of marine inlets, along exposed coasts and offshore. Characterised by robust infaunal polychaetes, crustacea and bivalves. Sea cucumber and lancelet *Cephalochordata* may also be present.
A5.15 Deep circalittoral coarse sediment	Offshore (deep) circalittoral habitats with coarse sands, gravel, or shell. May cover large areas of the offshore continental shelf. Little quantitative data available. However, habitats are quite diverse compared to their shallower counterparts. Generally characterised by robust infaunal polychaete and bivalve species. Communities closely related to offshore mixed sediments. Settlement of horse mussel *Modiolus* larvae may occur, and consequently may occasionally support large numbers of juveniles. Where the mussels reach maturity, the byssus threads bind sediments together, increasing stability and allowing an increased deposition of silt leading to the development of the biotope A5.622.
Sublittoral Sand	
A5.25 or **A5.26** Circalittoral fine sand or circalittoral muddy sand	(**A5.25**) Clean fine sands with <5% silt/clay in deeper water, either on the open coast or in tide-swept channels of marine inlets in depths >15-20 m. Habitat may also extend offshore. Characterised by a wide range of echinoderms, polychaetes, and bivalves. Habitat generally more stable than shallower, infralittoral sands and consequently supports a more diverse community. (**A5.26**) Circalittoral non-cohesive muddy sands with the silt content of the substratum typically ranging from 5%-20%. Generally found in water depths >15-20 m. Communities characterised by a wide variety of polychaetes, bivalves, and echinoderms. These habitats tend to be more stable than their infralittoral counterparts, and as such support a richer infaunal community.
A5.27 Deep circalittoral sand	Offshore (deep) circalittoral habitats of fine sands or non-cohesive muddy sands. Little data available. However, habitats likely to be more stable than their shallower counterparts. Characterised by a diverse range of polychaetes, amphipods, bivalves, and echinoderms.

Features of Conservation Interest

Annex I Habitats and Special Areas of Conservation

The only potential Annex I habitat present are reefs (H1170) (geogenic). Here, they are distributed across the Offshore Cable Array of Search, and part of the southeastern area of the Array Area, overlapping predicted extents of the broadscale habitat Atlantic circalittoral rock (A4.1) (EMODnet, 2023).

The Array Area and Offshore Cable Corridor Area of Search do not overlap any nature conservation site, and as such this area of potential Annex I geogenic reef is not a designated feature of Special Area of Conservation (SAC). The closest SAC to the topic species study area is Loch Roag Lagoons SAC, located approximately 9 km to the south of the Array Area.

Priority Marine Features

No benthic Priority Marine Features (PMFs) overlap the Array Area. A single PMF ('Kelp beds'), overlaps the Offshore Cable Corridor Area of Search. The Offshore Development Area of Search, and shortlisted landfall sites are, however, located near (within 5km) several relevant PMFs (Scottish Government, 2022). These include 'Kelp beds', 'Tide-swept algal communities', 'Seagrass beds', and 'Maerl or coarse shell gravel with burrowing sea cucumbers'.

OSPAR List of Threatened and/or Declining Habitats and Species

No known OSPAR threatened and/or declining habitats or species occur in close proximity to the site (EMODnet, 2023).

Invasive Non-Native Species

Invasive non-native species (INNS) recorded in the West Highlands and Outer Hebrides includes common cordgrass *Spartina anglica*, the Pacific oyster *Magallana gigas*, the Japanese skeleton shrimp *Caprella mutica*, and the Japanese wireweed *Sargassum muticum* (Nall *et al.*, 2015; Cook *et al.*, 2014; Kakkonen, *et al.*, 2019; Collin *et al.*, 2015; Smith *et al.*, 2014).

6.4.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Benthic and Intertidal Ecology assessment, which has been incorporated into the design of the Project (**Table 6.4-4**).

Table 6.4-4 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.2	Long-term changes in physical processes	Pre-construction characterisation studies will inform the optimal placement of infrastructure in order to minimise long-term changes in physical processes.
6.4	Accidental release of contaminants through sediment disturbance	Adherence to industry best practice (as detailed in CEMP)
6.5	Accidental release of pollutants from vessels	Development of a Construction Environmental Management Plan (CEMP). This would include adherence to requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78/. Best practice techniques employed through all phases of the Project, and measures provided in a Marine Pollution Contingency Plan (MPCP), which will form part of the CEMP. All vessels associated with the Project will comply with IMO/MCA codes for prevention of oil pollution and, where appropriate, will have onboard Shipboard Oil Pollution Emergency Plans (SOPEPs) (i.e. vessels over 400 Gross tonnes (GT)). Development of, and adherence to, a Decommissioning Plan.
6.8	Introduction of INNS	Adherence to INNS Management Plan to reduce the risk of introducing or spreading invasive species.
6.9	Temporary habitat disturbance	Pre-construction 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.
6.10	EMF emissions from subsea electrical cables	Cables will be buried where possible as per cable burial risk assessment studies.

6.4.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.4.5.1 Likely Significant Effects

Potential likely significant effects on Benthic and Intertidal Ecology have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 6.4-5.**

Table 6.4-5 EIA Scoping Assessment for Benthic and Intertidal Ecology

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Temporary habitat disturbance	6.9	In	Physical disturbance to habitats during installation of infrastructure (foundation installation and cable burial via open cut trenching) 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 more suitable areas.	The assessment will be informed following the findings of the environmental baseline survey, and calculations of expected area of habitat disturbance, duration and frequency.
Temporary increase in suspended sediment concentration (SSC), turbidity, and siltation	6.9	In	Disturbance of the seabed arising from construction activities (such as cable laying via open cut trenching and foundation installation) 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.	The assessment will be informed following the findings of the physical processes predictive modelling of the extent of any sediment plumes and expected sediment deposition that may occur within the Benthic and Intertidal Ecology Study Area.
Accidental release of pollutants from vessels and plant machinery	6.5	**Out**	The presence of works vessels, and plant machinery operating at the landfall during construction and decommissioning, introduces risk of accidental release of pollutants from leaks or spills of fuels, and accidental release of construction materials. However, an environmental monitoring plan (e.g. a Construction	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			Environmental Management Plan CEMP)), which complies with requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and Shipboard Oil Pollution Emergency Plans (SOPEPs), will reduce the likelihood and minimise the impact of any accidental release of pollutants from construction vessels and equipment. Therefore, this impact has been scoped out of the EIA assessment.	
Accidental release of contaminants through sediment disturbance	6.4	In	During any works at the seabed (for both construction and decommissioning phases), this will lead to sediment disturbance, and has the potential to re-mobilise contaminated sediments into the environment. The resuspension of contaminants may increase the bioavailability of these compounds to benthic fauna, impacting their physiology and overall fitness, and influencing local community structure (e.g. favouring opportunistic species).	The assessment will be informed by the environmental baseline survey that will determine the spatial distribution, and concentration of sediment contaminants within the Array Area and Offshore Cable Corridor Area of Search and calculations of expected area of disturbance, duration and frequency.
Release of drilling fluid mud, drilling arisings or bentonite	6.4	In	Trenchless techniques are a method of installation for the export cable at landfall during the construction phase. This activity can release drilling fluid muds and very low levels of bentonite into the water column, which may impact water quality and indirectly impact benthic communities and habitats.	The assessment will be informed following the findings of the predictive modelling of the extent of any plumes in the Benthic and Intertidal Ecology Study Area, and thus the expected transport of any generated discharges of drilling muds.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Introduction and colonisation of infrastructure by INNS	6.8	In	Increased vessel activity during construction and decommissioning phases will increase the potential risk of introduction of INNS into the area. The Project is located away from large ports, and as such, it is likely that INNS resident, or newly introduced, may extend their range.	The assessment will be informed by a desktop study on the presence of INNS in the region and likelihood of spread of INNS by Project related activities.
Protection of benthic habitats from fishing restrictions		In	There may be a loss of access to fishing grounds due to construction and decommissioning works. As such, this area becomes inaccessible to fishing vessels during this phase of the project and affords protection of benthic habitats and species from direct and indirect impacts from fishing gear on the seabed.	This assessment will be informed and supported through commercial fisheries assessments.
Operation and Maintenance				
Temporary habitat disturbance		In	Physical disturbance of benthic habitats may arise from 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 more suitable areas.	The assessment will be informed by the findings of the environmental baseline survey and calculations of expected area of habitat disturbance, duration and frequency.
Temporary increase in SSC, turbidity, and siltation		In	Disturbance of the seabed arising from maintenance activities (such as cable remedial works), may result in adverse effects on benthic communities from SSC and	The assessment will be informed by the findings of the predictive physical processes modelling of the extent of any sediment plumes and expected subsequent

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			water column turbidity, resulting in the smothering of sessile fauna and/or clogging of feeding apparatus.	sediment deposition that may occur within the Benthic and Intertidal Ecology Study Area.
Long-term loss of habitat		In	The placement of subsea infrastructure (wind turbine generator (WTG) foundation and/or scour and cable protection) will result in the long-term temporary loss of available benthic habitats.	The assessment will be informed with the findings of the environmental baseline survey and calculations of expected area of habitat loss based on the final design.
Long-term changes in physical processes		In	The long-term placement of subsea structures on the seabed (e.g. WTG foundations 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 sand and gravel, which are less likely to become resuspended and swept away.	The assessment will be informed and supported by the findings of the predictive physical processes modelling and assessment that will provide information on the potential magnitude of this impact.
Accidental release of pollutant from vessels and WTGs	6.5	**Out**	The presence of works vessels during operation and maintenance, and the operational WTGs, introduces risk of pollution from leaks or spills of fuels. However, an environmental monitoring plan (e.g. a Construction Environmental Management Plan CEMP)), which complies with requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			Shipboard Oil Pollution Emergency Plans (SOPEPs), will reduce the likelihood and minimise the impact of any accidental release of pollutants from operation and maintenance vessels and equipment. Therefore, this impact has been scoped out of the EIA assessment.	
Accidental release of contaminants through sediment disturbance	6.4	In	During O&M activities there is potential for sediment disturbance, which may re-mobilise contaminated sediments. The resuspension of contaminants may increase the bioavailability of these compounds to benthic fauna, impacting their physiology and overall fitness, and influencing local community structure (e.g. favouring opportunistic species).	The assessment will be informed by the environmental baseline survey that will determine sediment concentration of contaminants within the Array Area and Offshore Cable Corridor Area of Search and expected extent of disturbance that will occur through operational activities.
Release of drilling fluid mud, drilling arisings or bentonite	6.4	In	Trenchless techniques are a method for the export cable repair/replacement at landfall during the operational and maintenance phase. This activity can release drilling fluid muds and very low levels of bentonite into the water column, which may impact water quality and indirectly impact benthic communities and habitats.	The assessment will be informed following the findings of the predictive modelling of the extent of any plumes in the Benthic and Intertidal Ecology Study Area, and thus the expected transport of any generated discharges of drilling muds.
Introduction and colonisation by INNS	6.8	**Out**	During the lifetime of the Project, there is the potential for long-term colonisation of hard structures (e.g. WTGs) by INNS fauna, whereby these structures provide suitable artificial habitat for settlement. INNS taxa may outcompete and replace native fauna, altering a	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			community's structure and functioning. INNS colonisation risk will be mitigated via production and adherence to the INNS management plan. This, together with a high availability of naturally occurring hard substrate within the Array Area and wider region minimises the risks associated with INNS. It is therefore proposed that this impact is scoped out of the assessment.	
Electromagnetic fields (EMF) effects from subsea electrical cables	6.10	In	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. Although the magnitude of EMF is expected to be reduced through seabed burial, and naturally with horizontal and vertical distance, there may remain a potential localised pathway for an impact on benthic fauna.	Desktop study of EMF impacts on benthic features as well as consideration of cable design and cable installation.

6.4.6 Proposed Approach to EIA

6.4.6.1 Relevant Data Sources

In addition to the data sources highlighted in section 6.4.3.2, a site-specific benthic ecology survey will be conducted prior to the EIA (section 6.3.3.1). This survey will enable the subtidal and intertidal benthic habitats within the Array Area and Offshore Cable Corridor Area of Search to be characterised to inform the EIA process.

6.4.6.2 Consultation

Table 6.4-6 summarises the key consultees to be consulted with regard to the pre-EIA scoping, pre-survey, and EIA phases of the Project.

Table 6.4-6 Key Consultees and Stakeholders Identified as Relevant for Benthic and Intertidal Ecology

Proposed Consultee	Description
NatureScot	Statutory advisor to Scottish Ministers regarding environmental and natural heritage considerations; previously called SNH.
Marine Directorate – Licensing Operations Team (MD-LOT)	Department of Scottish Government responsible for marine licensing and consenting.
Scottish Wildlife Trust	Provide non-statutory advice to regulators and Government on environmental considerations.
Scottish Environment Protection Agency (SEPA)	A non-departmental public body of the Scottish Government responsible for protecting the environment and human health.
Comhairle nan Eilean Siar	Local planning authority with planning responsibilities out to mean low water springs (MLWS).

6.4.6.3 Policy, Legislation and Guidance

An account of relevant policy, legislation and best practice guidance is provided below:

Table 6.4-7 Legislation, policy and guidance relevant to the Benthic and Intertidal Ecology assessment

Relevant Legislation, Policy and Guidance
Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
The Scottish Government Strategy for Marine Nature Conservation
The Scottish Biodiversity Strategy 2020 Challenge
Scotland’s National Marine Plan (NMP)
OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR Agreement 2008-06)

Relevant Legislation, Policy and Guidance
Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008)
SNH - Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland Volume: Benthic Habitats (SNH, 2011)
Centre for Environment, Fisheries and Aquaculture Science (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)
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 *et al.,* 2020)
Decommissioning of Offshore Renewable Energy Installations Under the Energy Act: Guidance Notes for Industry (BEIS, 2019)

6.4.6.4 Impacts Assessment Methodology

The EIA methodology will follow the structure of the methodology presented in Chapter 4: Proposed Approach to EIA. A baseline section will identify the Benthic and Intertidal Ecology receptors potentially present within the Benthic and Intertidal Ecology Study Area, from which receptor groups will be determined.

Similar types of habitats in terms of their sensitivity to potential likely significant effects will be grouped to form Important Ecological Features (IEFs). The process and rationale of developing these IEFs will be checked with relevant stakeholders prior to the impact assessment work commencing, so that all parties agree on the key receptor groups. 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 effect magnitude on a benthic receptor. Magnitude will be dependent on scale, duration, 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 seabed preparation for gravity-based foundation 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 Project will be conducted 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 Project. Potential likely significant effects from all 3 main phases (construction, operation, and decommissioning) of development will be considered.

6.4.7 Scoping Questions for Consultees

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

1. Do you agree that the data sources identified along with the proposed baseline survey are sufficient to inform the Benthic and Intertidal Ecology baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all Benthic and Intertidal Ecology receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Benthic and Intertidal Ecology?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Project on Benthic and Intertidal Ecology receptors?

6.4.8 References

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6.5 Fish and Shellfish Ecology

6.5.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Fish and Shellfish Ecology within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

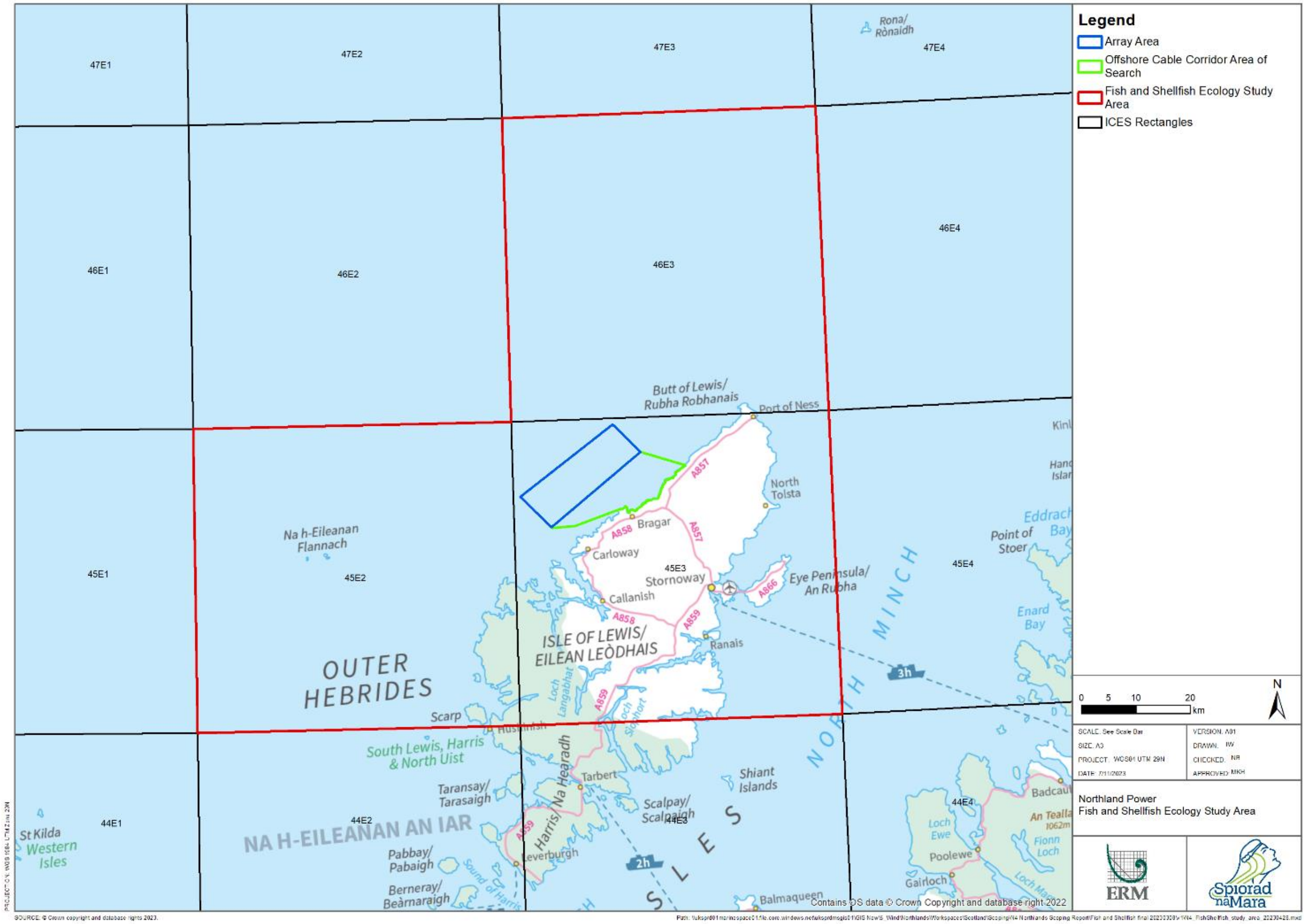
6.5.2 Study Area

The Fish and Shellfish Ecology Study Area has been defined based on ICES Statistical Rectangles in close proximity to the Project, ensuring that all Project infrastructure is included. This study area is representative of the marine environment within the region, and therefore data from within these ICES rectangles will provide a representative baseline of the fish and shellfish population.

The Array Area is located within the northeast portion of ICES Division 6a (West of Scotland) (ICES/CIEM, 2023), within the 12 nautical mile (NM) limit, in UK Exclusive Economic Zone (EEZ) waters (Scottish Government, 2020). For the purposes of recording and locating fisheries data, ICES divisions are further divided into statistical rectangles. These rectangles provide a grid covering the area between 36°N and 85°30'N and 44°W and 68°30'E (ICES/CIEM, 1970).

Due to the high likelihood of presence of species with large natural ranges, it has been determined that ICES Statistical Rectangles 45E2, 45E3, and 46E3 will define the boundary of the Fish and Shellfish Ecology Study Area. These ICES Statistical Rectangles surround the Array Area, and provide coverage for the western, northern, and northeastern inshore areas surrounding the Isle of Lewis. The Fish and Shellfish Ecology Study Area is shown in **Figure 6.5-1**. Rectangle 46E2 has been omitted as it does not adequately capture the characteristics of both coastal and offshore settings. Moreover, its distance of over 10 km from the Array Area means that it does not offer sufficient additional information to the baseline above that provided by rectangles 45E2 and 46E3.

Figure 6.5-1 Fish and Shellfish Ecology Study Area comprising ICES Rectangles 45E2, 45E3, and 46E3.



6.5.3 Baseline Environment

6.5.3.1 Data Sources

The data sources used to inform this Fish and Shellfish Ecology Chapter of the Scoping Report are presented within **Table 6.5-1**. These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside any additional site-specific data that are collected for the Project.

Table 6.5-1 Summary of key publicly available datasets for Fish and Shellfish Ecology.

Source	Spatial Coverage	Year	Summary
Distribution of spawning and nursery grounds defined by Coull *et al*. (1998) and Ellis *et al*. (2012)	The entire Fish and Shellfish Ecology Study Area and the rest of the United Kingdom's (UK's) coastal waters	2012 (inclusive of Coull *et al.* (1998) data)	This is a widely used dataset identifying the known spawning and nursery grounds of multiple fish species in UK and surrounding waters.
Digital Aerial Surveys (DAS) conducted by APEM	The Array Area with 10km buffer area	2022	These are DAS conducted by APEM on behalf of Northland Power UK Ltd, for Year 1 of a programme of 24 monthly surveys.
Marine Management Organisation (MMO) UK Fleet Landings Data (including Weight and Value) by species (MMO, 2021)	Data will be extracted for all ICES Statistical Rectangles within the Fish and Shellfish Ecology Study Area (45E2, 45E3, and 46E3)	2016-2020	This dataset includes landings data from fisheries operating within UK waters. It is therefore a direct sampling of fish assemblages within each ICES Statistical Rectangle. Gear type used includes demersal trawl/seine, dredge, pots and traps, and other passive gears (e.g. hooks).
Scottish Sea Fisheries Statistics 2021 Landings Data	Data will be extracted for all ICES Statistical Rectangles within the Fish and Shellfish Ecology Study Area (45E2, 45E3, and 46E3)	2017-2021	Marine Directorate landings (tonnage and value) by UK vessels into the UK and abroad, and foreign vessels into the UK by ICES rectangle and species type.
International Bottom Trawl Survey (ICES, 2023)	Data will be extracted for all ICES Statistical Rectangles within the Fish and Shellfish Ecology Study Area (45E2, 45E3, and 46E3)	Most recent report published in 2022. 2023 report pending.	The International Bottom Trawl Survey Working Group (IBTSWG) coordinates fishery-independent multispecies bottom-trawl surveys within the ICES area.
Scottish Marine and Freshwater Science	The entire Fish and Shellfish Ecology Study Area and the	2010	This report outlines major spawning routes and behaviours of Atlantic salmon *Salmo salar*, brown

Source	Spatial Coverage	Year	Summary
Volume 1 no. 14. Marine Directorate Science	rest of Scotland's coastal waters		trout *Salmo trutta*, and European eel *Anguilla anguilla* in and around the Fish and Shellfish Ecology Study Area.
Stream spawning of Arctic charr in Scotland (Walker, 2006)	The entire Fish and Shellfish Ecology Study Area and the rest of Scotland's coastal waters	2006	This publication identifies 5 potential spawning sites for Arctic charr *Salvelinus alpinus* in rivers and fjords near the Fish and Shellfish Ecology Study Area.
Oyster Wave Array Environmental Statement	The Oyster Wave Array study area, which overlaps the Array Area	2012	This report identifies a fish and shellfish baseline, albeit for a more restricted study area than the Fish and Shellfish Ecology Study Area presented in this Scoping Report.
Scottish Government (2023), Developing essential fish habitat maps: report	The entire Fish and Shellfish Ecology Study Area and the rest of Scotland's coastal waters	2023	Maps defining areas of the sea essential to fish for spawning, breeding, feeding or growth to maturity. The report and subsequent maps reviewed 29 species and multiple life stages of marine fish and shellfish of relevance to offshore wind development areas.

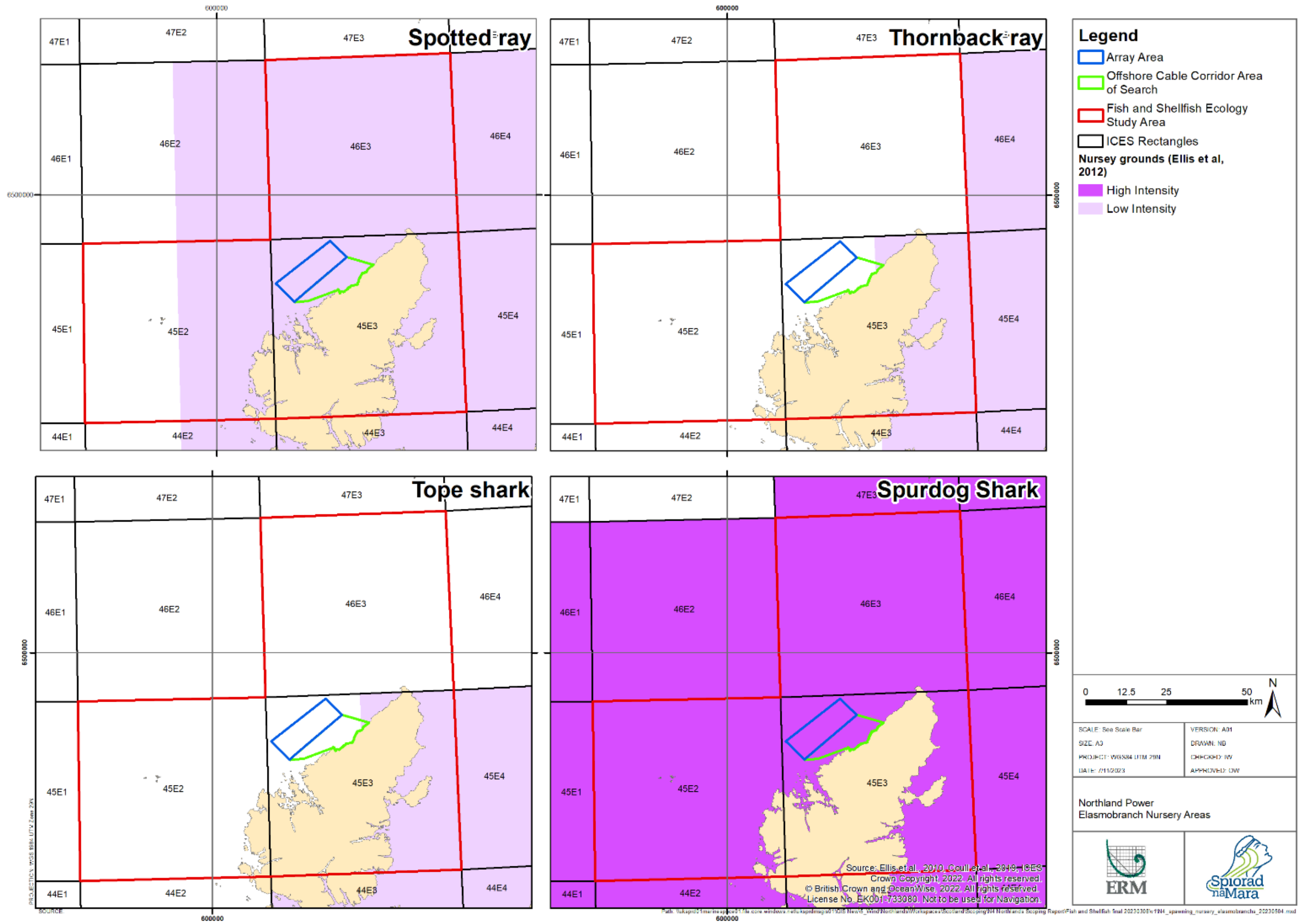
6.5.3.2 Overview of Baseline Environment

Elasmobranchs

Elasmobranch species present within the Fish and Shellfish Ecology Study Area are dominated by demersal species of skate and ray, including common skate complex (including both common skate *Dipturus batis*, and flapper skate *Dipturus intermedius*), blonde ray *Raja brachyura*, thornback ray *Raja clavata*, sandy ray *Leucoraja circularis*, starry ray *Raja radiata*, and spotted ray *Raja montagui*. Benthopelagic and pelagic shark species are likely to be present, including tope shark *Galeorhinus galeus*, various dogfish species *Squalidae*, starry smoothound *Mustelus asterias*, porbeagle shark *Lamna nasus*, Greenland shark *Somniosus microcephalus*, bluntnose sixgill *Hexanchus griseus*, and blue shark *Prionace glauca*. The majority of benthopelagic and pelagic shark species are likely to move through the Fish and Shellfish Ecology Study Area, as opposed to being resident, due to their widespread ranges. Locations of elasmobranch nursery grounds are presented within **Figure 6.5-2** (Ellis *et al*., 2012). No elasmobranch spawning grounds were identified within the Fish and Shellfish Ecology Study Area.

Larger elasmobranch species, such as basking shark *Cetorhinus maximus*, have impact pathways more similar to those of marine mammals than the majority of fish and shellfish receptors identified in this Chapter. As such, these species will be assessed within the Marine Mammals and Other Megafauna Chapter of the Scoping Report (Chapter 6.6: Marine Mammals and Other Megafauna).

Figure 6.5-2 Nursery areas of elasmobranch species within the Fish and Shellfish Ecology Study Area (Source: Ellis *et al.*, 2012).



Demersal and Pelagic Fish

The Array Area is located in an area of homogenous circalittoral coarse substrate, with an extensive area of circalittoral and infralittoral rock, and other hard substrata, on the shoreside of the Array Area. The seabed surrounding the Array Area varies between circalittoral coarse substrate and circalittoral sand (both in deep and shallow waters), with isolated outcrops of shallow circalittoral rock and other hard substrata. These habitats are characterised by benthic and benthopelagic fish, particularly sandeels (various Ammodytes species), flatfishes, and Gadidae (e.g. cod, haddock, and pollock), that feed on a variety of prey close to the seabed. Outcrops of circalittoral rock and other hard substrata are characterised by *Gobiidae*, *Blenniidae*, and *Labridae*. Some *Gobiidae* and *Blenniidae* species will also be present within infralittoral rock and hard substrata.

The Fish and Shellfish Ecology Study Area ranges in depth between 0 metres (m) and approximately 130 m, of which the northern entrance to The Minch channel represents the deepest section. As such, pelagic species including Atlantic herring *Clupea harengus*, Atlantic mackerel *Scomber scombrus*, and horse mackerel *Trachurus* readily utilise the Fish and Shellfish Ecology Study Area as a feeding ground and, potentially, as benthic and pelagic spawning grounds, dependent on the species (Coull *et al*., 1998; Ellis *et al*., 2012).

The habitats within the Fish and Shellfish Ecology Study Area support known key spawning and nursery grounds for several demersal and pelagic fish species, and are presented within **Figure 6.5-3**, **Figure 6.5-4**, and **Figure 6.5-5** (Coull *et al*., 1998; Ellis *et al*., 2012).

Further information on fish species of commercial importance will be provided in the Commercial Fisheries Chapter of the Scoping Report (Chapter 6.9: Commercial Fisheries).

Figure 6.5-3 Spawning and nursery areas of demersal species within the Fish and Shellfish Ecology Study Area Part 1 (Source: Coull *et al.*, 1998; Ellis *et al.*, 2012).

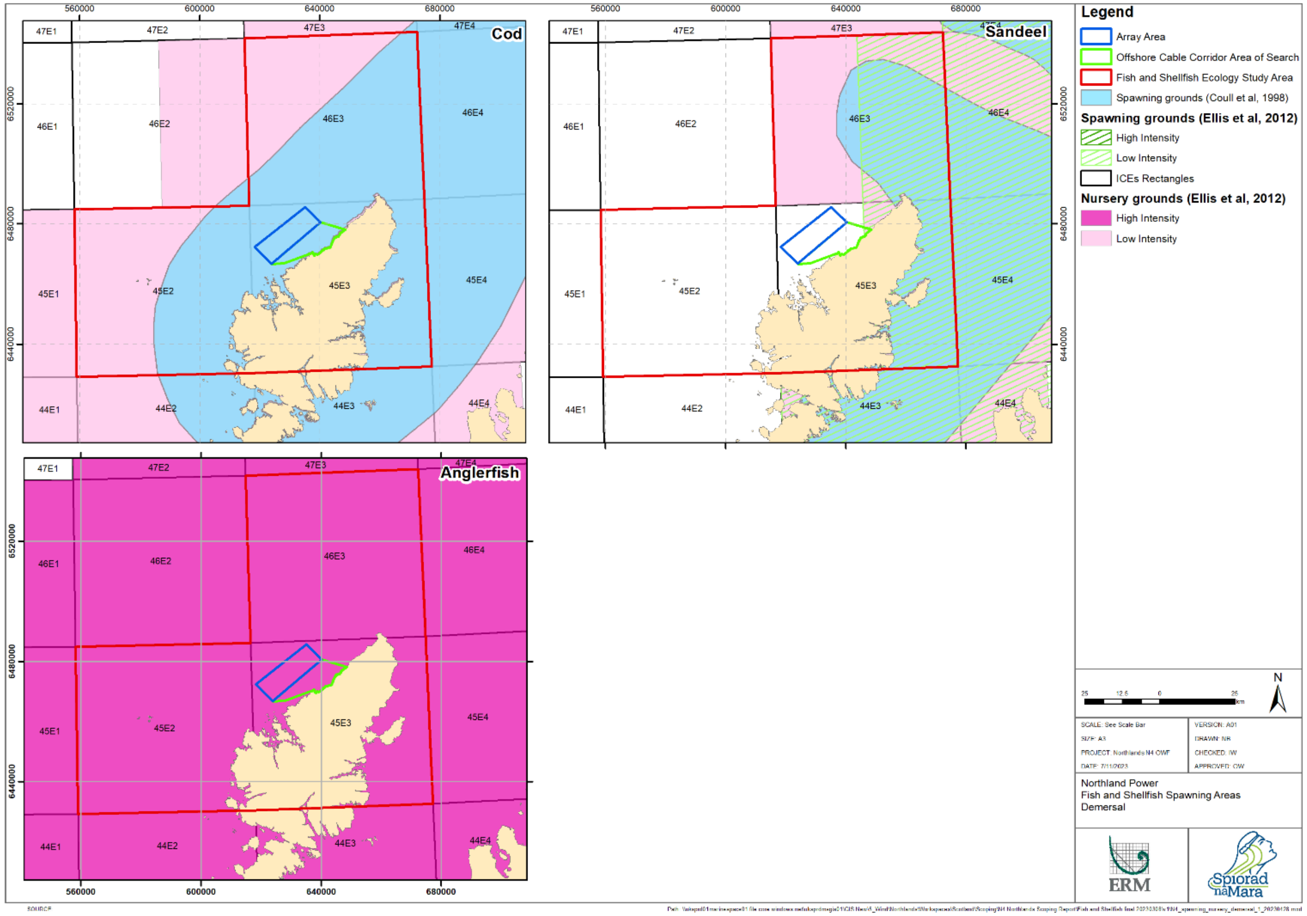


Figure 6.5-4 Spawning and nursery areas of demersal species within the Fish and Shellfish Ecology Study Area Part 2 (Source: Coull *et al.*, 1998; Ellis *et al.*, 2012).

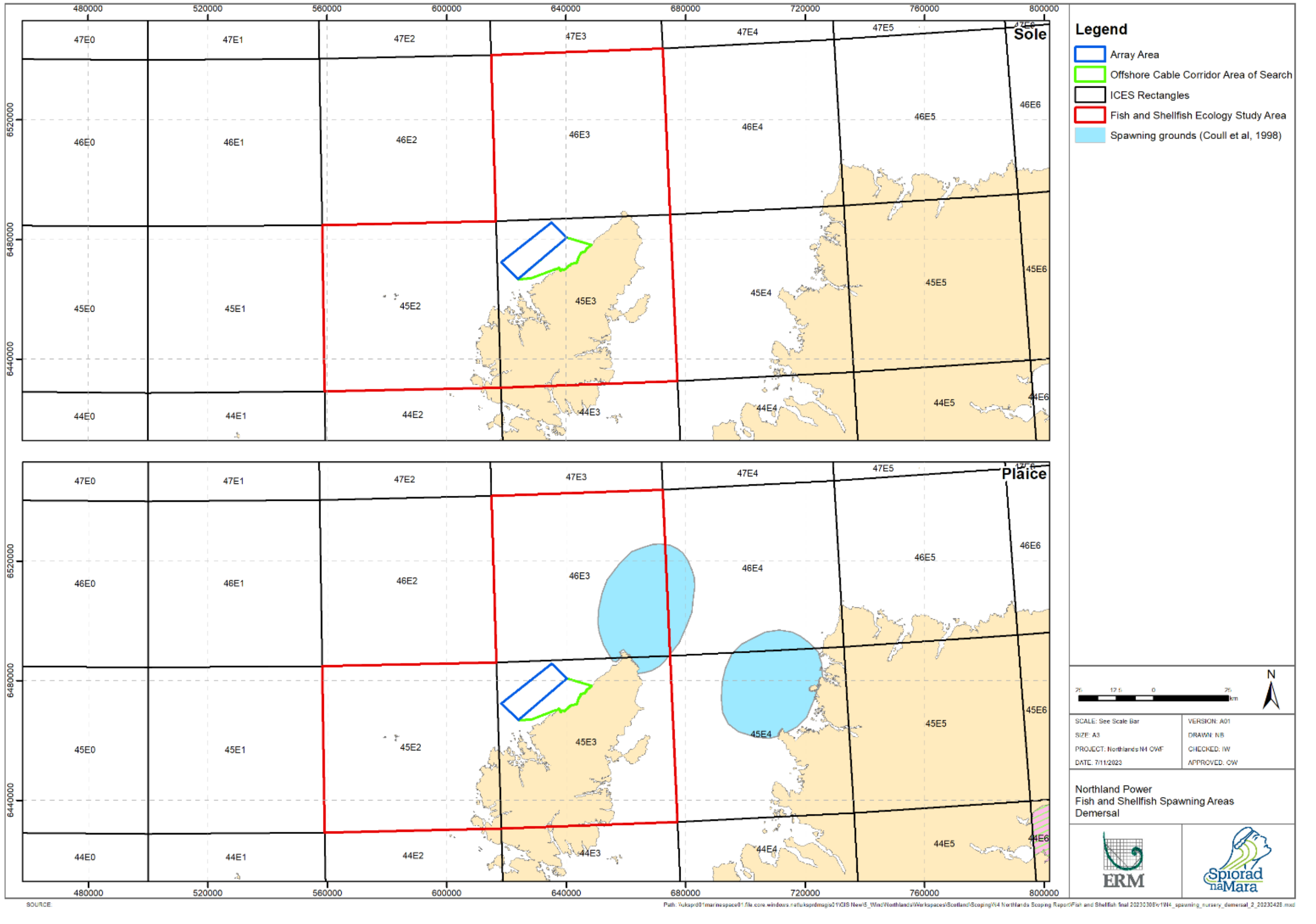
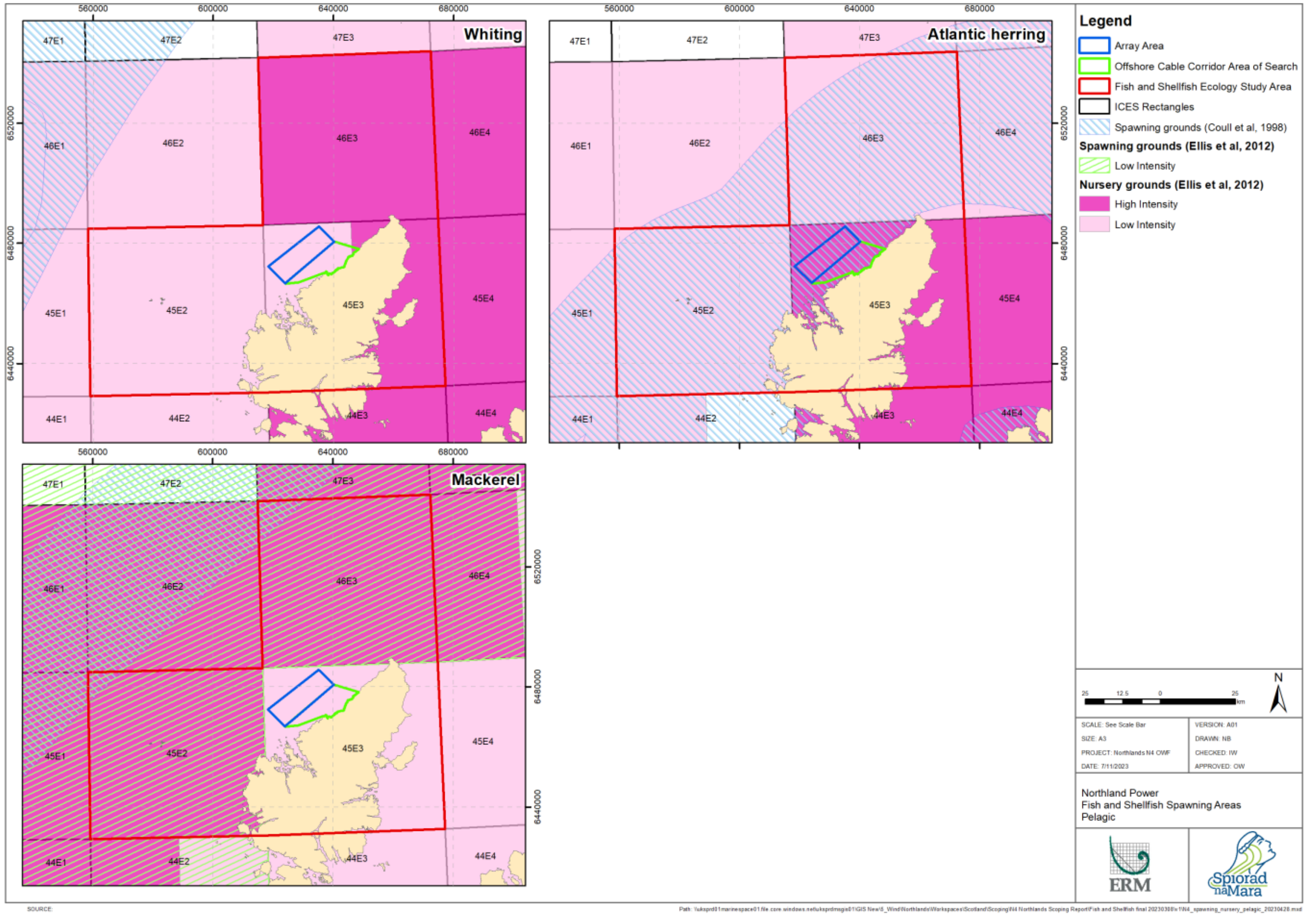


Figure 6.5-5 Spawning and nursery areas of pelagic species within the Fish and Shellfish Ecology Study Area (Source: Coull *et al.*, 1998; Ellis *et al.*, 2012).



Sandeel

Sandeel species are of high conservation importance within the Fish and Shellfish Ecology Study Area and designated as a feature of the North-east Lewis Marine Protected Area (MPA) (located approximately 21 km east of the Array Area). These demersal fish comprise a number of species within the family Ammodytidae. In Scottish water Raitt's sandeel *Ammodytes marinus*, and the lesser sandeel *Ammodytes tobianus* are most common. Sandeel are an important prey species for a number of fish, bird and marine mammal species (Marine Directorate, 2023).

Sandeel have a close association with the seabed. Over the winter period, and over night during other seasons, sandeel bury themselves in the sediment, up to a depth of between 4 and 6 cm (Holland *et al.*, 2005). Sediment preference is for medium to coarse sand (0.25-2.00 millimetre (mm)) to allow for this burying behaviour. Preferential habitat also comprises a fines component of ≤2%, and areas where fines exceed 4% become largely unsuitable for these species (Holland *et al.*, 2005).

Modelling undertaken using the methodology described within Latto *et al.,* (2013) is presented in **Figure 6.5-6**. This modelling utilises available data relating to spawning grounds, British Geological Survey (BGS) sediment data, Vessel Monitoring System (VMS) fishing data, and available fishing data, and presents the likely suitability of the region for sandeel habitat. **Figure 6.5-6** indicates that the Offshore Development Area of Search is generally of low suitability for sandeel species, with the exception of the southwest region which is indicated to be of medium potential. This level of habitat suitability is representative of the wider Fish and Shellfish Ecology Study Area, which is indicated to be of generally low suitability. A large proportion of the Offshore Cable Corridor Area of Search is determined to be unsuitable, along with a large region of ICES Rectangle 45E2, from the southwest corner to the Flannan Isles in the centre of the rectangle. Approximately 50% of ICES Rectangle 46E3, to the north of the Offshore Development Area of Search, is determined as being of medium potential for sandeel habitat.

Additional modelling on lesser sandeel has been undertaken by Marine Directorate Science, reported in Langton *et al.,* (2021), and is presented within **Figure 6.5-7**. This 'hurdle' model considered a number of factors including sediment silt and sand component percentage, seabed slope, and a depth range of 30-50 m. Much of the Offshore Development Area of Search is indicated as having a predicted density of 0 sandeel per m². In the southwest component of the Array Area, density is predicted to be between 10-20 per m², with some discrete points up to 30 per m². A similar region of predicted density is also present just to the south of the Array Area. Across the entirety of the Fish and Shellfish Ecology Study Area, the majority of the environment is indicated as having a predicted density of 0 sandeel per m². A region of predicted sandeel habitat of a similar density is present at the southeast corner of ICES Rectangle 45E2. To the northeast of ICES Rectangle 45E3, and into the southeast corner of 46E3 there is a region of high predicted sandeel density that follows the coastline from the Butt of Lewis to Broad Bay. Large regions of this area of sandeel spawning potential are >90 per m² and are highest in Broad Bay itself.

Figure 6.5-6 Potential sandeel habitat across the Fish and Shellfish Ecology Study Area (Source: Latto *et al.*, 2013).

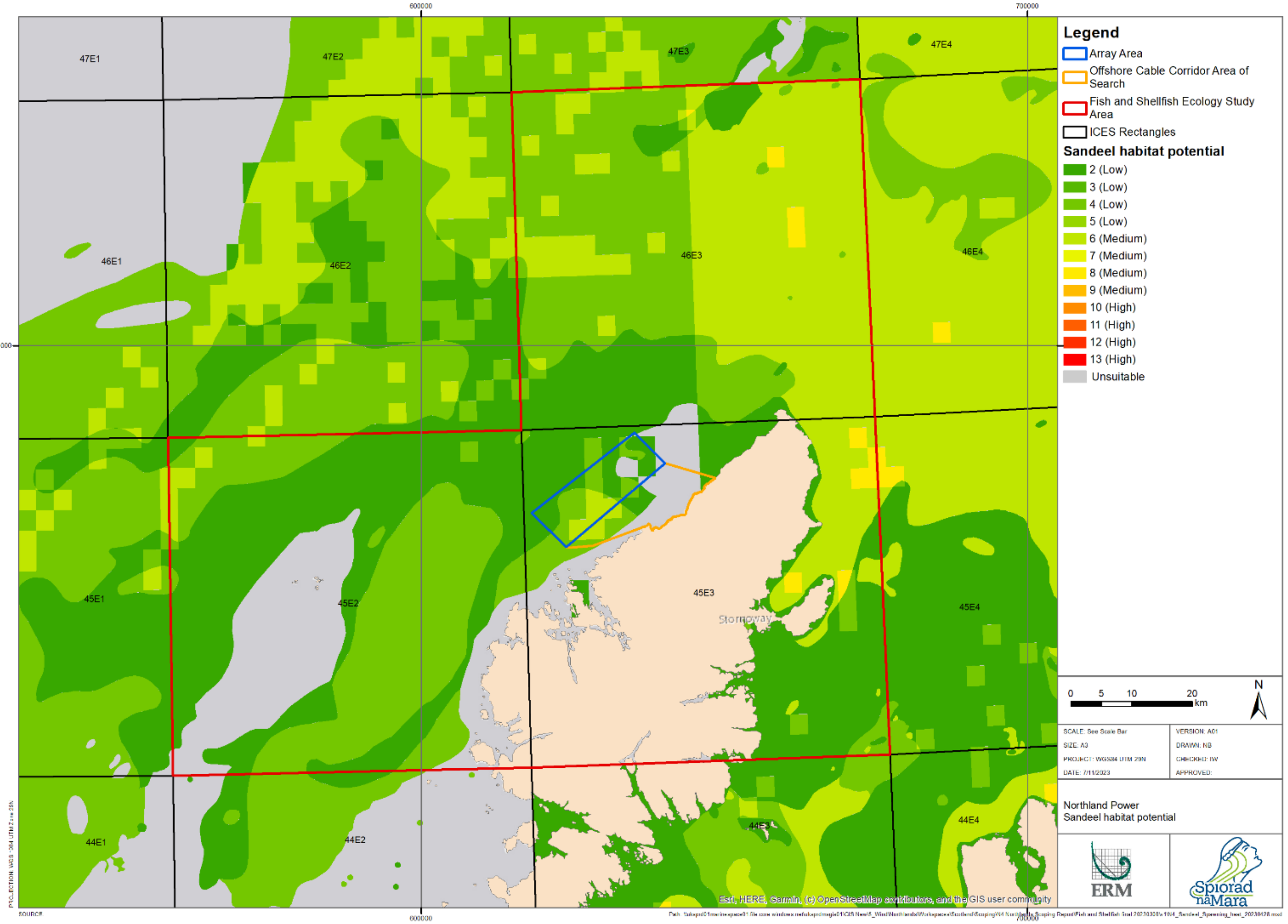
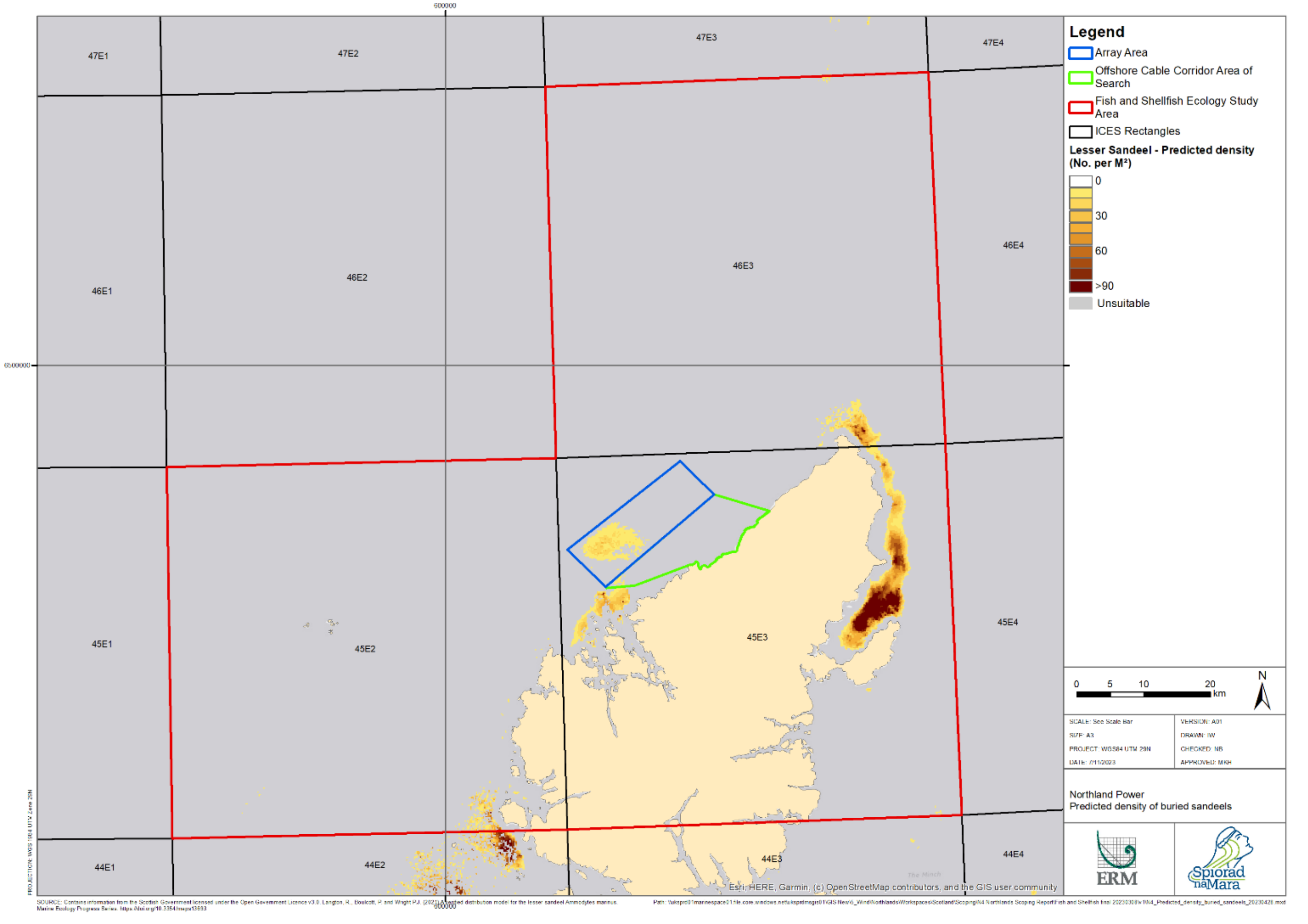


Figure 6.5-7 Potential sandeel habitat across the Fish and Shellfish Ecology Study Area (Source: Langton *et al.*, 2021).



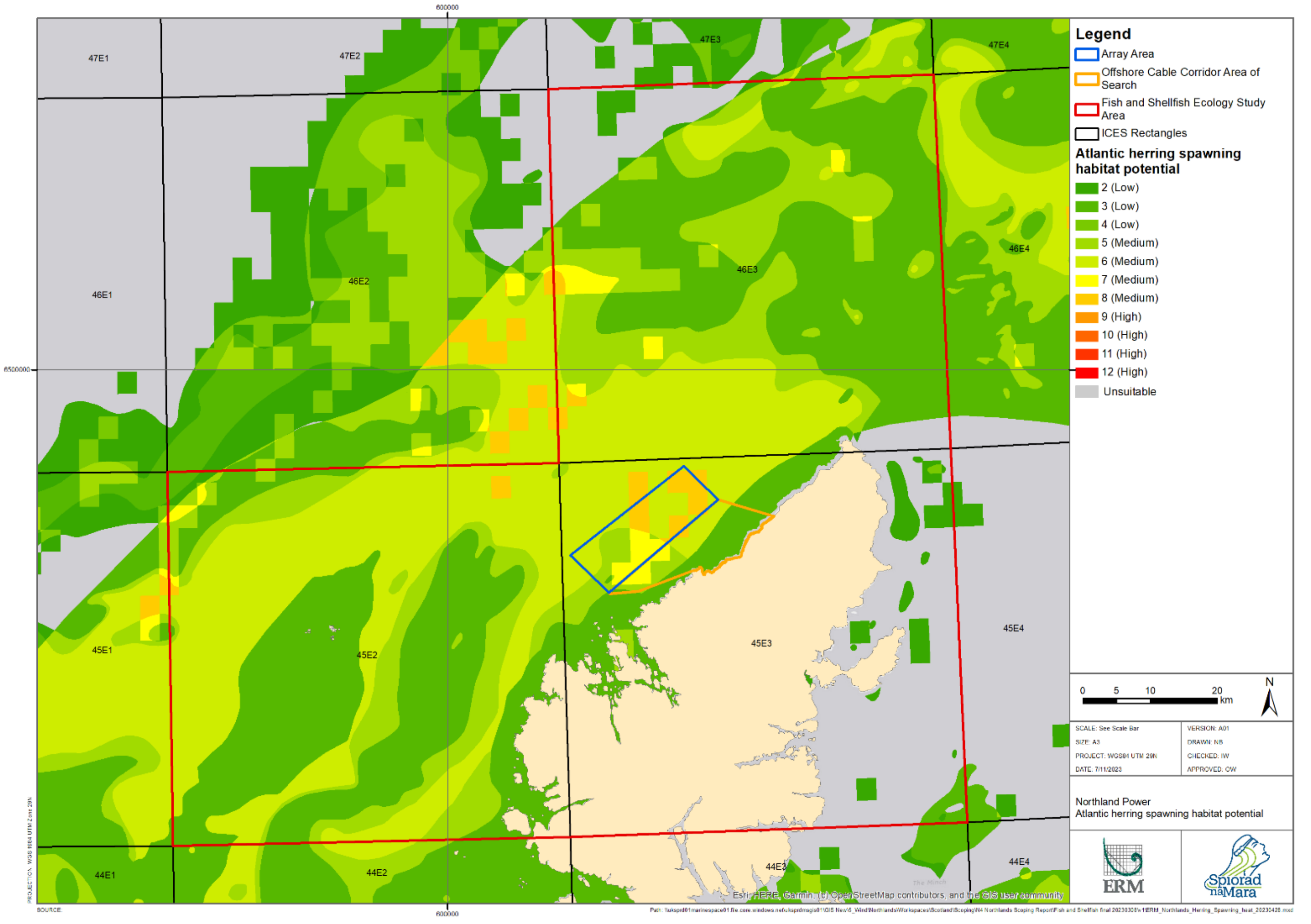
Atlantic Herring

Atlantic herring, like sandeel, acts as an important prey species for a number of fish, bird and marine mammal species (ICES, 2023b). Whilst Atlantic herring are a pelagic species during their adult life stage, spawning behaviour is demersal, and relies on the availability of suitable seabed habitat on which to lay eggs (ICES, 2023b). Seabed composition suitable for Atlantic herring spawning ranges from sandy Gravel to gravelly Sand, which is necessary for eggs to appropriately adhere to the substrate (Reach *et al.*, 2013). Habitat suitability is also determined by a number of additional environmental factors, including seabed flow rate and sediment oxygenation and, thus, suitable sediment alone is often not enough to allow for a viable population of Atlantic herring in a given location (O'Sullivan *et al.,* 2013).

The Offshore Development Area of Search lies within the West of Scotland Spawning Grounds (WoS), as identified within Frost and Diele (2022). The WoS population comprises 2 distinct groups of Atlantic herring; spring and autumn spawning populations. The spring-spawning group is known to utilise the Minch, the strait separating the Isle of Lewis from the Scottish mainland, for spawning (ICES, 2022). The spring-spawning group was the most abundant group of Atlantic herring in the WoS, up until the collapse of this stock in the 1950s, which has seen slow recovery since. Major spring spawning events were, however, recorded in both 2018 and 2019, possibly as a result of harsh winters in previous years (Frost and Diele, 2022). The spring-spawning population has a known association with maerl beds in the region (Morrison *et al.*, 1991). The WoS autumn-spawning group utilises Cape Wrath, approximately 90 kilometres (km) east-northeast of the Offshore Development Area of Search (ICES, 2022), and has been declining since the 1970s (Frost and Diele, 2022).

A large region of ICES Rectangle 45E2, from the southwest corner to Flannan Isles in the centre of the rectangle, as well as much of the north and east of ICES Rectangle 46E3, is unsuitable, or of low suitability. The region immediately northwest to northeast of the Offshore Development Area of Search is of medium suitability. Modelling undertaken using the methodology described within Reach *et al.* (2013) is presented in **Figure 6.5-8**. This modelling utilises available data relating to spawning grounds, BGS sediment data, VMS fishing data, International Herring Larvae Survey (IHLS) data, and available fishing data, and presents the likely suitability of the region for Atlantic herring spawning grounds. **Figure 6.5-8** indicates that the Offshore Development Area of Search is generally of medium suitability for Atlantic herring spawning. This decreases to low suitability within the inshore half of the Offshore Cable Corridor Area of Search. Spawning suitability across the wider Fish and Shellfish Ecology Study Area is indicated to be a mosaic of low and medium suitability..

Figure 6.5-8 Potential Atlantic herring spawning habitat across the Fish and Shellfish Ecology Study Area (Source: Reach *et al.*, 2013).



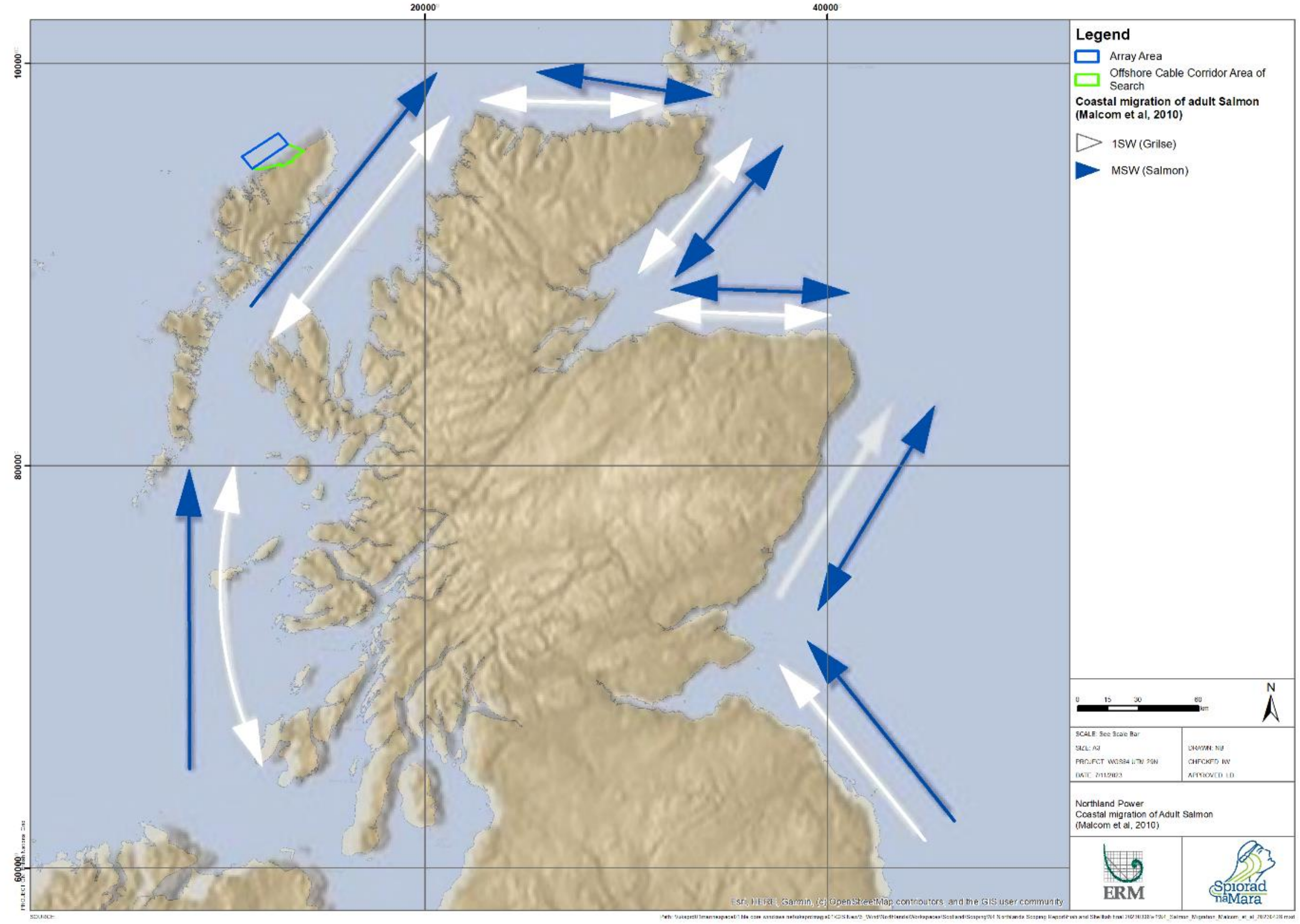
Migratory Fish

The northwest coast of Scotland is considered an important waterway for Atlantic salmon and European eel, which are both listed in Annex II of the EC Habitats Directive. The European eel and Atlantic salmon are also listed as UK Biodiversity Action Plan (BAP) priority fish species. Also protected as UK BAP priority fish species are sea lamprey *Petromyzon marinus* and river lamprey *Lampetra fluviatilis*. These species have been included due to the lack of information regarding their migration patterns and, therefore, the inability to discount them from the Fish and Shellfish Ecology Study Area.

Adult salmon returning from marine feeding in offshore waters may exhibit a northerly and westerly bias to the Scottish coasts, potentially passing the northwest coast of Lewis (Malcolm *et al.*, 2010). Once migrating adults have reached the Scottish coastline, the Isle of Lewis may act as a funnel into the Minch, to enter their natal rivers along the west coast of Scotland and north coast of Ireland (**Figure 6.5-9**). Migration routes for post-smolts are still not well-known. The North Harris Special Area of Conservation (SAC) located approximately 40.9 km southwest of the Offshore Development Area, includes Atlantic salmon as a Qualifying Interest for which the site is designated, where they are currently assessed as being in favourable maintained condition. The North Harris SAC partially overlaps with the Langavat SAC, which drains into the North Atlantic through Loch Roag approximately 19.5 km southwest of the Offshore Development Area of Search. Langavat SAC is a Grade 1 freshwater protected site (exploitation of Atlantic salmon is considered sustainable by Marine Directorate) also listing Atlantic salmon as a Qualifying Interest for which the site is designated and is currently in a favourable condition.

Although Atlantic salmon SACs in Scotland do not extend beyond the tidal limit of rivers, the Langavat SAC (located approximately 19 km south of the Array Area) is likely to be directly connected to the coastal waters that encompass the Project, and it is noted within the SAC conservation advice package that Atlantic salmon distribution within the protected site may be impacted by plans and projects in the area, via potential displacement or barrier effects on spawning salmon or migrating smolts (NatureScot, 2020).

Figure 6.5-9 Dominant directions of travel for multi-sea-winter (MSW) Atlantic salmon and 1 sea-winter (1SW) grilse in Scottish coastal waters based on tagging studies (Source: Malcolm *et al.*, 2010).



Within the Langavat SAC, spawning of Atlantic salmon peaks between November and December, with adults returning to the site between June and August, with downstream passage of smolts to the sea taking place in the spring (Marine Directorate, 2022; Ashley, 2019). Data on the fine-scale movement patterns of salmon in Scottish coastal waters are required to determine the potential impact of offshore renewable energy projects, as assessments may be affected by factors such as timing of migration (McLennan *et al.*, 2018), or swimming depth (Godfrey *et al.*, 2015). Initial studies of Atlantic salmon suggest that adults and post-smolts prefer the upper 10 m of the water column (Holm *et al.*, 2000; Davidsen *et al.*, 2008; Godfrey *et al.*, 2015). Studies conducted in Norway and Canada show preference for offshore waters ~370 m offshore (Thorstad *et al.*, 2004) and 2.5-5 km offshore (Lacroix *et al.*, 2005), respectively. However, post-smolts do not appear to closely follow nearby shores, and instead migrate rapidly and actively towards open marine areas (Malcolm *et al.*, 2010; Mcilvenny *et al.*, 2021). This has direct implications regarding the potential for interaction with wind turbine generators (WTGs), but also suggests a decreased likelihood of interaction with seabed features, such as cable protection or subsea cables.

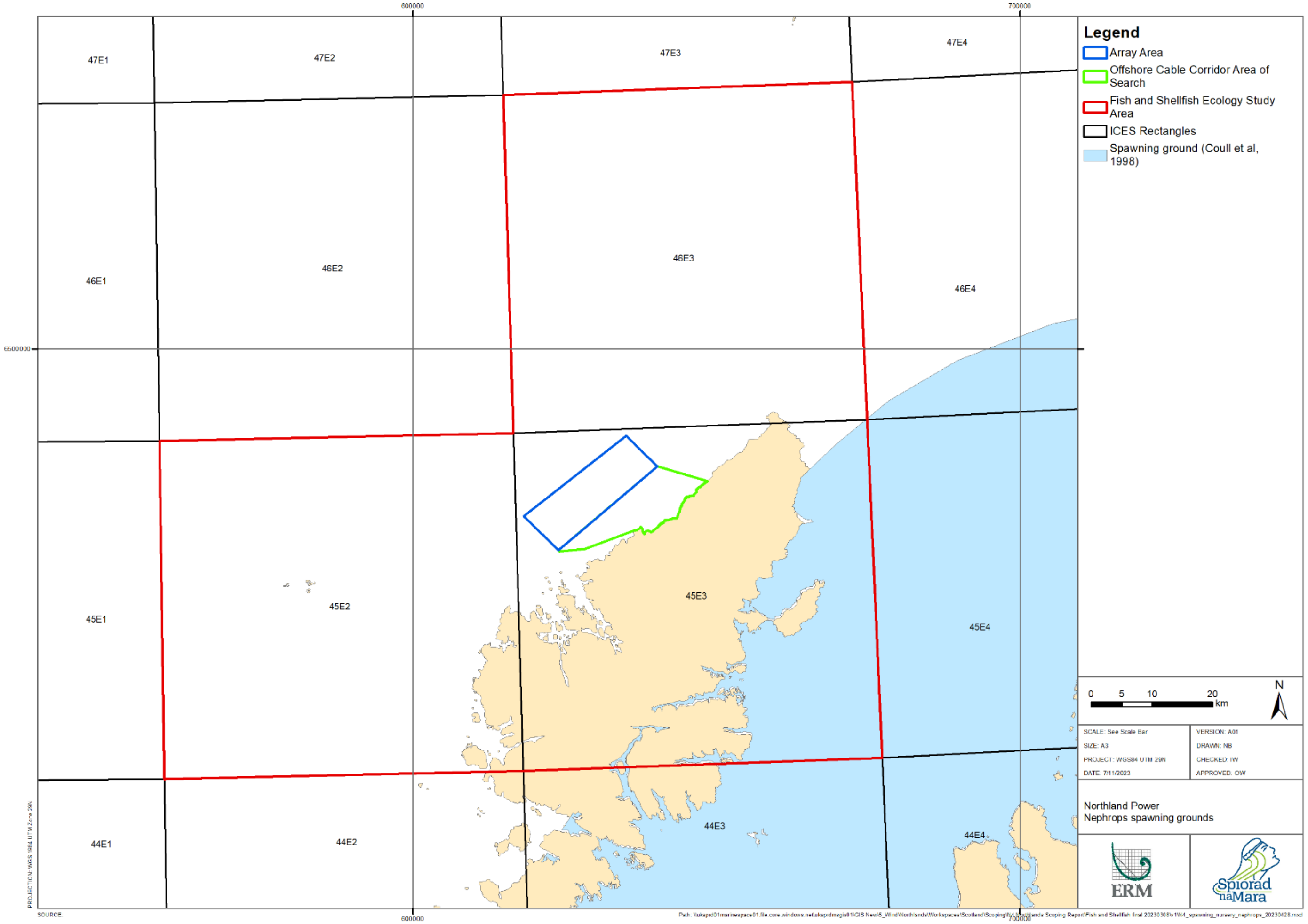
Other salmonid species such as brown trout (also known as sea trout), and Arctic charr have been recorded within the Fish and Shellfish Ecology Study Area, however these species are not designated features within the region despite being listed as UK BAP Priority Fish Species.

For European eel, the Isle of Lewis provides a hotspot of small rivers and water bodies within which the species can mature, before migrating back to the Sargasso Sea region of the North-Atlantic Ocean to spawn. It is possible that populations from northern (continental) Europe and the east coast of Scotland may pass through the Fish and Shellfish Ecology Study Area, however this migration pathway is poorly understood as referenced in Malcom *et al.*, 2010. It has been noted that Atlantic currents may passively divert juveniles (glass eels) around the European Continental Shelf past Ireland and across the Hebrides and north Scotland, feeding into the Northern North Sea. However, in the same paper it has not been confirmed that glass eel migrate passively or actively throughout the migration period. It is therefore expected that the European eel population within the vicinity of the Project are a result of a combination of mass transport of glass eels by the Scottish Coastal Current and active migration within smaller subsidiary currents around the Isle of Lewis.

Shellfish

A number of shellfish species are likely present within the Fish and Shellfish Ecology Study Area, including European spiny lobster (crawfish) *Palinurus elephas*, nephrops (Norway lobster) *Nephrops norvegicus*, green crab *Carcinus meanas*, velvet swimming crab *Necora puber*, brown crab *Cancer pagarus*, brown shrimp *Crangon crangon*, razor clams *Solen* spp., and common whelk *Buccinum undatum*. Spawning grounds for nephrops are presented within **Figure 6.5-10**.

Figure 6.5-10 Spawning and nursery areas of nephrops within the Fish and Shellfish Ecology Study Area (Source: Coull *et al.*, 1998).



6.5.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Fish and Shellfish Ecology assessment, which has been incorporated into the design of the Project (**Table 6.5-2**).

Table 6.5-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.3	Development of a Construction Environmental Management Plan (CEMP)	This would include adherence to requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78/. Best practice techniques employed through all phases of the Project, and measures provided in a Marine Pollution Contingency Plan (MPCP), which will form part of the CEMP. The development of a Drilling Fluid Detection and Response Plan.
6.8	INNS Management Plan	Adherence to INNS Management Plan to reduce the risk of introducing and spreading invasive species.

6.5.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.5.5.1 Likely Significant Effects

Potential likely significant effects on Fish and Shellfish Ecology have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These potential likely significant effects are outlined in **Table 6.5-3**.

Table 6.5-3 EIA Scoping Assessment for Fish and Shellfish Ecology

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Temporary seabed habitat loss and/or disturbance		In	Temporary seabed habitat loss from construction and decommissioning activities may reduce resource (e.g. prey and/or structural features) and spawning/nursery ground availability within the Offshore Development Area of Search. The scale of direct seabed habitat disturbance associated with construction and decommissioning will determine the significance of this impact.	Desktop assessment using relevant literature and project-specific worst-case Rochdale Envelope of direct seabed habitat disturbance.
Increases in suspended sediment concentration		In	Direct interaction with the seabed during the installation and/or removal of objects on, or within, the seabed has the potential to release fine sediments into the water column, which may resettle across a wider area. Sequestered contaminants may also be released. Reduction in water quality may negatively impact the health of fish and shellfish populations and the success of pelagic spawning events within the Fish and Shellfish Study Area. The timing and scale of direct seabed habitat disturbance	Desktop assessment using relevant literature and suspended sediment plume modelling and other relevant determinations within the Physical and Coastal Processes Chapter (Chapter 6.1: Physical and Coastal Processes).

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			associated with construction and decommissioning will determine the significance of this impact.	
Underwater noise and vibration associated with impulsive and continuous sources		In	Migration pathways for anadromous and diadromous fish may be displaced by the introduction of noise and/or vibration into the Project area during foundation piling and elevated vessel traffic.	Desktop assessment using relevant literature on noise sensitivity of receptor groups in relation to the project design envelope, and underwater noise modelling within the Underwater Noise Chapter (Chapter 6.2: Underwater Noise).
Release of drilling fluid mud, drilling arisings or bentonite	6.3	In	Trenchless techniques are a method of installation for the export cable at landfall during the construction phase. This activity can release drilling fluid muds and very low levels of bentonite into the water column, which may impact water quality and indirectly impact fish and shellfish communities and habitats.	The assessment will be informed following the findings of the predictive modelling of the extent of any plumes in the Fish and Shellfish Study Area, and thus the expected transport of any generated discharges of drilling muds.
Ghost fishing due to the presence of lost fishing gear entangled/snagged by infrastructure		**Out**	Lost fishing gear is known to cause entanglement, due to fish aggregation effects (i.e. passive/ghost fishing). Construction vessel mooring lines used during the construction stage will be only temporary, this effect is therefore scoped out.	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Accidental release of pollutants from vessels	6.3	**Out**	Accidental pollutant spills from equipment associated with construction and decommissioning may negatively impact fish and shellfish populations within the scoping area. However, the Construction Environmental Management Plan (CEMP), which complies with requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and Shipboard Oil Pollution Emergency Plans (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 EIA assessment.	
Invasive Non-native Species (INNS)	6.8	**Out**	Potential for the introduction or spread of INNS by transport from other regions via vessel hulls or ballast water. This impact is proposed to be scoped out in consideration of the mitigation and control measures that will be adhered to via an INNS Management Plan.	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Operation and Maintenance				
Permanent seabed habitat loss/disturbance		In	Permanent seabed habitat loss may reduce resource (e.g. prey and/or structural features), and spawning/nursery ground availability within the Offshore Development Area of Search. The scale of direct seabed habitat disturbance associated with operation and maintenance will determine the significance of this impact.	Desktop assessment, using relevant literature and project-specific worst-case Rochdale Envelope of direct seabed habitat disturbance.
Invasive Non-native Species (INNS)	6.8	**Out**	Potential for the introduction or spread of INNS by transport from other regions via vessel hulls or ballast water during operations and maintenance activities. This impact is proposed to be scoped out in consideration of the mitigation and control measures that will be adhered to via an INNS Management Plan.	
Underwater noise and vibration	6.3	**Out**	Migration pathways for anadromous and diadromous fish may be displaced by the introduction of noise and/or vibration into the Offshore Development Area of Search by vessels and activities associated with operation and maintenance. However, the relatively low	Adherence to best practices will reduce the probability of occurrence.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			increase in vessel traffic compared to the background level is unlikely to significantly elevate the impact of underwater noise and vibration for fish and shellfish species. Noice from vessel traffic is likely to be low and would only have an impact on fish species if they remained in close proximity to the transiting vessel for long periods of time, which is considered highly unlikely.	
Release of drilling fluid mud, drilling arisings or bentonite	6.3	In	Trenchless techniques are a method for the export cable repair/replacement at landfall during the operational and maintenance phase. This activity can release drilling fluid muds and very low levels of bentonite into the water column, which may impact water quality and indirectly impact fish and shellfish communities and habitats.	The assessment will be informed following the findings of the predictive modelling of the extent of any plumes in the Fish and Shellfish Study Area, and thus the expected transport of any generated discharges of drilling muds.
Electromagnetic Field (EMF) effects from cables		In	Elevated EMF, due to buried or protected subsea cables, may present a barrier or aggregating effect for some fish and shellfish species. Water and substrate temperatures may also be affected. The specification of subsea cable selected, and the depth of burial of cables on the seabed,	Desktop assessment, using relevant literature on EMF effects of the project design envelope on fish and shellfish receptors.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			will determine the scale of electromagnetic fields within the water column and on the seabed surface.	
Fish and shellfish aggregation effects due to the presence of infrastructure in the water column and on the seabed		In	Hard substrates and structures within the water column, and on the seabed, will attract fish and shellfish over time due to biofouling and added habitat complexity. On a large scale, the baseline ecology of the scoping area may differ from pre-construction levels, however this is unlikely to be the case due to the small scale of the Project. This impact has been scoped in for assessment due to the nature of seabed sediments and potential for attraction of species that would not otherwise be present/resident within the Array Area.	Desktop assessment, using relevant literature, on fish and shellfish aggregation rates upon infrastructure in relation to the project design envelope.
Ghost fishing due to the presence of lost fishing gear entangled/snagged by infrastructure		**Out**	Lost fishing gear is known to cause entanglement, due to fish aggregation effects (i.e. passive/ghost fishing). As all WTGs will be fixed base there will be no mooring lines associated with the Project in the operational stage, and O&M vessel mooring lines will be only temporary.	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Accidental release of pollutants	6.3	**Out**	Accidental pollutant spills from equipment associated with operation and maintenance may negatively impact fish and shellfish populations within the Fish and Shellfish Study Area. Operation and maintenance vessels will comply with the requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and Shipboard Oil Pollution Emergency Plans (SOPEPs), will reduce the likelihood and minimize the impact of any accidental release of pollutants from operations and maintenance vessels and equipment. Therefore, this impact has been scoped out of the EIA assessment.	
Increases in suspended sediment concentration and a reduction in water quality		In	Reductions in water quality or increases in suspended sediments in the water column due to O&M activities may impact foraging success, or negatively impact the health of prey species populations within the Offshore Development Area of Search, with indirect effects on Fish and Shellfish. The timing and scale of direct seabed habitat disturbance associated with construction and	Desktop assessment using relevant literature and suspended sediment plume modelling, and other relevant determinations within the Physical and Coastal Processes chapter (Chapter 6.1: Physical and Coastal Processes)

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			decommissioning will determine the significance of this impact.	

6.5.6 Proposed Approach to EIA

6.5.6.1 Relevant Data Sources

The baseline characterisation of the Fish and Shellfish Ecology Study Area will be determined through the range of data sources (see **Table 6.5-1**) including collation of MMO fish landings data and supplemented by species identified within the Commercial Fisheries Chapter (Chapter 6.9: Commercial Fisheries). The baseline characterisation of Fish and Shellfish Ecology Study Area will also be supplemented with site specific surveys as required with approach and scope agreed directly with Nature Scot prior to mobilisation. Further information relevant to the distribution of key species within the Fish and Shellfish Ecology Study Area, including migratory salmonids and European eel, will be collected and interpreted through desktop study of relevant peer reviewed publications and governmental reports (see **Table 6.5-1**).

Key sources for baseline information include fisheries sensitivity (including spawning and nursery grounds) maps in UK waters (Coull *et al*., 1998; Ellis *et al*., 2012; and Aires *et al*., 2014); Scottish priority marine features (Tyler-Walters *et al*., 2016); and various fish tagging studies published by Marine Directorate.

All impact pathways associated with Fish and Shellfish Ecology will be assessed using current knowledge of the specific effects of each impact, and an assessment will be made on the sensitivity of each receptor group to each impact based on peer reviewed literature.

6.5.6.2 Consultation

Consultation is not expected to be required for elasmobranch, pelagic fish, demersal fish, and shellfish species within the Fish and Shellfish Ecology Study Area.

However, the possibility of the Fish and Shellfish Ecology Study Area interacting with migratory fish species, sandeel and herring spawning, may require further consultation with Marine Directorate, NatureScot and the Outer Hebrides Salmon Board and Fisheries, if deemed relevant and appropriate.

6.5.6.3 Policy, Legislation and Guidance

The following policy, legislation and guidance will be considered.

Table 6.5-4 Legislation, policy and guidance relevant to the Fish and Shellfish assessment

Relevant Legislation and Policy
Scottish National Marine Plan, Marine Planning Policy Fisheries 2 and 3 and Wild Fish 1

Relevant Legislation and Policy
UK BAP List of Priority Species
Annex II of the European Commission Habitats Directive
Annex V of the European Commission Habitats Directive
Annex V of the OSPAR Convention
Section 41 of the Natural Environment and Rural Communities (NEARC) Act 2006
International Union for the Conservation of Nature (IUCN) Red List
The Tope (Prohibition of Fishing) Order 2008
Species of Conservation Interest for protection within Marine Conservation Zones (MCZs) and SACs

6.5.6.4 Assessment Methodology

The EIA methodology will follow the structure of the methodology presented in Chapter 4: Proposed Approach to EIA, whereby the EIAR will illustrate the level of significance of effect expected to result from the Project for the potential impacts scoped into the EIA both alone and cumulatively with other relevant plans, project and activities if deemed required. A baseline section will identify the fish and shellfish receptors that are potentially present within the Fish and Shellfish Ecology Study Area, from which receptor groups will be determined. These groups will be initially categorised as:

- Elasmobranchs;
- Demersal Fish;
- Pelagic Fish;
- Migratory Fish;
- Shellfish.

A Source-Pathway-Receptor (S-P-R) conceptual model will predicate the assessment of effects on fish and shellfish 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.

6.5.7 Scoping Questions for Consultees

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

1. Do you agree that the data sources identified are sufficient to inform the Fish and Shellfish Ecology baseline for the EIA (including potential observations from other relevant surveys)?

2. Have all Fish and Shellfish Ecology receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the potential likely significant effects in the EIA Scoping Assessment table for Fish and Shellfish Ecology?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential likely significant effects of the Project on Fish and Shellfish Ecology receptors?

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6.6 Marine Mammals and Other Megafauna

6.6.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Marine Mammals and Other Megafauna within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

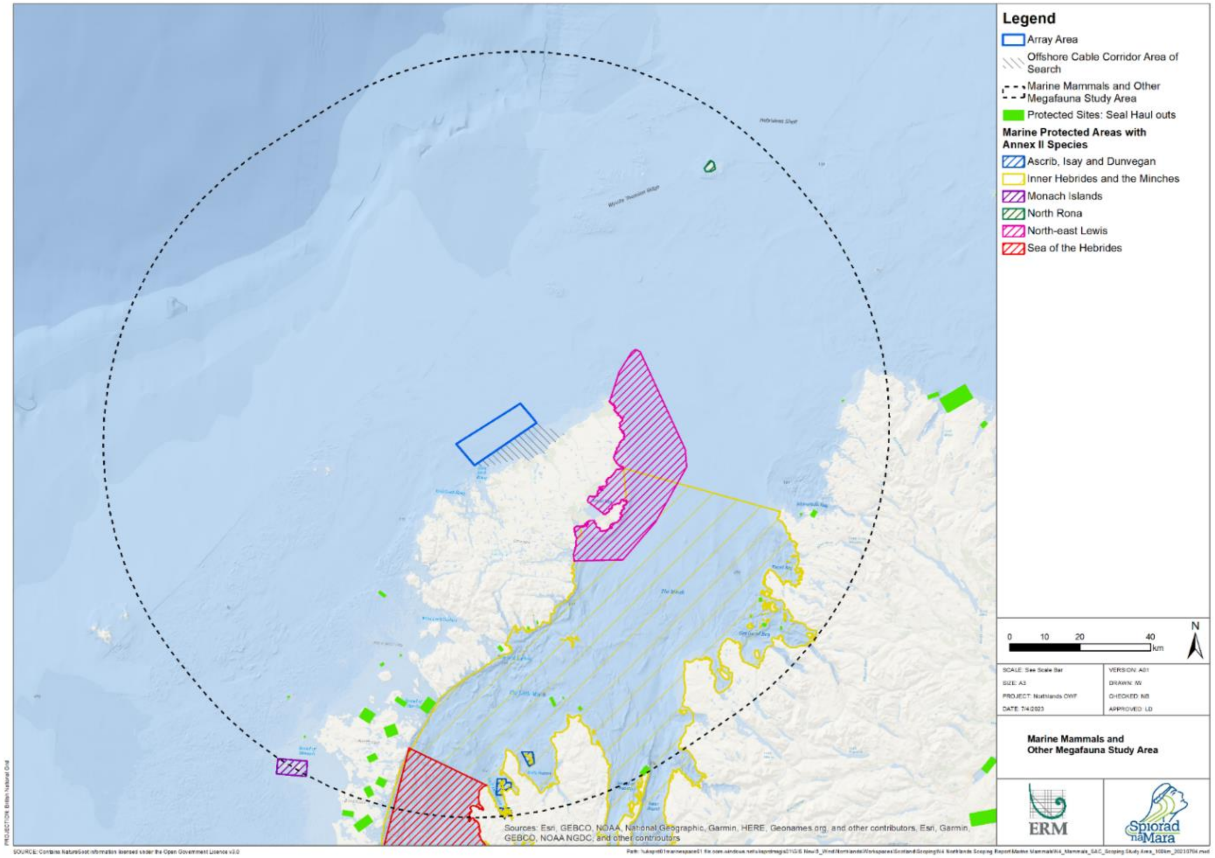
6.6.2 Study Area

The Marine Mammals and Other Megafauna Study Area has been delineated based on the offshore elements of the Project, with additional consideration for the wide-ranging nature of many marine mammal species in the region. The Marine Mammals and Other Megafauna Study Area is defined as the marine environment of the Array Area with a 100 kilometres (km) buffer area (see **Figure 6.6-1**), based on the average foraging range of grey seals, as they have the larger foraging area of the two United Kingdom (UK) resident species (SCOS, 2021). This buffer also encompasses the Offshore Cable Corridor Area of Search.

Cetaceans are highly mobile, with foraging ranges that cover areas much greater than that contained within the topic-specific Study Area. Additionally, the foraging range size of pinnipeds can vary significantly with location (Carter *et al.*, 2020). The true zone of influence is, therefore, likely to extend beyond the defined borders of the Study Area and, as a result, this chapter also considers marine mammal Management Units (MUs) for species that are likely to be present within the wider area (i.e. beyond the 100 km topic-specific Study Area). Also considered are the densities and abundances within the SCANS-III (Small Cetaceans in European Atlantic waters and the North Sea) survey blocks; and the total counts of individuals within the Project specific survey area (array area plus the 10 km buffer) from digital aerial surveys (DAS), noting that DAS are ongoing until February 2024.

Marine turtles, sunfish, and basking sharks are similarly highly mobile, and may all be present in low quantities within the Marine Mammals and Other Megafauna Study Area. Their presence is seasonal (restricted to summer months), as during this time their wide foraging ranges may overlap with the Study Area. The 100km buffer zone is therefore also appropriate for these wide-ranging species. Due to the possibility of interactions between the Project and these species, they have been included in this assessment.

Figure 6.6-1 Marine Mammals and Other Megafauna Study Area, with locations of Special Areas of Conservation (SAC) that have marine mammals as designated features.



6.6.3 Baseline Environment

6.6.3.1 Site Specific Surveys

In order to provide site specific, and up to date, information on which to base the impact assessment, DAS of the Array Area and a 10 km buffer were commissioned by the Applicant. Surveys commenced March 2022, for a total of 24 months. Data from the DAS (March 2022-February 2023) have been made available to inform this chapter and baseline environment assessment.

6.6.3.2 Data Sources

Other data sources used to inform the Marine Mammals and Other Megafauna Chapter are presented within **Table 6.6-1**. These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside the site-specific data collected for the Project.

Table 6.6-1 Summary of key publicly available datasets for Marine Mammals and Other Megafauna.

Source	Spatial Coverage	Year	Summary
SCANS-III revised report	The entire 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	2021	This report summarises design-based estimates of abundance for various cetacean species, based on a series of large-scale surveys in European Atlantic waters
SCANS-III density surface modelling report	The entire 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 the SCANS-III revised report and describes the density surface modelling for cetacean species for which sufficient data were obtained
JNCC Cetacean Atlas (Reid *et al.*, 2003)	Marine Mammals and Other Megafauna Study Area and wider UK	2003	Provides an account of the distribution of 28 cetacean species across UK waters
JNCC MPA Mapper SAC Scotland ESRI	UK	2022	Displays and provides data on Scotland Marine Protected Areas (MPAs), Sites of Special Scientific Interest (SSSIs) and SACs
National Biodiversity	Marine Mammals and Other Megafauna Study area and wider UK	2022	This project compiles biodiversity data on marine species for public access, including data on marine mammals

Source	Spatial Coverage	Year	Summary
Network (NBN) Atlas			
Hebridean Marine Mammal Atlas	Marine Mammals and Other Megafauna Study area and wider Outer Hebrides	2018	This document compiles 15 years of boat-based surveys of the Outer Hebrides, for a wide variety of marine mammals and basking sharks
Marine Information Network (MarLIN)	UK and beyond	2022	This database reviews and compiles scientific evidence on the effect of human and natural influences on marine species and their habitats
Management Units for Cetaceans in UK waters (IAMMWG, 2015)	Marine Mammals and Other Megafauna Study Area and wider UK	2015	This project describes Marine Mammal Management Units (MMMUs) with boundaries and estimated abundance
Review of Management Unit boundaries for cetaceans in UK waters (IAMMWG, 2023)	Marine Mammals and Other Megafauna Study Area and wider UK	2023	Review highlights that the MU boundaries defined in 2015 remain unchanged for harbour porpoise, short-beaked common dolphin, white-beaked dolphin, Atlantic white-sided dolphin, Risso's dolphin and minke whale. One MU for bottlenose dolphin has been extended, however the MU encompassing the Proposed Project is unchanged.
Updated abundance estimates for cetacean Management Units in UK waters (IAMMWG, 2022)	Marine Mammals and Other Megafauna Study Area and wider UK	2022	This report provides updated estimates of abundance for the seven most common cetacean species found in UK waters, within their defined MUs.
Scotland's Marine Atlas	Scottish waters	2018	An assessment of the condition of Scotland's seas based on scientific data
SCOS Scientific Advice on Seal Populations	Marine Mammals and Other Megafauna Study area and wider UK	2021	Scientific advice on management of UK seal populations

Source	Spatial Coverage	Year	Summary
Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggit *et al.*, 2019)	Marine Mammals and Other Megafauna Study area and northeast Atlantic	2019	Cetacean distribution maps from survey data collected between 1980-2019
Estimated At-Sea Distribution of Grey and Harbour Seals (Russell *et al.*, 2017)	UK	2017	These GIS files are an update of the previous seal usage maps described in Jones *et al.* (2015), and reflect an estimated mean number of seals per 5x5 km cell
Designated haul-out sites for grey and harbour seals (Protection of Seals Orders)	Scottish waters	2019	These GIS files show 194 seal haul-out sites (where seals rest, moult, or breed) across Scotland
Regional Baselines for Marine Mammal Knowledge Across the North Sea and Atlantic Areas of Scottish Waters (Hague *et al.*, 2020)	Scottish waters (North Sea and Atlantic)	2020	This report presents a consolidated record of marine mammal abundance and distribution estimates for all commonly occurring Scottish marine mammal species (17 species), from data collected by local, regional, national and international partners through visual (aerial, land-based and vessel-based) surveys, static and towed acoustic monitoring, and animal-borne telemetry
Lewis Wave Array (Oyster 2) Environmental Statement	The Oyster Wave Array study area, which overlaps the Marine Mammals and Other Megafauna Study Area, closer to shore	2012	This report contains detailed baseline information for a site that overlaps the proposed Project, and characterises the distribution and abundance of marine mammal species in the area

6.6.3.3 Overview of Baseline Environment

A range of marine mammals may be present within the Marine Mammals and Other Megafauna Study Area, including cetaceans (dolphins, porpoises, and whales), pinnipeds (seals), as well as marine megafauna such as basking sharks.

Cetaceans

Within the waters of the north Atlantic surrounding the Inner and Outer Hebrides, 23 species of whale, dolphin, and porpoise have been recorded (Hebridean Whale and Dolphin Trust, 2018). In the waters of the Outer Hebrides, off the northwest coast of the Isle of Lewis, the most abundant species are harbour porpoise *Phocoena phocoena*, white-beaked dolphin *Lagenorhynchus albirostris*, Risso's dolphin *Grampus griseus*, common dolphin *Delphinus delphis*, and minke whale *Balaenoptera acutorostrata* (Hammond *et al*., 2021). Bottlenose dolphin *Tursiops truncatus* may also be present in the survey area, although in very low numbers (APEM, 2022a-g).

Coastal waters adjacent to the Offshore Development Area of Search were the subject of visual surveys undertaken for the Lewis Wave Array, over a period of 1 year (September 2010-September 2011), where pods of up to 20 common dolphins were sighted on 3 days (2 in October and 1 in July) (Royal Haskoning, 2012). Harbour porpoises were recorded on 6 occasions across summer and winter months, both alone and in small pods (up to 3 individuals). Risso's dolphins were sighted on 11 occasions, in pods of up to 6 animals, and as individuals. Sightings were relatively evenly spread across months between March and August. There were 2 minke whales, and 1 potential additional individual, sighted further offshore (1.5 km and 9 km from the vantage point) during October, April, and June, with all appearing to be transiting through the area.

The Offshore Development Area of Search is located in Block K of the SCANS III aerial and boat-based survey blocks, and directly adjacent to Block J (Hammond *et al*., 2021). Densities for both survey blocks have, therefore, been provided in **Table 6.6-2,** alongside abundance estimates for the relevant MUs (IAMMWG, 2022). This table should not be considered an exhaustive list of the cetacean species present within the Offshore Development Area of Search, but rather presents the cetacean species likely to be present for which MUs are defined and SCANS III density estimates are available.

For species that have been included in **Table 6.6-2** that were also identified in the DAS of the Offshore Development Area of Search across 12 months (March 2022 to February 2023), the total counts across the 12 month period have been included. The DAS detected the presence of harbour porpoise (n=61), Risso's dolphin (n=16), common dolphin (n=47), bottlenose dolphin (n=1), orca (n=7; not included in **Table 6.6-2** due to lack of established MU), minke whale (n=1), unidentified dolphin/porpoise (n=17) (APEM, 2022a-l).

Some species may be present in the waters of the Outer Hebrides at any point in the year, such as harbour porpoise, Risso's dolphin and, to a lesser extent, white-beaked and bottlenose dolphin. Other species have a seasonal distribution and, so, are more likely to be encountered during the summer months, for example minke whale and common dolphin. Orca *Orcinus orca* were detected in the January DAS survey and have been recorded off Rubha Robhais (Butt of Lewis) and the mouth of Loch Roag within the Marine Mammals and Other Megafauna Study Area (Hebridean Whale and Dolphin Trust, 2023), however the area is not considered to be a hotspot of distribution (Hebridean Whale and Dolphin Trust, 2018). Humpback whale *Megaptera novaeangliae* have recorded presence in the wider region, with sightings recorded near St. Kilda, and through The Minch and the Inner Hebrides (Hebridean Whale and Dolphin Trust, 2023; Reid *et al.*, 2003).

The closest MPA with cetaceans as a feature is the North-east Lewis MPA, which is approximately 22.4 km northeast of the Array Area (between the Port of Ness and Cromore); and is designated, in part, for Risso's dolphin. The Inner Hebrides and the Minches SAC, is located on the opposite side of the Isle of Lewis, on the southeast coast. This SAC is designated for harbour porpoise and encompasses an area of 13,814 km^2.

Table 6.6-2 Abundance and Density of Cetaceans in Surrounding Waters.

Species	Site-specific DAS survey total count (APEM, 2022)	Shore-based survey max single count (Royal Haskoning, 2012)	Density (animals/km^2; Hammond *et al.*, 2021)		Abundance and Management Unit (IAMMWG, 2022)
			Block J	Block K	
Common dolphin *Delphinus delphis*	47	20	Density: 0.1333 Abundance: 4,679	Density: 0 Abundance: 0	Celtic and Greater North Seas (CGNS): 102,656 (UK section 57,417)
Harbour porpoise *Phocoena phocoena*	61	3	Density: 0.058 Abundance: 2,045	Density: 0.308 Abundance: 9,999	West Scotland (WS): 28,936 (UK section 24,305)
White-beaked dolphin *Lagenorhynchus albirostris*	0	0	Density: 0.053 Abundance: 1,871	Density 0.217 Abundance 7,055	CGNS: 43,951 (UK section 34,025)
Bottlenose dolphin *Tursiops truncatus*	1	0	Density: 0 Abundance: 0	Density: 0 Abundance: 0	Coastal West Scotland & Hebrides (CWSH): *unknown* (UK section 45)
Risso's dolphin *Grampus griseus*	16	6	Density: 0.1923 Abundance: 6,750	Density: 0.0135 Abundance: 440	CGNS: 12,262 (UK section 8,687)
Atlantic white-sided dolphin *Lagenorhynchus acutus*	0	0	Density: 0 Abundance: 0	Density: 0 Abundance: 0	CGNS: 18,128 (UK section 12,293)
Minke whale *Balaenoptera acutorostrata*	1	1	Density: 0.0184 Abundance: 647	Density: 0.0091 Abundance: 295	CGNS: 20,118 (UK section 10,288)

Pinnipeds

There are 2 species of pinniped considered resident in UK waters: the harbour seal *Phoca vitulina* and the grey seal *Halichoerus grypus*. The closest seal haul-out sites to the Offshore Development Area of Search are Gasker (site code WI-018; grey seals only) and Sgeir Leathann (Broad Bay) (site code WI-004; harbour and grey seals), which are approximately 50 km and 59 km distant, respectively. There are no SACs with designated features for grey seals or harbour seals within 80 km. The percentage of at-sea population, of grey seals and harbour seals, in the waters surrounding the Project are presented in **Figure 6.6-2** and **Figure 6.6-3**, respectively. DAS of the Offshore Development Area of Search, across 12 months (March 2022-February 2023), detected 43 grey seals and 8 harbour seals (across all surveys) (APEM, 2022a-l).

Figure 6.6-2 Distribution of grey seals around the Array Area, as a percentage of the total at-sea population (from Carter *et al.*, 2022)

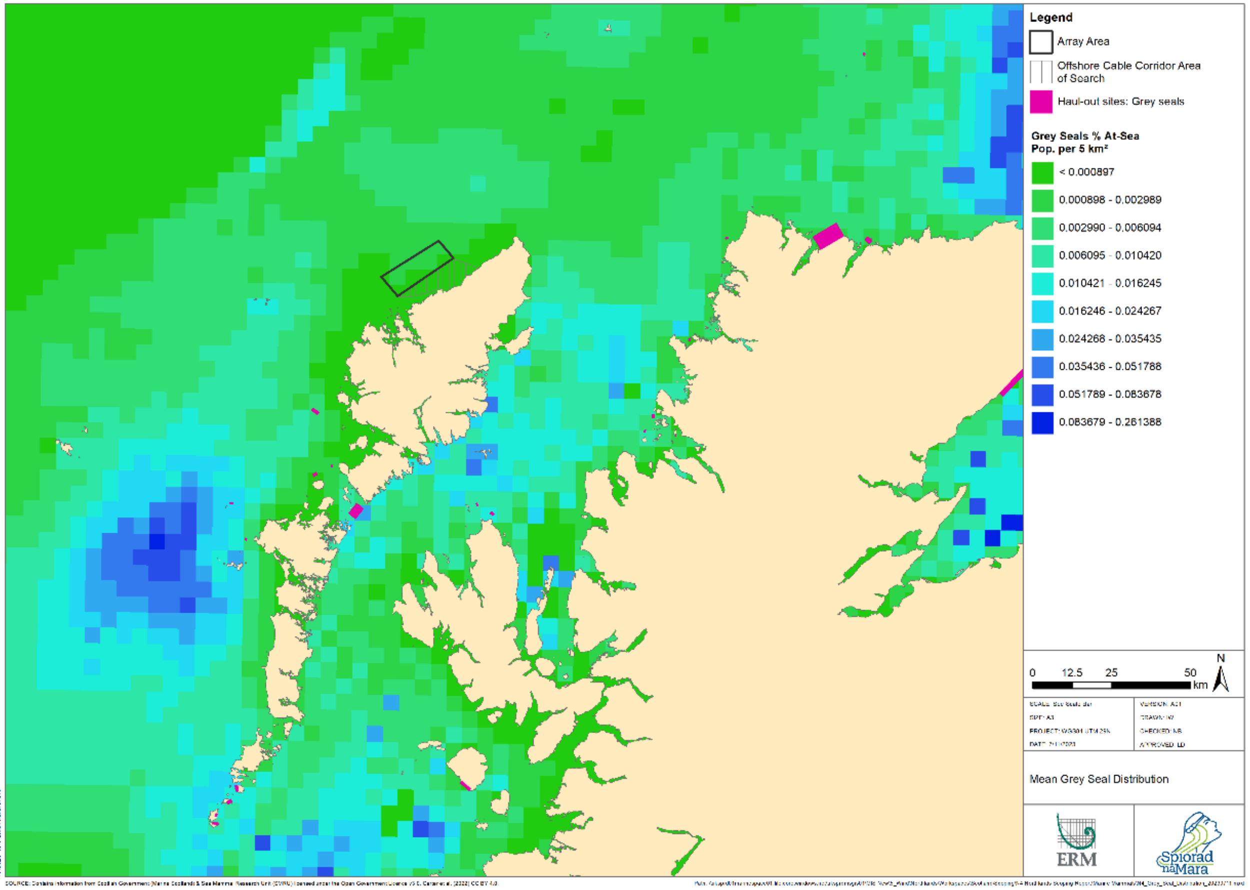
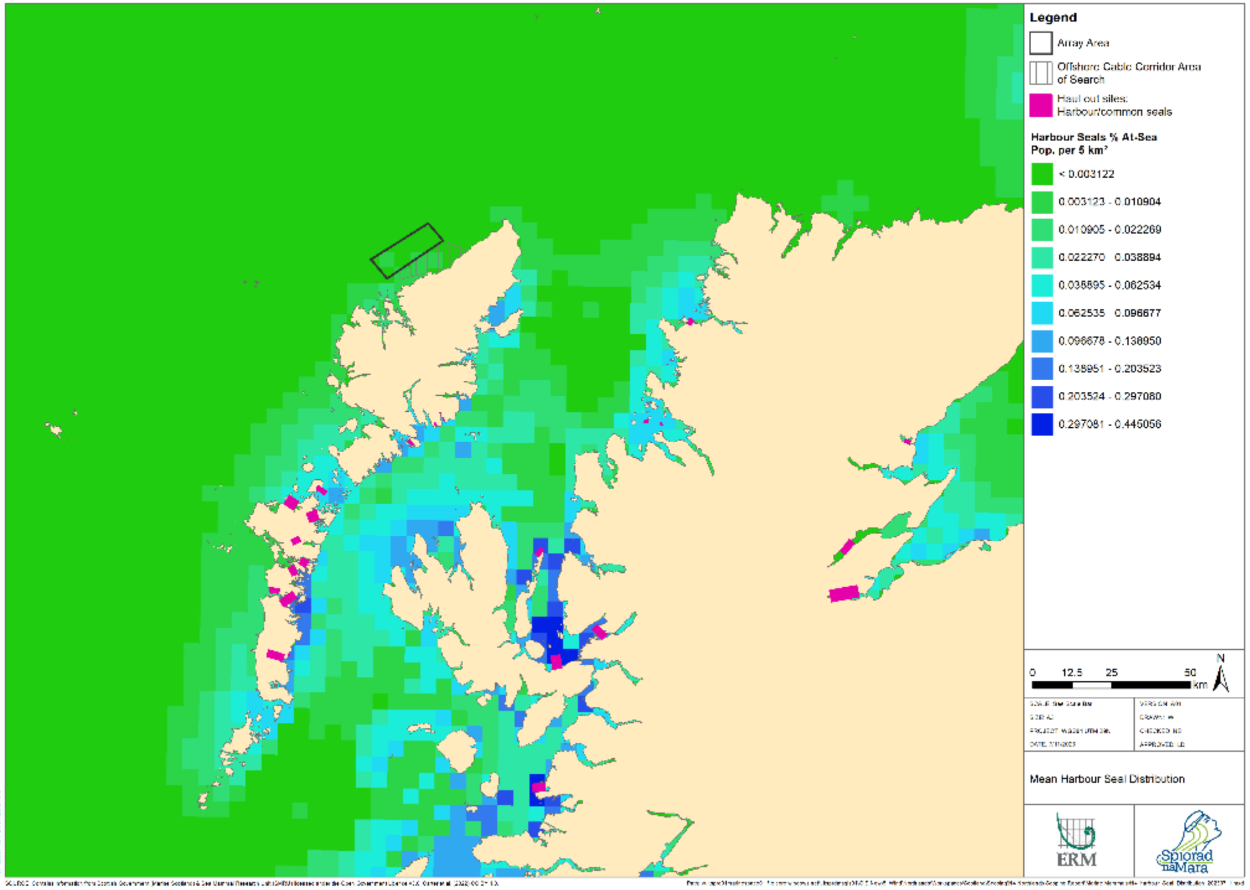


Figure 6.6-3 Distribution of harbour seals around the Array Area, as a percentage of the total at-sea population (from Carter et al., 2022)



Grey seals are an Annex II species of the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992), with a presence across the Outer Hebrides. Their breeding period occurs in autumn, spanning the months of September to November, with the closest breeding colonies found in the Sound of Harris. They are the larger of the 2 resident pinniped species, and primarily forage offshore, at depths of <100 m. Their foraging ranges are large, sometimes exceeding 100 km, and prey species include demersal fishes such as cod, plaice, flounder, and haddock (Thompson *et al.*, 1996; Carter *et al.*, 2022). Across the greater UK waters, the most recent estimate (2019) of grey seal population is 157,300, with Scotland making up 120,800 of the total (SCOS, 2021). Pup production of grey seals occurs during autumn, with production currently estimated at 54,050. Within the Outer Hebrides, pup production increased by 0.7% between 2016 and 2019 (from 15,732 to 16,038). Pupping occurs primarily within the Monach Isles SAC (approximately 100 km away), with lesser pup production occurring at North Rona SAC (approximately 85.8 km away). Together, these 2 SACs form the Western Isles Seal Management Unit (SMU), which is currently listed as stable/increasing (SCOS, 2021). To date, the DAS have recorded a total of 43 grey seals between March 2022 and February 2023 (APEM, 2022a-l). In visual surveys of adjacent waters for the Lewis Wave Array (Royal Haskoning, 2012), grey seals were observed relatively consistently throughout the year (with fewer in January-February and May-June). Approximately 95 individuals were observed across a period of 1 year (2010-2011), and no haul-out sites were identified.

Harbour seals are also present throughout waters of the Outer Hebrides, falling within the Western Isles SMU. Harbour seals generally forage between 40-50 km from haul out sites, on a variety of prey species including cephalopods (e.g. octopus and squid), and fishes such as cod, haddock, herring, sprat, and sandeels (Thompson *et al.*, 1996). The most recent estimate of harbour seal population throughout the UK (2020) was 43,750, and in Scottish waters was 37,200 (SCOS, 2021). Due to Coronavirus Disease 2019 (COVID-19) restrictions, no large-scale surveys have been conducted by the Special Committee on Seals (SCOS) since 2020. Pupping occurs in June to July, and moulting usually occurs in August, during which individuals tend to stay closer to shore. Harbour seal records are less frequent in the Offshore Development Area of Search, compared with grey seals. In visual surveys adjacent to the Marine Mammal and Other Megafauna Study Area, no haul-out sites were identified, and no harbour seals were observed (Royal Haskoning, 2012). This corresponds with published literature, which suggests harbour seals prefer sheltered areas to the exposed coastline characteristic of the proposed Project area (Jones *et al.*, 2015; Arias-del-Razo *et al.*, 2016). The DAS, across 7 months (March 2022 to February 2023), have recorded a total of 8 individual harbour seals (APEM, 2022a-l). Harbour seal populations in the Outer Hebrides appear to be increasing, after a significant recovery between 2005 and 2017. The only SAC within the Western Isles SMU, for which harbour seal is a designated feature, is the Sound of Barra SAC (132 individuals), which is approximately 150 km from the Marine Mammal and Other Megafauna Study Area. Although not technically within the Western Isles SMU, the Ascrib, Isay and Dunvegan SAC (West Scotland SMU) is closer, 142 km from the Marine Mammal and Other Megafauna Study Area, and had a population, at last count, of 712 and is stable.

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

Basking sharks have a distribution that overlaps with the Marine Mammals and Other Megafauna Study Area, however their abundance in the area is low. Basking shark densities are higher in the region between Coll and Tiree, and to the west of Mull, due to a high availability of plankton associated with local tidal fronts (Pingree *et al.*, 1975; Sims *et al.*, 2006). From boat surveys by the Hebridean whale and dolphin trust, from the vessel *Silurian* over 15 years, basking sharks had a sighting per unit effort (km) of between 0.030-0.520 in the Marine Mammals and Other Megafauna Study Area, particularly during peak months in the summer (Hebridean Whale and Dolphin Trust, 2018). In surveys for the Lewis Wave Array area, 8 sightings of single basking sharks were recorded on 6 days (in May to August), over 1 year of surveys (Royal Haskoning, 2012). Feeding behaviour was observed in half of these sightings. In the DAS of the Offshore Development Area, to date, no basking sharks have been identified.

Records exist of 4 species of marine turtle within Scottish waters, primarily during summer months: leatherback turtles *Dermatochelys coriacea*, loggerhead turtles *Caretta caretta*, Kemp's ridley *Lepidochelys kempii*, and green turtles *Chelonia mydas*. All 4 of these species are protected as European Protected Species (EPS) and are listed on Annex IV of the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992), they are further listed on the IUCN Red List of Threatened Species. Leatherback and loggerhead turtles are also listed on the OSPAR List of Threatened and/or Declining Species and Habitats. Between 1989-2011, there were 156 reported turtle sightings (Scotland's Marine Atlas, 2011); however, in all records going back to 1748, there have only been 415 turtle records in Scottish waters (Penrose *et al.*, 2022). Leatherback turtle sightings are most common, accounting for 11 of 12 live turtle sightings in UK waters in 2021, as they may forage on jellyfish in the region (Penrose *et al.*, 2022). Of these live turtle sightings, 4 were in Scottish waters. The presence of other marine turtle species is more likely to occur through disorientation or accidental transport via ocean currents. Since 2011, there have been 2 turtle sightings off the northwest coast of the Isle of Lewis: 1 in Loch Roag, and one >40 km offshore to the north of the island (Penrose *et al.*, 2022). Marine turtles are therefore considered extremely rare within the proposed Marine Mammals and Other Megafauna Study Area.

Ocean sunfish *Mola mola* are globally distributed through temperate and tropical seas, however they have been recorded in low numbers off Scottish and Irish coasts, the south and west coasts of England, and even into the Baltic Sea (Bleach, 2002; Hinrichsen *et al.*, 2022). While their frequency in northern climates appears to be increasing (Rogan and Mackey, 2007), they are still present only rarely, and seasonally (due to winter temperatures falling below their thermal tolerance). In Scottish waters, their presence appears to be exclusively solitary, however they are found in higher abundances elsewhere (Cartamil and Lowe, 2004). Aerial surveys in the Irish Sea, conducted across an area of 11,951 km between 2003-2004, detected 68 individuals (Houghton *et al.*, 2006). This suggests that sunfish may be more abundant in the region than previously imagined and are more common than other rare seasonal species such as leatherback turtles. Density was lower in the north Irish Sea, compared with St George's Channel and the Bristol Channel, and this trend is likely to extend northward into Scottish waters. The DAS has, to date (March 2022 to February 2023), recorded a single sunfish (APEM, 2022a-l). Ocean sunfish are not included under any conservation measures within the UK or EU Habitats Directive but are vulnerable to human activity via entanglement and ship strikes and are listed as Vulnerable on the IUCN Red List of Threatened Species (Liu *et al*., 2015).

6.6.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Marine Mammals and Other Megafauna assessment, which has been incorporated into the design of the Project (**Table 6.6-3**).

Table 6.6-3 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.11	Development of a Marine Mammal Management Plan (MMMP).	This would include adherence to requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78/. Best practice techniques employed through all phases of the Project, and measures provided in the MMMP, which will form part of the Construction Environmental Management Plan (CEMP).

6.6.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.6.5.1 Likely Significant Effects

Potential likely significant effects on Marine Mammals and Other Megafauna have been identified, which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 6.6-4**.

Table 6.6-4 EIA Scoping Assessment for Marine Mammals and Other Megafauna

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Indirect effects resulting from impacts on prey availability	6.11	In	Changes in prey availability, through underwater noise or from physical impacts during construction and decommissioning (e.g. disruption of seabed or placement of cable protection) on prey species and their associated habitat, may have energetic impacts on Marine Mammals and Other Megafauna that forage within the Offshore Development Area of Search.	Desk-based assessment of impacts to prey items (e.g. benthic ecology and fish and shellfish receptors), largely informed by outcomes of the corresponding assessments.
Disturbance, displacement, and/or injury from underwater noise and vibration associated with piling	6.11	In	Disturbance, displacement, and/or injury may occur as a result of underwater noise generated through Wind Turbine Generator (WTG) or substation foundation piling during the construction phase. Marine mammals are particularly sensitive to underwater noise and use sound for communication, foraging, predator detection, and navigation.	Desk-based assessment, informed by existing literature and reviews of mammal sensitivity to underwater noise; supplemented by Project specific survey data and underwater noise modelling, detailed in the Underwater Noise chapter (Chapter 6.2: Underwater Noise).
Disturbance, displacement, and/or injury from underwater noise and vibration associated with vessels and other noise producing activities	6.11	In	Construction activities associated with the project such as vessel movements or placement of cable protection, or decommissioning activities such as cutting will produce underwater noise, which may cause direct injury or result in disturbance, avoidance, or other alterations of behaviour in Marine Mammals and Other Megafauna.	Desk-based assessment, informed by existing literature and reviews of mammal sensitivity to vessel presence and underwater noise; supplemented by Project specific survey data and underwater noise modelling, detailed in the Underwater Noise chapter (Chapter 6.2: Underwater Noise).

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Disturbance, displacement, and/or injury from underwater noise and vibration associated with clearance of unexploded ordnance (UXO)	6.11	In	Clearance of any Unexploded Ordinance (UXO) across the Array Area and the Offshore Cable Corridor Area of Search, either through detonation or other methods (e.g. deflagration), will produce underwater noise, which has the potential to cause auditory injury, trauma, or mortality to Marine Mammals and Other Megafauna species, or result in behavioural disturbance.	Desk-based assessment, informed by existing literature and reviews of mammal sensitivity to underwater noise; supplemented by Project specific survey data and underwater noise modelling, detailed in the Underwater Noise chapter (Chapter 6.2: Underwater Noise).
Risk of injury from collision with construction vessels		**Out**	Marine Mammals and Other Megafauna are known to be susceptible to ship strikes. Construction works will follow relevant industry guidance to minimise the risks of injury; these measures outlined within the MMMP which forms part of the CEMP.	
Disturbance or temporary habitat loss due to the physical presence of construction vessels		In	Temporary habitat loss (e.g. foraging habitat, migration corridors) or disturbance of Marine Mammals and Other Megafauna may occur as a result of 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.	Desktop assessment using relevant literature and Project specific worst-case Rochdale Envelope of vessel presence and activities.
Accidental release of pollutants	6.11	**Out**	Accidental pollutant spills from equipment associated with construction and decommissioning may negatively impact marine mammal and other megafauna populations; however, a CEMP, which complies with requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and Shipboard Oil Pollution Emergency Plans (SOPEPs), will reduce the likelihood and minimise the impact of any accidental release of pollutants	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			from construction/decommissioning vessels and equipment. Therefore, this impact has been scoped out of the EIA assessment.	
Risk of injury from entanglement with construction vessel mooring lines, or discarded fishing gear	6.11	**Out**	Mooring lines associated with construction vessel activity have the potential to pose an entanglement risk for Marine Mammals and Other Megafauna. However, any vessel moorings during the construction phase will be temporary, and mooring lines will be maintained taught with no ability to form loops. Likewise, any mooring lines are unlikely to collect ghost fishing gear as they will be in place only temporarily. Additionally, marine mammals are likely to avoid interaction with any vessels or mooring lines due to disturbance effects from vessels during works. As all WTGs will be fixed base, there will be no mooring lines associated with WTGs. The effect is therefore scoped out.	
Increases in suspended sediment concentration and a reduction in water quality		In	Reductions in water quality or increases in suspended sediments in the water column as a result of installation activities (such as piling of the WTG foundations), may impact foraging success, or negatively impact the health of prey species populations within the topic-specific study area, with indirect effects on Marine Mammals and Other Megafauna. The timing and scale of direct seabed habitat disturbance associated with construction and decommissioning will determine the significance of this impact.	Desktop assessment using relevant literature and suspended sediment plume modelling and other relevant determinations within the Physical and Coastal Processes chapter (Chapter 6.1: Physical and Coastal Processes).
Operation and Maintenance				

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Indirect effects resulting from impacts on prey availability	6.11	In	Changes in prey availability, through underwater noise from maintenance/repairs or from physical impacts on prey species and their associated habitat, may have energetic impacts on Marine Mammals and Other Megafauna that forage within the Offshore Development Area of Search.	Desk-based assessment of impacts to prey items (e.g. benthic ecology and fish and shellfish receptors), largely informed by outcomes of the corresponding assessments.
Risk of injury from entanglement with Operations and Maintenance (O&M) vessel mooring lines, or discarded fishing gear	6.11	**Out**	Mooring lines associated with O&M vessel activity have the potential to pose an entanglement risk for Marine Mammals and Other Megafauna. However, any vessel moorings during the O&M phase will be temporary, and mooring lines will be maintained taught with no ability to form loops. Likewise, any mooring lines are unlikely to collect ghost fishing gear as they will be in place only temporarily. Additionally, marine mammals are likely to avoid interaction with any vessels or mooring lines due to disturbance effects from vessels during works. As all WTGs will be fixed base, there will be no mooring lines associated with WTGs. The effect is therefore scoped out.	
Disturbance, displacement, and/or injury from underwater noise and vibration associated with vessels and other noise producing activities	6.11	In	Operation and maintenance activities associated with the project such as vessel movements cable repairs will produce underwater noise, which may cause injury or result in disturbance, avoidance, or other alterations of behaviour in Marine Mammals and Other Megafauna.	Desk-based assessment, informed by existing literature and reviews of mammal sensitivity to vessel presence and underwater noise; supplemented by Project specific survey data and underwater noise modelling, detailed in the Underwater Noise chapter (Chapter 6.2: Underwater Noise).

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Disturbance, displacement, and/or behavioural modification from underwater noise and vibration associated with turbine operation	6.11	In	During operations, there is the potential for disturbance, displacement, and/or modifications of behaviour as a result of underwater noise and vibration that may be produced by turbines.	Desk-based assessment, informed by existing literature and reviews of mammal sensitivity to noise from operational turbines; supplemented by Project specific survey data and underwater noise modelling, detailed in the Underwater Noise chapter (Chapter 6.2: Underwater Noise).
Risk of injury from collision with operations and maintenance vessels		**Out**	While Marine Mammals and Other Megafauna are known to be susceptible to ship strikes, the vessels associated with the 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.	
Barrier effects due to the presence of infrastructure in the water column and on the seabed		In	Infrastructure associated with the Project has the potential to cause barrier effects from WTGs, which could disrupt the passage of Marine Mammals and Other Megafauna.	Desktop assessment using relevant literature on sensitivity of Marine Mammals and Other Megafauna to infrastructure, in relation to the Project design envelope.
Electromagnetic fields (EMFs) associated with subsea cables		**Out**	EMFs emitted by offshore cables will be at low levels, and cables will be buried or covered by protection, therefore it is considered there will be no significant impacts of EMFs on Marine Mammals. EMFs can present a barrier or deterrent effect for some elasmobranch species, however as the cables will be buried or covered by protection, and as basking sharks are not considered benthic species, no significant impacts on basking sharks are predicted.	Desktop assessment, using relevant literature on EMF effects of the project design envelope on marine mammal and other megafauna receptors.

Potential Likely Significant Effect	**Relevant Embedded Mitigation**	**Scoping Result**	**Justification**	**Assessment Method**
Accidental release of pollutants	6.11	**Out**	Accidental pollutant spills from equipment associated with O&M may negatively impact marine mammals and other megafauna; however, an 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 maintenance or repair vessels and equipment. Therefore, this impact has been scoped out of the EIA assessment.	
Long-term habitat change due to operational infrastructure, including change in foraging opportunities		In	Physical presence of project infrastructure, noise from maintenance activities, and underwater noise from vibration of operating turbines can displace Marine Mammals and Other Megafauna from the Offshore Development Area of Search. This can reduce the amount of available foraging opportunities.	
Increases in suspended sediment concentration and a reduction in water quality		In	Reductions in water quality or increases in suspended sediments in the water column due to O&M activities may impact foraging success, or negatively impact the health of prey species populations and the within the Offshore Development Area of Search, with indirect effects on Marine Mammals and Other Megafauna. The timing and scale of direct seabed habitat disturbance associated with construction and decommissioning will determine the significance of this impact.	Desktop assessment using relevant literature and suspended sediment plume modelling, and other relevant determinations within the Physical and Coastal Processes chapter (Chapter 6.1: Physical and Coastal Processes)

6.6.6 Proposed Approach to EIA

6.6.6.1 Relevant Data Sources

The key data sources that will be used for the characterisation of the Marine Mammals and Other Megafauna assessment are detailed in section 6.6.3.1 and will be supplemented by additional desktop study of relevant peer reviewed publications and governmental reports, and by any sources or data obtained through the consultation process.

6.6.6.2 Consultation

Table 6.6-5 includes a preliminary list of consultees for Marine Mammal and Other Megafauna discussions, but is not considered comprehensive, and may be modified with additional consultees/stakeholders as they are identified.

Table 6.6-5 Preliminary list of consultees

Consultee	**Description**
NatureScot	Statutory advisor to Scottish Ministers regarding environmental and natural heritage considerations; previously called Scottish Natural Heritage (SNH).
Marine Directorate Science (MSS)	Department of Scottish Government responsible for managing Scotland's marine environment.
Marine Directorate Licensing and Operations (MD-LOT)	Department of Scottish Government responsible for marine licensing and consenting.
Whale and Dolphin Conservation Society	Provide non-statutory advice to regulators and Government on environmental considerations.
Scottish Wildlife Trust (SWT)	
Hebridean Whale and Dolphin Trust	

6.6.6.3 Policy, Legislation and Guidance

Account of relevant policy, legislation and best practice guidance is provided in **Table 6.6-6**.

Table 6.6-6 Legislation, Policy and Guidance Relevant to the Marine Mammals and Other Megafauna assessment

Relevant Legislation and Policy
Agreement on Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
Annex IV of the Habitats Directive (European Union (EU) Directive 92/43/EEC)

Relevant Legislation and Policy
Annex V of the Habitats Directive (pinnipeds)
The Habitats Regulations 1994
The Conservation of Offshore Marine Habitats and Species Regulations 2017
Marine Directorate Act 2010
Nature Conservation (Scotland) Act 2004
Wildlife and Countryside Act 1981
The Scottish Government Strategy for Marine Nature Conservation
2020 Challenge for Scotland's Biodiversity
Scotland's National Marine Plan (NMP)
Southall *et al.*, 2019; 2020: Guidance on exposure criteria and safe thresholds for marine mammals to underwater noise.
Marine Directorate 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)
Centre for Environment, Fisheries and Aquaculture Science (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)

6.6.6.4 Assessment Methodology

The EIA methodology will follow the structure of the methodology presented in Chapter 4: Proposed Approach to EIA. A baseline section will identify the Marine Mammal and Other Megafauna receptors potentially present within the Marine Mammal and Other Megafauna Study Area, from which receptor groups will be determined. All potential likely significant effects will be agreed and defined using expert judgement, the guidance and policy documents listed in **Table 6.6-1**, and through consultation with relevant consultees and stakeholders.

Input from technical consultation and discussions with key stakeholders will be considered when determining the final approach for the assessment of potential impact, alongside best practice guidance and industry standards from previous offshore wind projects. Once the list of potential receptors and the assessment methodology have been agreed, the significance of potential effects will be assessed through the consideration of receptor value, sensitivity (e.g. tolerance, recovery, and exposure), and the magnitude of the impact.

The final design and construction method are still to be finalised, however the impacts considered of primary concern to Marine Mammals and Other Megafauna receptors are those associated with underwater noise generation (particularly piling and UXO) and disturbance from vessel activity. These will be assessed through desk based- review of other offshore wind project noise assessments, and through site-specific- noise modelling. Underwater noise modelling will be performed as described in Chapter 6.2: Underwater Noise, and outputs will be overlaid on site-specific and desk-based density estimates of marine mammal and other megafauna receptors to quantify the impact and any potential negative effects. Reference will be made to industry standard acoustic injury thresholds via subsea noise, as described in Southall *et al.* (2019) and Popper *et al.* (2014) (for basking sharks and ocean sunfish). Where appropriate, mitigation measures may be proposed to address residual effects.

6.6.7 Scoping Questions for Consultees

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

1. Do you agree that the data sources identified are sufficient to inform the Marine Mammal and Other Megafauna baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all Marine Mammal and Other Megafauna receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment and modelling (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Marine Mammals and Other Megafauna?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Project on Marine Mammals and Other Megafauna receptors?

6.6.8 References

APEM (2022a). ScotWind N4 - Digital Aerial Bird and Marine Megafauna Survey 1: March 2022. APEM Scientific Report P000007592. Northland Power UK Limited, 21/06/2022, v1.0 Final, 11 pp.

APEM (2022b). ScotWind N4 - Digital Aerial Bird and Marine Megafauna Survey 2: April 2022. APEM Scientific Report P000007592. Northland Power UK Limited, 05/07/2022, v1.1 Final, 16 pp.

APEM (2022c). ScotWind N4 - Digital Aerial Bird and Marine Megafauna Survey 3: May 2022. APEM Scientific Report P000007592. Northland Power UK Limited, 14/07/2022, v1.1 Draft, 15 pp.

APEM (2022d). ScotWind N4 - Digital Aerial Bird and Marine Megafauna Survey 4: June 2022. APEM Scientific Report P000007592. Northland Power UK Limited, 09/08/2022, v1.1 Final, 15 pp.

APEM (2022e). ScotWind N4 – Digital Aerial Bird and Marine Megafauna Survey 5: July 2022. APEM Scientific Report P000007592. Northland Power UK Limited, 07/10/2022, v1.1 Final, 12 pp.

APEM (2022f). ScotWind N4 – Digital Aerial Bird and Marine Megafauna Survey 6: August 2022. APEM Scientific Report P000007592. Northland Power UK Limited, 16/11/2022, v1.1 Final, 13 pp.

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6.7 Marine and Nearshore Ornithology

6.7.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Marine and Nearshore Ornithology within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

Intertidal Ornithology receptors are covered in the Onshore and Intertidal Ornithology Chapter of this Scoping Report (Chapter 7.3: Onshore and Intertidal Ornithology).

6.7.2 Study Area

The Offshore Development Area of Search has been defined as the Array Area plus a 10 kilometre (km) buffer (referred to as 'the Marine and Nearshore Ornithology Study Area') to assess species most likely to be present. The 10 km buffer aligns with the survey area for the Project specific seabird and marine mammal digital aerial surveys (DAS).

For ornithological receptors, a wider zone of influence is predicted compared to the direct area of works. However, for the purpose of the Scoping Report, and to ensure the information contained within remains relevant but concise, a regional 'Wider Marine and Nearshore Ornithology Study Area' has been utilised, capturing key regional Special Protection Areas (SPAs) and seabird colonies (see **Figure 6.7-1**). The Wider Marine and Nearshore Ornithology Study Area (the 'Wider Study Area') reflects foraging areas and migratory routes associated with seabird colonies, extending 150 km from the Array Area. This covers regional SPAs for the primary ornithological receptors identified in the Project specific and regional data (refer to section 6.7.3). The Marine and Nearshore Ornithology Study Area and Wider Study Area are summarised in **Table 6.7-1**.

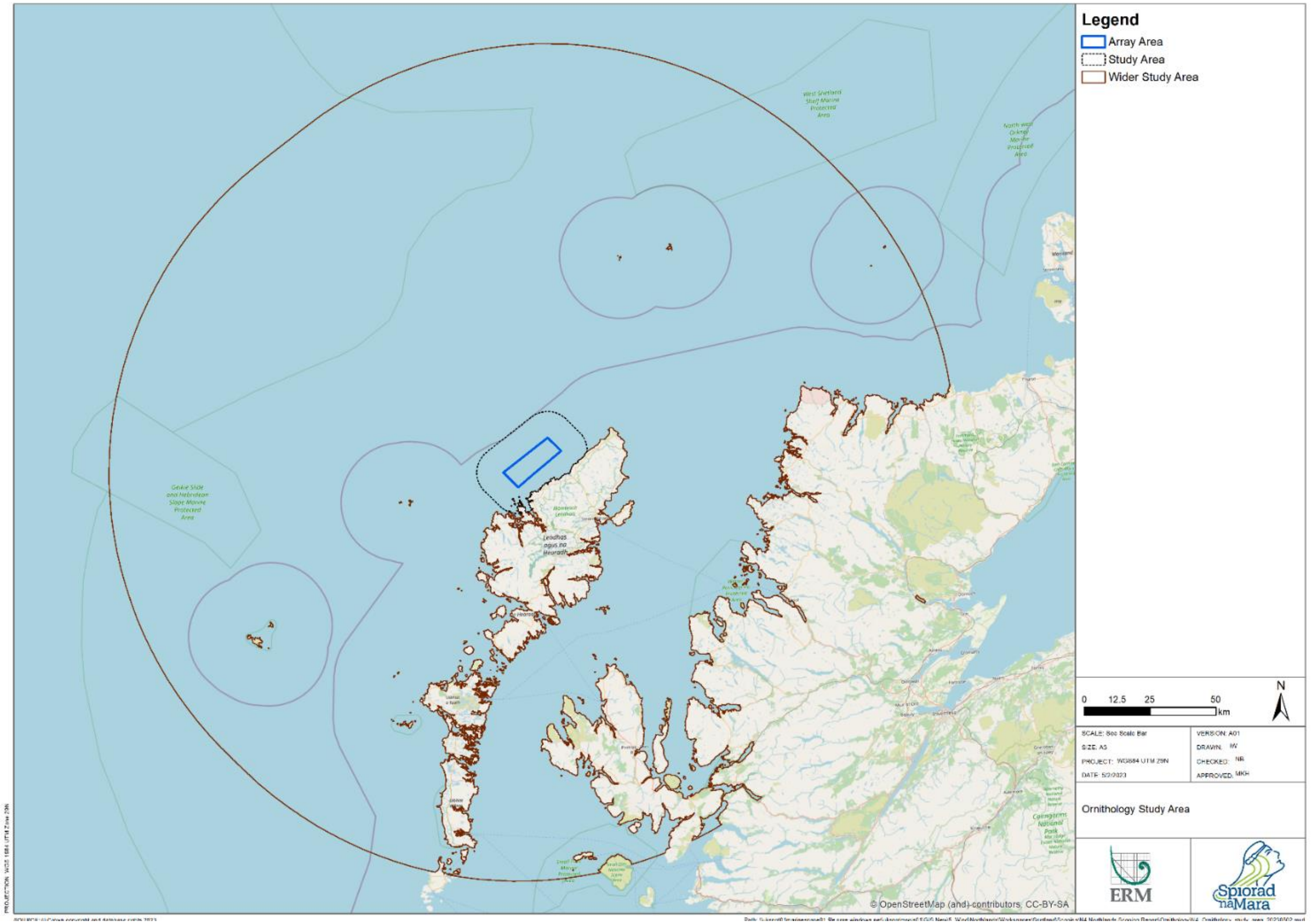
The Marine and Nearshore Ornithology Study Area is separated from the Onshore and Intertidal Ornithology Study Area by the mean low water springs (MLWS) mark. The intertidal zone, as well as coastal habitats and terrestrial ornithology, is covered in Chapter 7.3: Onshore and Intertidal Ornithology.

Table 6.7-1 Overview of the Marine and Nearshore Ornithology Study Area and Wider Study Area

Area	Definition	Spatial Extent (km^2)
Marine and Nearshore Ornithology Study Area	Array Area plus 10 km buffer, which encompasses the Offshore Development Area of Search	c.950

Area	Definition	Spatial Extent (km^2)
Wider Marine and Nearshore Ornithology Study Area	Array Area plus 150 km buffer, covering key regional Special Protection Areas (SPAs)*	c.65,000
* The 150 km represents a study area for EIA purposes; it is not used for HRA screening		

Figure 6.7-1 Marine and Nearshore Ornithology Study Areas



6.7.3 Baseline Environment

6.7.3.1 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 Array Area plus a 10 km buffer (‘the Survey Area'). The surveys are planned for a period of 24 months, the first of which was undertaken in March 2022. The primary purpose of such surveys is to acquire data for the assessment of bird abundance and distribution of species present within the Survey Area.

6.7.3.2 Data Sources

The data sources used to inform this Marine and Nearshore Ornithology Chapter of the Scoping Report are presented within **Table 6.7-2**. These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside any additional site-specific data that is collected for the Project.

The site specific DAS data will be used to inform the quantitative assessment of impacts to seabird receptors; the source summarised in **Table 6.7-2** will be used for additional context and background information to inform the baseline environment. It is noted that several of these sources are dated or distanced from the Project and therefore are not appropriate for use in quantitative assessment.

Table 6.7-2 Summary of key publicly available datasets for Marine and Nearshore Ornithology

Source	Spatial Coverage	Year	Summary
Lewis Tidal Array Environmental Statement (ES) (Aquamarine Power and Royal Haskoning, 2012)	Site specific data of the Lewis Tidal Array plus a 10 km buffer	September 2010-2012	Survey data of seabirds (and marine mammals) collected through monthly DAS surveys of the proposed (but never constructed) Lewis Tidal Array
Spaceport 1 ES (AquaTerra, 2021)	Northwest Uist, including terrestrial, coastal, and partial marine coverage	April 2019-March 2021	Seabird survey data specific to the Spaceport 1 site on the northwest coast of Uist. Data were collected through monthly observations of birds and site walk-over surveys.
Seabird 2000 Census (Mitchell *et al.*, 2004)	United Kingdom (UK)	2000	Distribution maps and regional population estimates for 25 seabird species from surveys executed between 1998-2002.
Royal Society for the Protection of Birds (RSPB's) Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) Survey Data (Cleasby *et al.*, 2018)	UK and Ireland	2010-2015	GPS tagging data collected between 2010-2014 at UK breeding colonies for northern fulmar *Fulmarus glacialis*, European shag *Gulosus aristotelis* (formerly *Phalacrocorax aristotelis*), black-legged kittiwake *Rissa tridactyla*, common guillemot *Uria aalge*, and razorbill *Alca torda*.

Source	Spatial Coverage	Year	Summary
EURING Migration Atlas (Spina *et al.*, 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 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 (1 SD) (Woodward *et al.*, 2019)	UK	2019	Species-specific foraging ranges derived from published literature for UK breeding seabirds.
National Biodiversity Network (NBN) Atlas	Marine and Nearshore Ornithology Study Area and wider UK	2022	Collaborative project that aggregates biodiversity data, including ornithology, for public access.

6.7.3.3 Overview of Baseline Environment

Within the Marine and Nearshore Ornithology Study Area and Wider Study Area, bird groups including divers, far-foraging seabirds, gulls, terns, and auks are likely to be present. The 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 DAS specifically for the Project, regional and contextual data from third party sources, and modelled seabird distribution data.

6.7.3.4 Regional Special Protection Areas with Marine Components

There are several SPAs with marine components (i.e. classified seabird populations) located around the Scottish coast. There are no SPAs within the Marine and Nearshore Ornithology Study Area, however, there are several within the Wider Marine and Nearshore Ornithology Study Area, and a greater number within species-specific foraging range of the Array Area (Woodward *et al.*, 2019). Any SPAs located above the MLWS within the intertidal zone and onshore are covered in Chapter 7.3: Onshore and Intertidal Ornithology. The regional SPAs, as presented in **Figure 6.7-2**, with features which may interact with the Array Area are discussed below. The extent of **Figure 6.7-2** is based on the 150 km buffer forming the Wider Marine and Nearshore Ornithology Study Area; it should be noted that this represents the EIA study area and not the Habitats Regulations Appraisal (HRA) screening. The main SPAs in the region have been identified through examination of the Project specific DAS data, as well as through review of regional data sources and studies; this is not considered a comprehensive list of all SPAs which are to be considered in the assessment and Habitats Regulations Appraisal (HRA).

HRA screening is being undertaken separately, therefore, the approach and methodology are not discussed in the EIA Scoping Report.

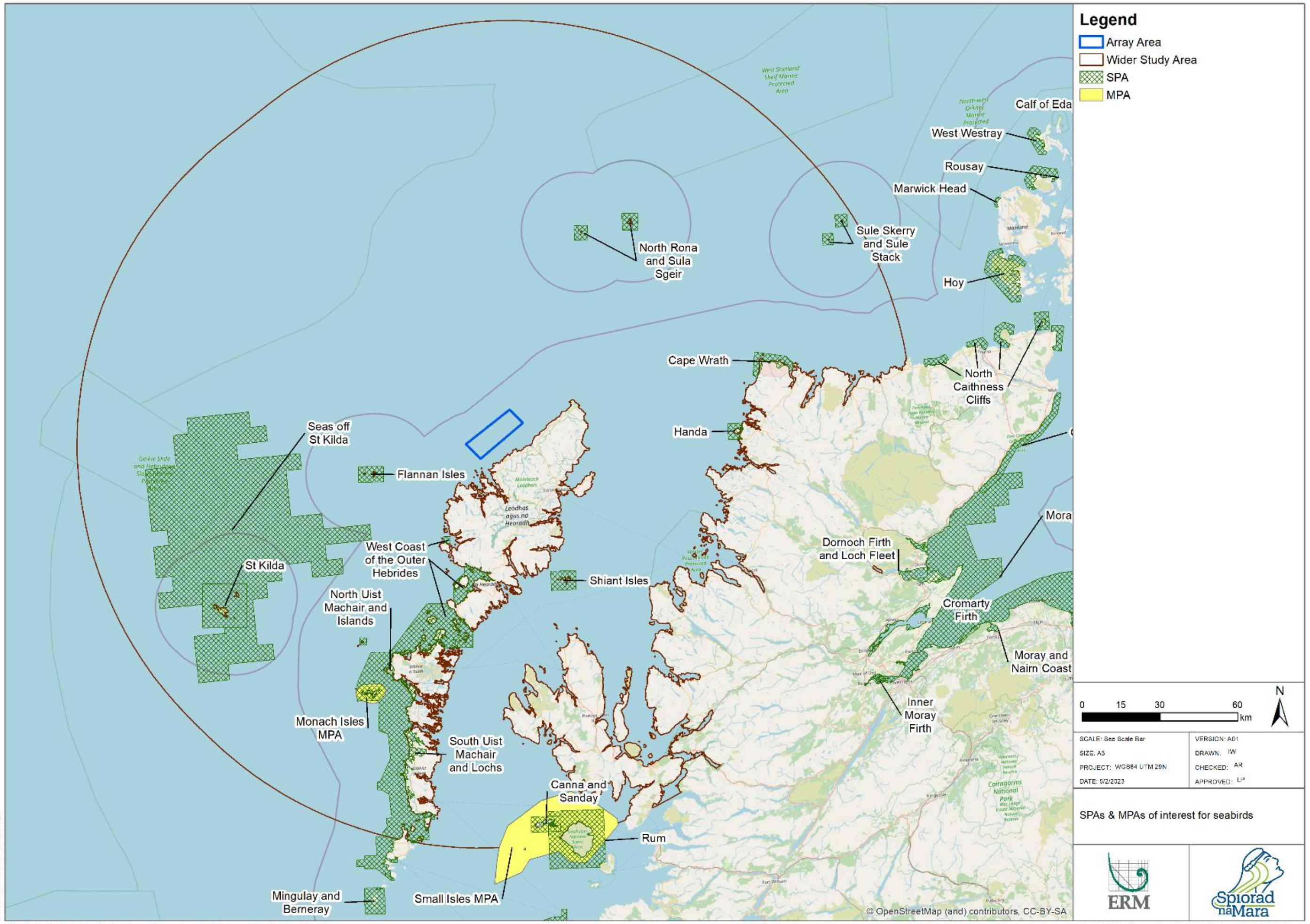
A summary of the number of SPAs where each seabird species is a qualifying feature is presented in **Table 6.7-3**. As shown, northern fulmar, black-legged kittiwake, and auks (Atlantic puffin *Fratercula arctica*, common guillemot, and razorbill) are frequently classified features of regional SPAs. Each of these species is listed as a feature at between 6-10 of the protected sites, suggesting the importance of the northwest of Scotland as breeding and foraging grounds.

In addition to the SPA qualifying features listed in **Table 6.7-3**, black guillemot *Cepphus grylle* is a qualifying feature of 2 Nature Conservation Marine Protected Areas (NC-MPAs) in the Wider Marine and Nearshore Ornithology Study Area; however, this species has a limited foraging range of under 10 km (Woodward *et al.*, 2019).

Table 6.7-3 Qualifying seabird populations of SPAs within the Wider Marine and Nearshore Ornithology Study Area (150 km of the Array Area)

Common Name	**Scientific Name**	**Number of SPAs**
Seaducks	*Mergini*	1
Red-throated diver	*Gavia stellata*	2
Black-throated diver and great northern diver	*Gavia arctica* and *G. immer*	1
Northern fulmar	*Fulmarus glacialis*	7
Manx shearwater	*Puffinus puffinus*	2
European storm petrel	*Hydrobates pelagicus*	4
Leach's storm petrel	*Oceanodroma leucorhoa*	4
Northern gannet	*Morus bassanus*	4
European shag	*Gulosus aristotelis*	3
Arctic skua	*Stercorarius parasiticus*	1
Great skua	*Stercorarius skua*	2
European herring gull	*Larus argentatus*	1
Great black-backed gull	*Larus marinus*	1
Black-legged kittiwake	*Rissa tridactyla*	8
Little tern	*Sternula albifrons*	1
Atlantic puffin	*Fratercula arctica*	8
Common guillemot	*Uria aalge*	10
Razorbill	*Alca torda*	6
Seabird assemblage	-	10

Figure 6.7-2 SPAs and Marine Protected Areas (MPAs) with Marine Seabird Components in northwest Scotland



6.7.3.5 Project Specific Data

Site specific surveys have been executed within the Marine and Nearshore Ornithology Study Area since March 2022, and are proposed to conclude in February 2024, the data from which provides an insight into the seabird species that use the area. At the time of writing, survey data are available from March 2022 to February 2023 only. During this first year of surveys, auk species, including Atlantic puffin, common guillemot, and razorbill, were consistently present in high numbers across all survey periods, with most individuals using the area for loafing. Northern fulmar were also observed in high numbers, appearing to use the area primarily for passage. During the July survey, Atlantic puffin were the most abundant species with 2,376 individuals recorded in the Marine and Nearshore Ornithology Study Area, the majority of which were recorded as loafing. Other species that were consistently present, albeit in lower numbers, across all available survey periods include common eider *Somateria mollissima*, great northern diver (also known as common loon) *Gavia immer*, Manx shearwater *Puffinus puffinus*, northern gannet *Morus bassanus*, black-legged kittiwake, and Arctic tern *Sterna paradisaea*.

Towards the end of the breeding season (August-October), northern gannet abundance increased, peaking at 169 individuals in August 2022, and the number of European shag[15] also increased, with 77 individuals recorded in August and 105 in September 2022. Common terns (including common tern *Sterna hirundo* and Arctic tern) and gull species, such as European herring gull *Larus argentatus*, great black-backed gull *Larus marinus*, and common gull (also known as mew gull) *Larus canus*, were also recorded as present in consistently very low numbers (fewer than 20 individuals).

In the late autumn and winter period (November to February), black-legged kittiwake were the most abundant in all months except December (peak count: 369 individuals in February 2023), when northern fulmar were the most abundant (115 individuals). The relative number of common guillemot observations was consistent throughout this period, fluctuating slightly with the total number of birds observed. The number of northern gannet observations reduced in the winter, while large gull and diver observations remained consistently low for all periods.

The relative abundance of the species recorded in the DAS data aligns with the number of regional SPAs where these species are listed as qualifying features, with northern fulmar and auks appearing regularly in high numbers in the survey data. A limited number of storm petrels (European and Leach's *Oceanodroma leucorhoa*) were recorded in comparison to the number of regional SPAs; however, this may be due to the

[15] Some individuals could not be identified to species-level from the DAS data, and as such were assigned to the group 'cormorant/shag'. As no cormorants were observed during these surveys, individuals assigned to this group have been apportioned to European shag.

limited data availability (i.e. 1 breeding season) or due to a more sparsely spread distribution considering the extensive foraging ranges of Procellariiformes (fulmars, shearwaters, and petrels).

6.7.3.6 Third Party Regional Data

Lewis Tidal Array

To supplement the available site-specific DAS data, the Lewis Tidal Array (LTA) Environmental Statement (ES) (Aquamarine Power and Royal Haskoning, 2012) and associated data sources were reviewed, providing additional regional information on the importance of the area for ornithological features. It should be noted that the ES was written in 2012, and that the LTA was due to be located approximately 5 km to the east of the Array Area, adjacent to the coast, and therefore the specific importance and flight overlap pathways at the LTA may differ to those of the Project.

The LTA ES identified 3 species for which the area is of moderate foraging importance (Aquamarine Power and Royal Haskoning, 2012). These are red-throated diver, great northern diver, and common eider. The region is important to these species during the breeding season, with adults from nearby colonies foraging for food in the marine area. Outside the breeding season, the area is of low importance to these species due to limited presence, as individuals migrate south for the winter.

The area around the LTA was determined to be of low or very low importance for other species (Aquamarine Power and Royal Haskoning, 2012), including northern fulmar, Manx shearwater, European storm petrel, northern gannet, European shag, gulls (European herring gull, common gull, great black-backed gull, black-legged kittiwake) and terns (Arctic tern and common tern), and auks (Atlantic puffin, common guillemot, and razorbill).

Species with flight paths which may overlap the LTA were found to include northern fulmar, Manx shearwater, and razorbill (Aquamarine Power and Royal Haskoning, 2012).

Spaceport 1

The data collected for Spaceport 1, located in the northwest of Uist were also reviewed to provide additional background context. Relatively few seabirds were recorded in the project-specific surveys (AquaTerra, 2021), including red-throated diver *Gavia stellata* and great northern diver (also known as common loon) *Gavia immer*, European shag, Arctic tern, and common gull.

During the breeding season, both diver species were observed in very low numbers, with a single red-throated diver recorded flying through the Marine and Nearshore Ornithology Study Area. Great northern divers were recorded in higher, although still very low, numbers. Most individuals were recorded in inshore waters in winter and spring. European shag was recorded in low to moderate numbers, typically in the region of 20-40 individuals, peaking at 73 in November 2019. Most individuals were roosting on the coast, with a limited number observed foraging in inshore areas. Arctic tern were only recorded in the late spring/early summer: May to July, and in low numbers. The survey area covered coastal and terrestrial sites, with a total of 10 breeding pairs of Arctic tern recorded over the 2-year period. Common gull were also primarily recorded in the breeding season, with pairs observed around the southern and western shores of Loch Scolpaig and in moorland in the north of the survey area.

Over the full survey period, several additional seabird species were observed, mostly during passage further offshore (AquaTerra, 2021; Jackson and Evans, 2021). These species are listed in **Table 6.7-4**, with occurrence in the Spaceport 1 study area during the breeding, passage (migration), and winter seasons.

Table 6.7-4 Summary of seabirds and occurrences during the breeding season, during passage (migration), and over the winter period observed during the Spaceport 1 ornithology surveys conducted from April 2019 to March 2021 (Source: Jackson and Evans, 2021).

Common Name	**Scientific Name**	**Breeding**	**Passage**	**Winter**
Red-throated diver	*Gavia stellata*	Foraging	Regular	Absent
Great northern diver	*Gavia immer*	Absent	Regular	Uncommon
Northern fulmar	*Fulmarus glacialis*	Absent	Regular	Absent
Manx shearwater	*Puffinus puffinus*	Absent	Regular	Absent
Northern gannet	*Morus bassanus*	Absent	Regular	Absent
Great cormorant	*Phalacrocorax carbo*	Occasional	Absent	Uncommon
European shag	*Gulosus aristotelis*	Regular	Regular	Common
Arctic skua	*Stercorarius parasiticus*	Absent	Regular	Absent
Great skua	*Stercorarius skua*	Occasional	Regular	Absent
Black-headed gull	*Chroicocephalus ridibundus*	Resident birds only	Common	Scarce
Common gull	*Larus canus*	Breeding (34 pairs)	Common	Scarce
Lesser black-backed gull	*Larus fuscus*	Resident birds only	Uncommon	Absent
European herring gull	*Larus argentatus*	Resident birds only	Absent	Very common
Great black-backed gull	*Larus marinus*	Resident birds only	Absent	Common
Black-legged kittiwake	*Rissa tridactyla*	Occasional	Uncommon	Absent
Arctic tern	*Sterna paradisaea*	Breeding (10 pairs)	Absent	Absent
Common guillemot	*Uria aalge*	Occasional	Absent	Absent
Razorbill	*Alca torda*	Occasional	Absent	Absent
Black guillemot	*Cepphus grylle*	Breeding (2 pairs)	Absent	Absent

Seabird 2000 Census

Due to the availability of site specific survey data covering full seasons (overwintering and breeding), Seabird 2000 Census data (Mitchell *et al*., 2004) were reviewed. These data are broader scale than site specific data, and therefore are not of the resolution required to reliably inform the baseline for assessment, however, they can be used to provide a regional context and indication of likely important species for consideration.

The data suggest that the region to the west of the Isle of Lewis is important for 4 main species (Mitchell *et al*., 2004), 3 of which have been identified in review of the existing site specific data. Seabird 2000 Census data indicate that northern fulmar (10,000+ Apparently Occupied Sites (AOS)), European shag (500+Apparently Occupied Nests (AON)), Arctic tern (1,000+ AON), and common guillemot (1,000+ individuals) utilise the area for breeding.

In addition to the species above, relatively high numbers of northern gannet, Atlantic puffin, common guillemot, and razorbill were recorded further offshore during the breeding season (Mitchell *et al*., 2004). Similar results have been observed in the site specific data, although northern gannet were observed in comparatively lower numbers. It is possible that the later-season data (July-September) may show increased numbers of northern gannet (Kober *et al*., 2010), or the lower numbers may be a result of the Highly Pathogenic Avian Influenza (HPAI) or 'bird flu' season, which the quantifiable effects of are currently unknown.

Gull species also utilise the area for breeding, although in lesser abundance. Breeding gull species recorded in the area in the Seabird 2000 Census data include European herring gull, common gull, great black-backed gull, black-legged kittiwake, and black-headed gull *Chroicocephalus ridibundus* (Mitchell *et al*., 2004).

EURING Migration Atlas

Although not necessarily marine species/seabirds, the EURING Migration Atlas (Spina *et al*., 2022) was also reviewed, providing information on migratory routes which may interact with the Marine and Nearshore Ornithology Study Area. These routes are important to consider in offshore ornithology assessments, as Offshore Wind Farm (OWF) developments can present collision risks and barriers to migrating birds – both terrestrial and marine.

The data were reviewed to identify species whose migration corridors overlap with the Marine and Nearshore Ornithology Study Area, and the species most likely to be at risk are discussed below. It is important to note that the information is based on ringing data, whereby individuals are captured, affixed with an identification band, and then released. The migratory routes are based on a straight-line based on recapture of the ringed individuals; therefore, the data may overrepresent some species (where study or survey effort is focussed) or underrepresent others (where it is difficult to capture or recapture individuals, such as those who spend time offshore or in remote locations). Where available, telemetry (tracking) data are also discussed below.

Whooper swan *Cygnus cygnus* and greylag goose *Anser anser* migrate between the UK and Iceland, breeding in Iceland and spending the winter season in Ireland, Scotland, and northern England. This migration involves flying in a north-northwest direction from the UK, meaning individuals may pass over/through the Marine and Nearshore Ornithology Study Area.

Red-throated diver breed in northern Scotland, with most rings and recoveries from the Shetland and Orkney Islands off the northeast coast of the mainland. Although the migration atlas does not indicate substantial migration overlap with the Marine and Nearshore Ornithology Study Area, the West Coast of the Outer Hebrides SPA, to the south of the Marine and Nearshore Ornithology Study Area (**Figure 6.7-2),** is classified for breeding red-throated diver, with a reference population of 58 breeding pairs (NatureScot, 2020).

European storm petrel breed in the region, with several colonies and SPAs located around the northern coast of Scotland and the Scottish Isles. Migration (ringing) data suggest movements around the northern UK coasts, and between the UK and Scandinavia and southern Europe, as well as South Africa. Migration/ringing data are very limited for Leach's storm petrel, however, its breeding and wintering regions are similar to those of European storm petrel, and it is also a classified feature of several regional SPAs, and, therefore, the species is included for consideration.

Northern fulmar ringing data show species movement between Iceland, the northern Scottish Isles, the northern and east coasts of Scotland and England, and the northwest coast of mainland Europe in the southern North Sea. Although the northwest coast of Scotland has comparatively lower ringing recoveries, relatively high numbers of northern fulmar have been observed in the available DAS data.

Auks (Atlantic puffin, common guillemot, and razorbill) were also investigated, with ringing data showing movement around the UK and across the North Sea to mainland Europe and to southern Iceland for all species, as well as to eastern Canada for Atlantic puffin. There is likely to be some overlap with migration routes and the Marine and Nearshore Ornithology Study Area, and the species have been observed in high numbers in the available DAS data.

6.7.3.7 Modelled Seabird Distribution Data

European Seabirds At Sea

Whilst observational data can be considered more valuable and accurate than modelled seabird distribution data, it is often that observation data do not cover specific areas of interest. Therefore, modelled seabird distribution data have also been reviewed, to provide further context, and to indicate at-sea usage of the Marine and Nearshore Ornithology Study Area.

Kober *et al.* (2010) utilised the European Seabirds At Sea (ESAS) data to model seabird distribution around the UK. The outputs of this modelling exercise have been used to indicate which species may utilise the Marine and Nearshore Ornithology Study Area during different seasons throughout the year; however, it must be noted that this study is more than 10 years old, and that the data are modelled, and not observational. As such, the data can be used for contextual information on likely seabird species, however, should not be used as an estimate of abundance on a project specific scale.

The study suggests that the region is of importance to the following species:

- Northern fulmar during the breeding season (March-July), as supported by the site specific DAS data;
- Northern gannet during the breeding season (May-September), as supported by the site specific DAS data;
- European shag during the winter period (October-February), not covered by the existing DAS data;
- Black-legged kittiwake during the breeding season (May-September), however, this species was not observed in high numbers in the March-September DAS data;
- Atlantic puffin during the breeding season (April-June), as supported by the DAS data;
- Common guillemot during the breeding season (May-June), as supported by the DAS data;
- Common guillemot during the winter season (October-April), not covered by the existing DAS data.

Based on a merged 5% threshold[16], Kober *et al.* (2010) suggest that the region is of 'most' importance to breeding northern gannet and Atlantic puffin. However, it is recognised that other data sources, and the available site specific DAS data, indicate importance to other species as well.

FAME and STAR

The RSPB undertook seabird tracking from 2010-2015, monitoring movements of 4 seabird species during the chick-rearing period: European shag, black-legged kittiwake, common 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.

The Wider Marine and Nearshore Ornithology Study Area overlaps with hotspots of all 4 species, however, the Marine and Nearshore Ornithology Study Area only interacts with hotspots identified for black-legged kittiwake (**Figure 6.7-3**). The northern and central northwest coasts of the Isle of Lewis were identified as hotspots for European shag, whereas most of the island represented areas for black-legged kittiwake and

[16] Top 5% hot spot locations as determined by Getis-Ord (GI*) analysis (measurement of the concentration of high or low values within the study area).

razorbill. Hotspots for the latter generally align with regional SPA colonies (**Figure 6.7-2; Table 6.7-3**) and associated foraging ranges (Woodward *et al.*, 2019).

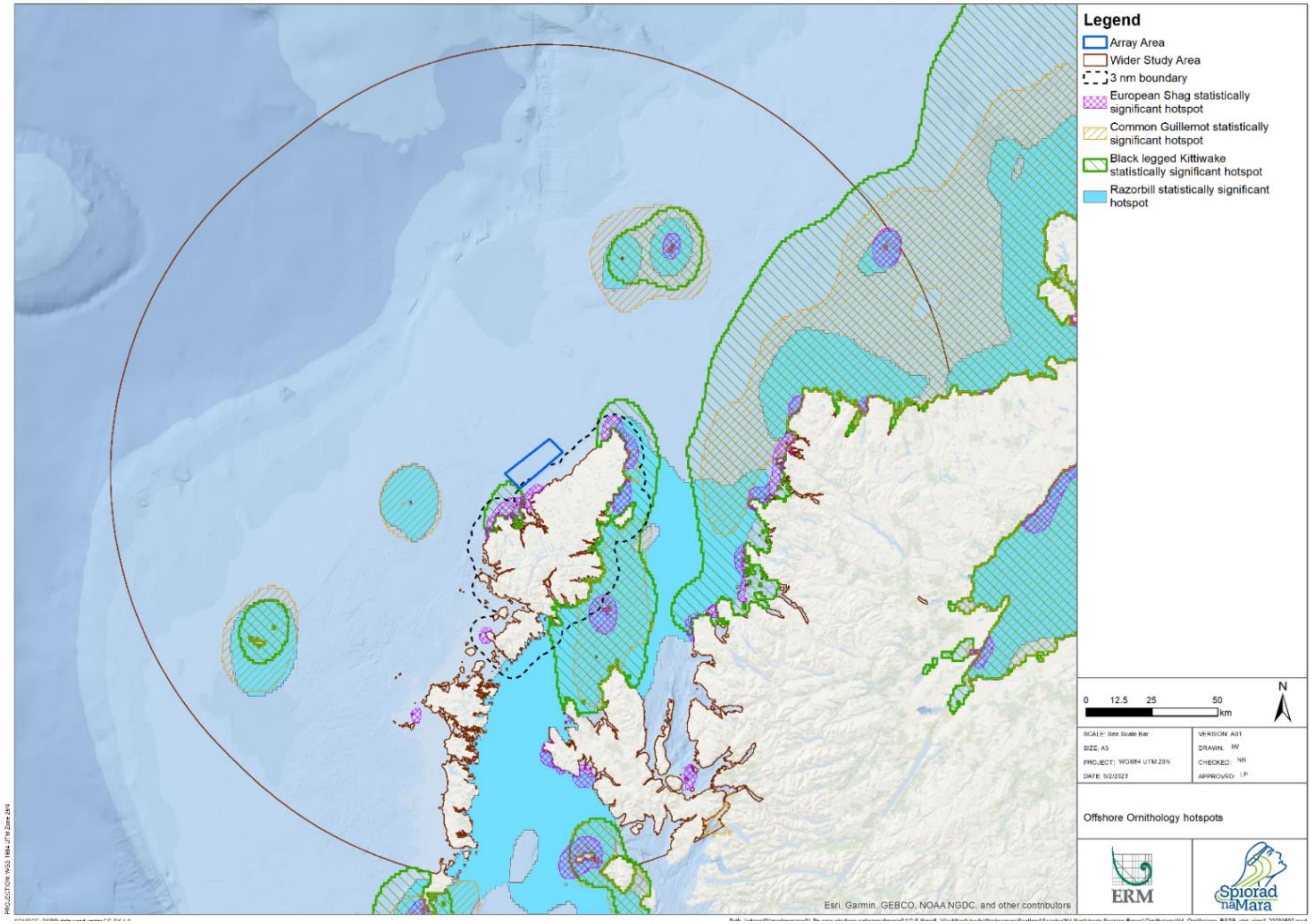
6.7.3.8 Migratory Birds

There is potential for migrating birds, especially those migrating between the UK/Ireland and Iceland or Greenland, to interact with the Marine and Nearshore Ornithology Study Area. As part of the British Trust for Ornithology (BTO) Strategic Ornithological Support Service (SOSS), a Migration Assessment Tool (SOSS-MAT) was produced (Wright and Austin, 2012). The tool uses ringing data collected at wintering and breeding grounds, as well as migration routes, to determine approximate flyways for the UK's migratory birds. The results are presented as migration corridors by Wright *et al*. (2012).

Wright *et al*. (2012) has been reviewed, and the list of species presented below show a level of overlap between the migration corridor and the Marine and Nearshore Ornithology Study Area. Species denoted with an asterisk (*) have limited overlap, with the boundary of the migration corridor running parallel to the northwest coast of the Isle of Lewis.

- Whooper swan *Cygnus cygnus*;
- Pink-footed goose Anser brachyrhynchus;
- Greenland white-fronted goose *A. albifrons flavirostris*;
- Icelandic greylag goose *A. anser*;
- Greenland barnacle goose *Branta leucopsis*;
- Canadian light-bellied brent goose *B. bernicla hrota*;
- Shelduck Tadorna tadorna (*);
- Wigeon Anas penelope;
- Gadwall A. strepera;
- Team A. crecca;
- Mallard A. platyrhynchos (*);
- Pintail *A. acuta*;
- Shoveler *A. clypeata* (*);
- Pochard *Aythya ferina* (*);
- Tufted duck *A. fuligula*;
- Scaup A. marila;
- Common eider Somateria mollissima (*);
- Long-tailed duck *Clangula hyemalis* (*);
- Common scoter *Melanitta nigra*;
- Goldeneye Bucephala clangula (*);
- Red-breasted merganser *Mergus serrator*;
- Common merganser *M. merganser* (*);
- Red-throated diver *Gavia stellata*;
- Northern fulmar Fulmarus glacialis;
- Manx shearwater *Puffinus puffinus* (*);
- European storm petrel *Hydrobates pelagicus*;
- Leach's storm petrel *H. leucorhous*;
- Northern gannet *Morus bassanus*;
- Great cormorant *Phalacrocorax carbo* (*);
- European shag *Gulosus aristotelis* (*);
- Slavonian grebe *Podiceps auritus*;
- Merlin Falco columbarius;
- Corncrake *Crex crex* (*);
- Oystercatcher Haematopus ostralegus (*);
- Ringed plover Charadrius hiaticula;
- Golden plover Pluvialis apricaria;
- Grey plover *P. squatarola* (*);
- Lapwing Vanellus vanellus (*);
- Knot Calidris canutus;
- Sanderling *C. alba*;
- Purple sandpiper *C. maritima*;
- Dunlin C. alpina;
- Snipe Gallinago gallinago;
- Black-tailed godwit Limosa limosa islandica;
- Whimbrel Numenius phaeopus;
- Curlew *N. arquata* (*);
- Greenshank *Tringa nebularia* (*);
- Redshank *T. totanus*;
- Turnstone Arenaria interpres;
- Red-necked phalarope *Phalaropus lobatus*;
- Arctic skua Stercorarius parasiticus;
- Great skua *S. skua*;
- Black-legged kittiwake *Rissa tridactyla*;
- Black-headed gull Chroicocephalus ridibundus;
- Common gull *Larus canus*;
- Lesser black-backed gull *L. fuscus*;
- European herring gull *L. argentatus*;
- Great black-backed gull *L. marinus*;
- Little tern Sternula albifrons;
- Common tern Sterna hirundo;
- Arctic tern *S. paradisaea*;
- Common guillemot *Uria aalge*;
- Razorbill *Alca torda*;
- Atlantic puffin *Fratercula arctica*;
- Short-eared owl *Asio flammeus*.

Figure 6.7-3 RSPB FAME and STAR statistically significant (Getis-Ord; GI*) seabird hotspot modelling (Source: Cleasby *et al.*, 2018)



6.7.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Marine and Nearshore Ornithology assessment, which has been incorporated into the design of the Project (**Table 6.7-5**).

In addition to the mitigation outlined in **Table 6.7-5**, a Project Environmental Monitoring Programme (PEMP) will be produced. At this stage, details are unconfirmed. The PEMP will be produced once the full project design and assessment of impacts has been completed, allowing a specific monitoring approach to be produced.

Table 6.7-5 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.3	Development of a Construction Environmental Management Plan (CEMP)	This would include adherence to requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78/. Best practice techniques employed through all phases of the Project, and measures provided in a Marine Pollution Contingency Plan (MPCP), which will form part of the CEMP.
6.8	INNS Management Plan	Adherence to INNS Management Plan to reduce the risk of introducing and spreading invasive species.

6.7.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.7.5.1 Likely Significant Effects

Potential likely significant effects on Marine and Nearshore Ornithology have been identified which may occur during the construction, operation (including maintenance), and decommissioning phases of the Project. These potential likely significant effects are outlined in **Table 6.7-6.**

Table 6.7-6 EIA Scoping Assessment for Marine and Nearshore Ornithology

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Temporary habitat loss	6.3	In	The physical presence of vessels and noise emissions from vessels and construction/decommissioning activities can displace birds from the Offshore Development Area of Search. This can reduce the amount of available foraging, nesting, and resting habitat.	Habitat loss will be assessed through desk-based identification of seabird and foraging areas and determining the overlap between these areas and Project activities. The seasonality of birds and periods of site occupancy will be considered within the assessment, along with the overall area of habitat available to regional and SPA bird populations. The assessment may be supplemented by site specific benthic characterisation surveys and the benthic and intertidal ecology impact assessment (refer to Chapter 6.4: Benthic and Intertidal Ecology), where potential likely significant effects to prey items will be considered.
Temporary disturbance and displacement	6.3	In	Noise and visual disturbance from vessel movements and construction/decommissioning activities such as piling may deter seabirds from the Offshore Development Area of Search. This can have additional energetic costs.	Desk-based assessment, informed by existing literature and reviews of seabird sensitivity to vessel presence and underwater noise, supplemented by Project-specific survey.

Potential Likely Significant Effect	**Relevant Embedded Mitigation**	**Scoping Result**	**Justification**	**Assessment Method**
Indirect effects through effects on prey species	6.8	In	Changes in prey availability, through physical impacts on prey species and their associated habitat, may have energetic impacts on birds that forage within the Offshore Development Area of Search.	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: Fish and Shellfish Ecology).
Entanglement Risk		**Out**	Mooring lines associated with construction vessel activity and ghost fishing gear that becomes caught in the infrastructure could present an entanglement risk. However, any vessel moorings during the construction phase will be temporary, and mooring lines will be maintained taught with no ability to form loops. Likewise, any mooring lines are unlikely to collect ghost fishing gear as they will be in place only temporarily. The effect is therefore scoped out.	Desk-based review of existing literature on diving seabird sensitivities to entanglement in ghost fishing gear. Supplemented by Project specific data (distribution and abundance of seabird species).
Response to Artificial Lighting		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 artificial light, with focus on petrels and shearwaters, specifically Manx shearwater, European storm petrel and Leach's storm petrel, informed by regional and site specific data.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Operation and Maintenance				
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.	Desktop assessment using site specific abundance data and generic flight height data, input into the stochastic Collision Risk Model (sCRM) Tool (Caneco, 2022), and parameters recommended by NatureScot (2023).
Distributional Responses (Displacement and Barrier Effects) associated with the Array Area.		In	Birds may be displaced from the Array Area and surrounding area through avoidance. This can restrict access to important foraging, resting, and nesting 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. Particularly important for individuals moving to and from breeding colonies or migrating.	Desk-based assessment using site specific abundance data and SPA apportioning results, using the SeabORD Tool (Searle *et al.*, 2018) for auks and black-legged kittiwake during the chick-rearing period, and using Displacement Matrices for other species and during other seasons. The input parameters will align with those outlined by NatureScot (2023) and Statutory Nature Conservation Bodies (SNCBs) (2017; 2022) and will be agreed through Consultation.
Habitat Loss (Long term, i.e. duration of the project).		In	Physical presence of project infrastructure, noise from maintenance activities, and underwater noise from vibration of operating turbines can displace birds from the Offshore Development Area of Search. This can	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

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			reduce the amount of available foraging, nesting, and resting habitat. It should be noted that infrastructure can provide a new roosting habitat for some species.	impacts to birds which 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 outside the Array Area will be assessed through desk-based identification of seabird and intertidal bird foraging areas and overlap between these areas and Project activities.
Entanglement Risk		**Out**	Mooring lines associated with O&M vessel activity and ghost fishing gear that becomes caught in the infrastructure could present an entanglement risk. However, any vessel moorings during the O&M phase will be temporary, and mooring lines will be maintained taught with no ability to form loops. Likewise, any mooring lines are unlikely to collect ghost fishing gear as they will be in place only temporarily. As all WTGs will be fixed base, there will be no mooring lines associated with WTGs. The effect is therefore scoped out.	Desk-based review of existing literature on diving seabird sensitivities to entanglement in ghost fishing gear. Supplemented by Project specific data (distribution and abundance of seabird species).
Response to Artificial Lighting		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	Desk-based review of recent studies and research on the impacts of artificial light, with focus on petrels and shearwaters, specifically Manx shearwater, European

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			lighting, and differing responses in adult and juvenile individuals.	storm petrel and Leach's storm petrel, informed by regional and site specific data.

6.7.6 Proposed Approach to EIA

6.7.6.1 Relevant Data Sources

In addition to the desktop data sources described in section 6.7.3.2, ongoing site specific survey data will be available prior to commencement of the EIA (see section 6.7.3.1). This DAS data will cover a 2-year period and will characterise the abundance and distribution of birds, and usage of the Marine and Nearshore Ornithology Study Area by such species. This information will be used to inform the EIA.

6.7.6.2 Consultation

Table 6.7-6 includes a preliminary list of the primary consultees for Marine and Nearshore Ornithology discussions; it should be noted that additional consultees/stakeholders may be identified and may be included later.

Table 6.7-7 Preliminary List of Consultees

Consultee	Description
NatureScot	Statutory advisor to Scottish Ministers regarding environmental and natural heritage considerations; previously called Scottish Natural Heritage (SNH)
Marine Directorate Science (MSS)	Department of Scottish Government responsible for managing Scotland's marine environment
Marine Directorate Licensing and Operations Team (MD-LOT)	Department of Scottish Government responsible for marine licensing and consenting
Joint Nature Conservation Committee (JNCC)	Statutory advisor to UK Government and devolved administrations regarding nature conservation in the UK and internationally
RSPB	Provide non-statutory advice to regulators and government on environmental considerations
Scottish Wildlife Trust (SWT)	
Comhairle nan Eilean Siar	Local Government council for the Outer Hebrides area of Scotland, based in Stornoway, Isle of Lewis

6.7.6.3 Policy, Legislation and Guidance

The relevant policy, legislation, and best practice guidance documents are provided in **Table 6.7-7**. NatureScot (2023) guidance will be followed, with reference to the sources contained within the various OWF development advice notes. It is noted that some advice notes are due to be updated; the latest version of the advice notes and any updates to assessment tools (e.g. Collision Risk Modelling (CRM)) will be checked prior to work beginning.

Table 6.7-8 Legislation, policy and guidance relevant to the Marine and Nearshore Ornithology assessment

Relevant Legislation, Policy and Guidance	
NatureScot (2023)	Guidance Note 3: Guidance to support Offshore Wind Applications: Marine Birds - Identifying theoretical connectivity with breeding site Special Protection Areas using breeding season foraging ranges
	Guidance Note 4: Guidance to support Offshore Wind Applications: Ornithology - Determining Connectivity of marine birds with Marine Special Protection Areas and breeding seabirds from Colony SPAs in the non-breeding season
	Guidance Note 5: Guidance to support Offshore Wind Applications: Recommendations for marine bird population estimates
	Guidance Note 6: Guidance to support Offshore Wind Applications - Marine Ornithology Impact Pathways for Offshore Wind Developments
	Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds
	Guidance Note 8: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for assessing the distributional responses, displacement, and barrier effects of marine birds
	Guidance Note 9: Guidance to support Offshore Wind Applications: Seasonal periods for birds in the Scottish Marine Environment
	Guidance Note 10: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for apportioning impacts to breeding colonies
	Guidance Note 11: Guidance to support Offshore Wind Applications: Marine Ornithology - Recommendations for seabird Population Viability Analysis (PVA)
Mackenzie *et al.* (2013) Statistical Modelling of Seabird and Cetacean data: Guidance Document	
Thaxter *et al.* (2012) Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas	
Woodward *et al.* (2019) Desk-based revision of seabird foraging ranges 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 Biologically Defined Minimum Population Scales (BDMPS)	
Band (2012) Using a Collision Risk Model to assess bird collision risks for Offshore Windfarms	
Masden (2015) Developing an avian collision risk model to incorporate variability and uncertainty	
McGregor *et al.* (2018) A Stochastic Collision Risk Model for seabirds in flight	
Johnston *et al.* (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	

Relevant Legislation, Policy and Guidance
Furness *et al.* (2018) Nocturnal flight activity of northern gannets *Morus bassanus* and implications for modelling collision risk at offshore wind farms.
Pennycuick (1997) Actual and 'optimal' flight speeds: field data reassessed
Alerstam *et al.* (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 (2022)
Searle *et al.* (2018) Finding out the fate of displaced birds
Searle *et al.* (2022) Study to examine the impact of climate change on seabird species off the east coast of Scotland and potential implications for environmental assessments
Searle *et al.* (2019) A Population Viability Analysis Modelling Tool for Seabird Species
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 *et al.* (2017) Testing and Validating Metrics of Change Produced by Population Viability Analysis (PVA)

6.7.6.4 Assessment Methodology

The EIA Methodology for Marine and Nearshore Ornithology will follow that outlined in Chapter 4: Proposed Approach to EIA, establishing receptor sensitivity, magnitude of impact, and evaluation of significance, before discussing mitigation and monitoring. If the HRA requires any compensation measures, these will also be considered in the EIA. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Marine and Nearshore Ornithology.

Marine and Nearshore Ornithology requires specific consideration of certain impacts (specifically collision risk and distributional responses). The assessment approaches for these impacts, and for PVA, are discussed below. The approaches outlined follow the latest (2022/2023) guidance published by NatureScot (2023).

Apportioning

Apportioning, both of non-identified birds to species groups, and of observed birds to SPA populations and colonies, will be undertaken following guidance outlined by NatureScot (2023).

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. For example, an unidentified auk may be assigned to the overarching 'auks' group, or could be assigned to a more specific group, such as 'guillemot or razorbill'.

The unassigned or grouped individuals will then be ascribed to species based on the proportion of identified birds within each species. An illustrative example is outlined in **Table 6.7-9**.

Table 6.7-9 Worked example of apportioning of non-identified birds to species

Species/Group	Abundance	Unidentified Bird Proportion	Apportioned Abundance
Atlantic puffin	30	0.3	30 + (0.3 × 20) + (0.3 × 10) = **39**
Common guillemot	40	0.4	40 + (0.4 × 20) + (0.4 × 10) = **52**
Razorbill	30	0.3	30 + (0.3 × 20) + (0.3 × 10) = **39**
Common guillemot/razorbill	20	-	-
Auk	10	-	-
Total Abundance	130	-	130

Following assessment of impacts and resultant mortality estimates, these will be apportioned to colony/SPA populations. This will be undertaken in accordance with NatureScot (2023) guidance; however, it is noted that the associated guidance note (*Guidance Note 10: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for apportioning impacts to breeding colonies*) has not yet been published.

In absence of the guidance note at the present time, it is proposed that apportioning impacts to SPA populations will follow the methodology used in other recent OWF projects. The proposed method involves applying a weighting based on population size (as determined via the Seabird Monitoring Programme (SMP), distance between the 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).

Exceptions to the above approach include black-legged kittiwake, common guillemot, razorbill, and European shag. NatureScot recommend[17] that the apportioning tool produced by Butler *et al.* (2020) is used for these species. This approach will be used to apportion impacts to these species to breeding colonies.

Prior to SPA apportioning being undertaken, the approach and methodology will be agreed with NatureScot through consultation. It is recognised that Guidance Note 10 is expected to be updated in the

[17] In written response the Scoping Workshop held on 13 June 2023; response dated 30 June 2023 (Ref.: CNS/ REN/ OSWF/ ScotWind N4/ Pre application)

near future, therefore, the applied method may deviate from the method above, in line with any published or updated guidance.

Collision Risk

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 CRM, using the sCRM approach in the most up to date tool (Caneco, 2022).

Sensitive receptors will be identified through review of existing literature and previous studies and informed by 2 years of site specific baseline DAS data collected from March 2022, which will cover 2 full breeding and 2 full wintering seasons. Preliminary review of the data available at the time of writing (March-September 2022) suggests that northern gannet are likely to be most at risk from collision impacts. However, analysis of the full data is yet to be undertaken and will identify any additional ornithological receptors in need of consideration.

A minimum of 4 sCRM scenarios will be run for each species sensitive to collision risk. These will cover the most likely and worst-case scenarios for the Project, using both Option 2 and Option 3 in the sCRM. The outputs will be presented as estimated mortalities per month but will also be calculated to show mortality estimates per season as well as total annual impacts.

Site specific seabird abundance estimates will be input into the model (Table 6.7-10 and Table 6.7-11), and then the model will be ran using generic data for flight speed, flight height distribution, and size parameters. However, should any site specific data on these parameters also be collected, additional scenarios using the site specific data will also be run. In accordance with current guidance, the output of these scenarios will not be used to inform the impact assessment. However, it will be provided for comparison, validation, and additional context.

NatureScot (2023) guidance will be adhered to, and Advisors will be consulted to ensure the most appropriate Project and seabird parameters are entered into the sCRM scenarios. These will be agreed prior to analyses beginning.

It is noted that NatureScot are currently developing a stance on updated avoidance rates published by Ozanlav-Harris (2023). Recommended avoidance rates will be reviewed prior to undertaking CRM, and the most appropriate rates at the time will be agreed and used in the models. Additionally, NatureScot will be consulted once the full DAS data are available and have been analysed to agree any unconfirmed parameters in Table 6.7-10 and Table 6.7-11.

Should the estimated collision mortality (cumulatively with distributional response impacts) exceed the threshold at any SPA population, PVA will be undertaken to assess the overall impact to the population throughout the life of the Project.

Table 6.7-10 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 (0.1)	Gliding
Cormorant**	0.9 (0.05)	1.45 (0.075)	15.2 (0)	TBC	Flapping
Shag**	0.725 (0.0375)	1.03 (0.0625)	15.4 (0)	TBC	Flapping
Fulmar**	0.45 (0.025)	1.07 (0.025)	13 (0)	TBC	Flapping
Kittiwake	0.39 (0.005)	1.08 (0.0625)	13.1 (0.4)	0.375 (0.0637)	Flapping
Herring Gull	0.6 (0.0225)	1.44 (0.03)	12.8 (1.8)	0.375 (0.0637)	Flapping
Lesser Black-backed Gull	0.58 (0.03)	1.42 (0.0375)	13.1 (1.9)	0.375 (0.0637)	Flapping
Great Black-backed Gull	0.71 (0.035)	1.58 (0.0375)	13.7 (1.2)	0.375 (0.0637)	Flapping
Common Tern**	0.33 (0.01)	0.88 (0.525)	10.9 (0)	0.20 (0)	Flapping
* Species observed in DAS surveys, final DAS report will determine requirement for inclusion in CRM					
** Parameters from Caneco (2022)					
*** Nocturnal activity from Garthe and Huppop (2004), as recommended by NatureScot					

Table 6.7-11 Non-exhaustive list of proposed seabird parameters for sCRM

Species	Basic (2SD)	Extended (2SD)
Gannet	0.989 (0.002)	N/A*
Kittiwake	0.989 (0.002)	N/A*
Lesser Black-backed Gull	0.995 (0.001)	0.989 (0.002)
Herring Gull	0.995 (0.001)	0.990 (0.002)
Great Black-backed Gull	0.995 (0.001)	0.989 (0.002)
Other Species	TBC	TBC
* It is not appropriate to use the extended model for gannet or kittiwake at present (SNCB, 2014)		

Distributional Responses (Displacement and Barrier 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’. This may also have some overlap with the effects of artificial light attraction; however, this is of most relevance to petrels and shearwaters. Artificial light will be considered separately through review of existing literature, regional data, and, where available, site specific data.

Displacement impacts will be assessed through two potential methods: the SeabORD tool (Searle *et al.*, 2018) or Displacement Matrices, as recommended by NatureScot (2023) and SNCB (2017; 2022). The SeabORD tool can only be used for auks (common guillemot, Atlantic puffin, and razorbill) and blacklegged kittiwake and is only applicable during the chick-rearing period. For assessment of other species and other seasons, displacement matrices will be used. The effects of barrier to species movement to migratory birds will be identified and assessed through the Strategic Ornithological Support Services (SOSS) Migration Assessment Tool, or ‘SOSS-MAT’ (Wright and Austin, 2012; Wright *et al.*, 2012). This includes spatial analysis of migrating bird flight routes in relation to the position of the project and identifies the level of interaction between the two.

Displacement rate (proportion of birds displaced) and mortality rate (proportion of displaced birds that may die) will be determined as per NatureScot (2023) and SBCB (2017; 2022) guidance. However, it will be agreed with Advisors prior to analyses being undertaken. Preliminary review of the available site specific DAS data indicates that common guillemot, Atlantic puffin, and razorbill are likely to be prominent species in the Marine and Nearshore Ornithology Study Area. Northern gannet have also been observed in the survey data, and abundance estimates may increase following review of data collected later in the breeding season (July-September). These species are regarded as sensitive to distributional responses, and, as such, NatureScot (2023) recommend the displacement and mortality rates outlined in **Table 6.7-12**.

Should the estimated distributional response mortality (cumulatively with collision impacts) exceed the threshold at any SPA population, PVA will be undertaken to assess the overall impact to the population throughout the life of the Project.

Table 6.7-12 Recommended seabird displacement and mortality rates (Source: NatureScot, 2023)

Common Name	Scientific Name	Displacement Rate	Mortality Rate (breeding)	Mortality Rate (non-breeding)
Black-legged Kittiwake	*Rissa tridactyla*	30%	1% and 3%	1% and 3%
Northern gannet	*Morus bassanus*	70%	1% and 3%	1% and 3%
Atlantic puffin	*Fratercula arctica*	60%	3% and 5%	1% and 3%
Common guillemot	*Uria aalge*			
Razorbill	*Alca torda*			

Population Viability Analysis (PVA)

PVA is used to predict the short- and long-term effects of an impact on a population, comparing baseline (unimpacted) population trends with the impacted population trends over the Project lifespan and beyond. The outputs of PVA can then be used to determine whether an effect is significant (e.g. whether it will adversely affect a classified population) or not, and can be used to inform mitigation, monitoring, and compensatory measures.

It is not possible to determine whether PVA will be required for the Project, as the requirement for PVA is triggered if the adult survival rate is predicted to drop by ≥0.02 percentage points (e.g. survival rate change from 80.00 to 79.98, noting this is not the same as a 0.02% change in survival rate), due to impacts associated with all aspects of the Project alone and cumulatively with other reasonably foreseeable plans and projects (NatureScot, 2023).

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.

It is recognised that HPAI/'bird flu' has affected many seabirds, with notable mortalities recorded at seabird colonies throughout the summer breeding season, and effects continuing to occur within wintering waterfowl and wader populations. At present, the full effect of the 2022/2023 'flu season' is not quantified in any datasets, and as such, it is difficult to incorporate into impact assessments for marine renewable energy projects. As of February 2023, NatureScot has not published any guidance specific to incorporating HPAI into assessments. The Applicant and its consultants will work with NatureScot and the other SNCBs to account for HPAI within any required PVA, noting that the full effects may or may not be observable within the data acquired over the DAS survey period.

NatureScot (2023) recommend the use of Natural England's (NE) PVA tool (Searle *et al.*, 2018), running PVA for the Project lifespan, as well as for 25 years and 50 years. Life history and starting parameters will be acquired from Horswill and Robinson (2015) and the SMP database (BTO, 2023), respectively.

Ratios which compare the unimpacted with the impacted population will be presented, including 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.

The PVA outputs, alongside published literature, reports and reviews, and the Conservation Objectives of SPAs, as well as discussion with advisors and stakeholders, will be used to determine whether the Project is predicted to have significant effect, either alone or cumulatively, with other OWF projects. Monitoring, mitigation, and any requirement for compensatory measures, will also be discussed and considered.

NatureScot (2023) guidance will be adhered to, and advisors will be consulted to ensure the most appropriate Project and seabird parameters are entered into the PVA, and the most appropriate outputs are presented in the assessment.

6.7.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Marine and Nearshore Ornithology include:

1. Do you agree that the data sources identified are sufficient to inform the Marine and Nearshore Ornithology baseline for the EIA (and therefore that no further baseline data collection, beyond completion of the scheduled digital aerial surveys, is merited)?
2. Do you agree with the use of Woodward *et al.* (2019), or site specific, where available and if greater than Woodward *et al.* (2019), foraging ranges for Marine and Nearshore Ornithology?
3. Have all Marine and Nearshore Ornithology receptors and potential likely significant effects that could result from the Project been identified?
4. Do you agree with the proposed approach to assessment (scoped in or out) for each of the potential likely significant effects in the EIA Scoping Assessment table for Marine and Nearshore Ornithology?
5. Do you agree with the proposed modelling approaches, including the proposed models being used (CRM, displacement matrices/SeabORD, apportioning, and PVA)?
6. Do you agree that the model-specific parameters highlighted above, as taken from NatureScot (2023) guidance, are appropriate for use; and do you have any further recommendations for model-specific parameters?
7. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential likely significant effects of the Project on Marine and Nearshore Ornithology receptors?
8. 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 Project?
9. Are any site-level or pressure-related research projects that are due to be published within the next 12 months that may be relevant to this specific project or offshore wind in general?

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6.8 Marine Archaeology and Cultural Heritage

6.8.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Marine Archaeology and Cultural Heritage within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

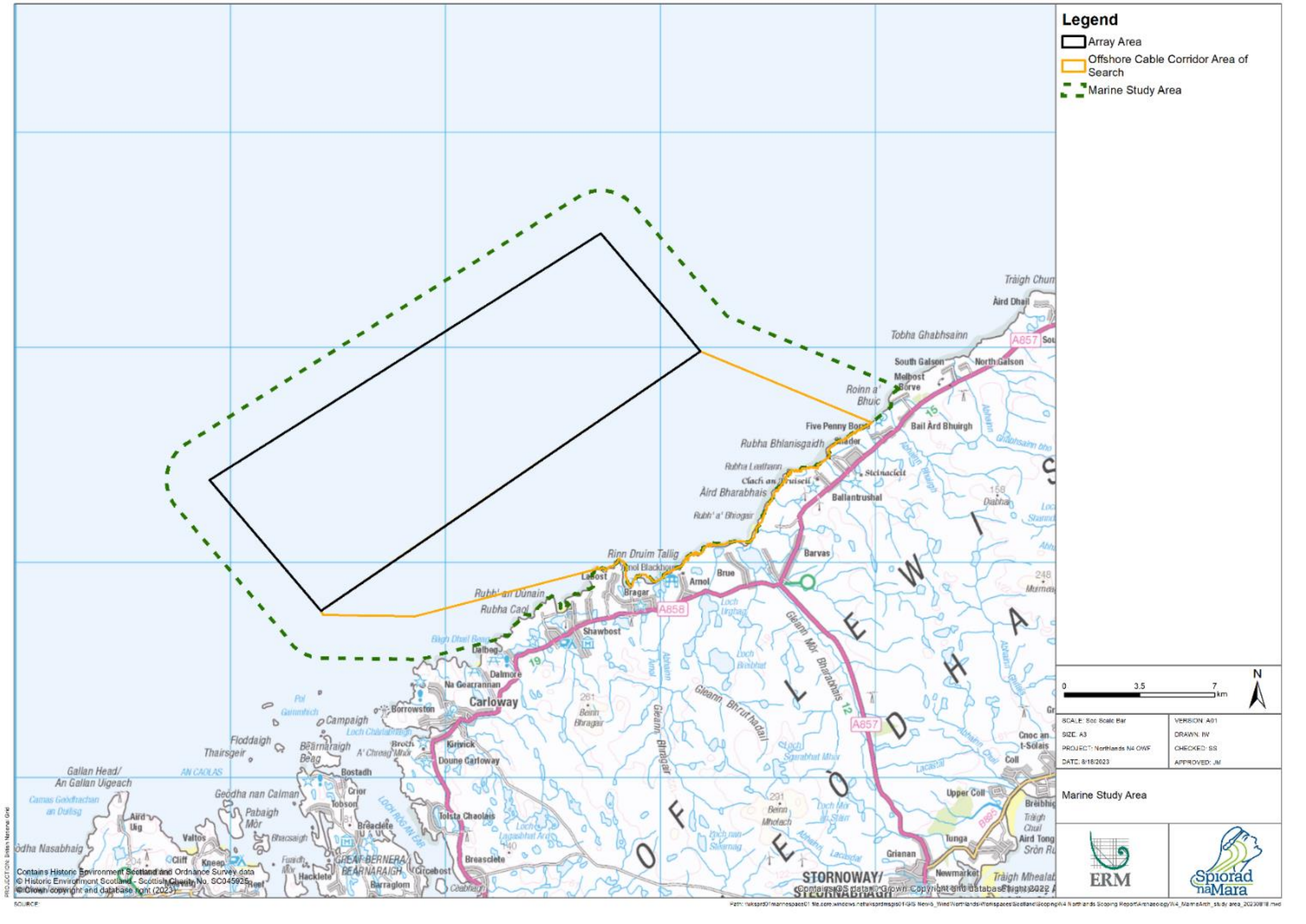
6.8.2 Study Area

The Marine Archaeology and Cultural Heritage Study Area (the Marine Study Area) is defined based on the Offshore Development Area of Search (Array Area, Offshore Cable Corridor Area of Search, and Landfall), plus a buffer of 2 km up to the Mean High-Water Springs (MHWS) boundary. At present the Onshore Archaeology and Cultural Heritage Study Area assesses down to the Mean Low Water Springs (MLWS). The Red Line Boundary developed during Environmental Impact Assessment (EIA) will confirm these extents and limits and to ensure a consistent approach between chapters for the intertidal section of the Project, communication and liaison between the two chapter leads will be key.

A settings assessment accounts for potential impacts to identified heritage assets with a potential for adverse effects due to a change in their setting, as a result of the Project. Effects to offshore heritage assets are discussed within this chapter. Any impact from the Array Area on onshore heritage assets will be assessed within the Onshore Archaeology and Cultural Heritage Chapter (see Chapter 7.4: Onshore Archaeology and Cultural Heritage).

The Marine Archaeology and Cultural Heritage Study Area (Marine Study Area) is shown on **Figure 6.8-1**. Further refinement of the Marine Study Area will be undertaken as the EIA process develops, with confirmation of the Red Line Boundary, along with discussions with regulator and other key stakeholders (see section 6.7.7).

Figure 6.8-1 Marine Archaeology and Cultural Heritage Study Area



6.8.3 Baseline Environment

6.8.3.1 Site-specific Surveys

To provide relevant, up-to-date data with which to characterise the Marine Archaeology and Cultural Heritage Study Area and to inform the impact assessment process, the following surveys/methods of data collection are proposed.

Table 6.8-1 Summary of baseline surveys/methods of data collection to inform Marine Archaeology and Cultural Heritage

Data Required	Survey Method	Approach Summary
Historic Environment Record (HER)/Sites and Monuments Records (SMR)	Desk-based assessment	Conduct in-depth desk-based assessment and baseline studies to gather information on all known Marine Archaeology and Cultural Heritage features in the Marine Archaeology and Cultural Heritage Study Area.
Underwater anomalies	Site-specific survey data	The desk-based assessment will be supplemented by site specific geophysical data to support the identification of potential paleo landforms, Marine Archaeology or Cultural Heritage features or receptors. Further supplementary data may be used where appropriate and available, such as drop-down video footage and/or geotechnical cores.
Intertidal site and viewpoint determination	Walkover survey	Following review with stakeholders and in-depth desk-based assessment, a walkover survey may be undertaken to address any intertidal anomalies or setting assessments as needed.

6.8.3.2 Data Sources

The data sources used to inform the Marine Archaeology and Cultural Heritage section of the Scoping Report are presented within **Table 6.8-2.** These data sources will be taken forward and used to inform the EIA, alongside secondary sources and grey literature - relevant papers, journals and unpublished reports, and the additional site-specific data collected for the Project (including surveys and local records), as well as any recommended data sources from stakeholders.

Table 6.8-2 Summary of key publicly available datasets for Marine Archaeology and Cultural Heritage

Source	Spatial Coverage	Year	Summary
UK Hydrographic Office (UKHO) - Global Wrecks and Obstructions (Portal)	Global	2023	An extensive dataset containing charted, uncharted, live, and dead wrecks and obstructions from around the world. Updated on a quarterly basis, this dataset is made available free of charge under an Open Government Licence, which can be accessed via the INSPIRE portal.

Source	Spatial Coverage	Year	Summary
Historic Environment Scotland (HES) – Designated Assets	Scotland	2020	A dataset containing records of the historic environment for Scotland, available free of charge under an Open Government Licence, accessed via Scottish Government spatialdata.gov.scot: Listed Buildings; Scheduled Monuments; Gardens and Designated Landscapes; Battlements; Historic Marine Protected Areas; Conservation Areas; World Heritage Sites; Properties in Care; Historic Land use Assessment.
National Record of the Historic Environment: Canmore	Scotland	2023	Map viewer of the National Records of the Historic Environment, including documented losses of vessels, and records of terrestrial monuments and findspots, including the archaeological excavation index.
Marine Directorate's Historic Marine Protected Areas online viewer	Scotland	2023	Map viewer with locations for Marine Directorate's Historic Marine Protected Areas, amongst other layers.
Scottish Archaeological Research Framework (ScARF)	Scotland	-	The key resource for Scottish archaeology research, providing an overview of the subject and a set of relevant research questions to guide assessment. Potential for local resources and expertise.
British Geological Society (BGS)	UK	Variable	BGS GeoIndex (offshore) mapper.

6.8.3.3 Overview of Baseline Environment

An initial desk-based review of literature and available data sources (see **Table 6.8-2)** has been undertaken to support this Scoping Report. The findings are presented below to provide the current understanding of the Marine Archaeology and Cultural Heritage baseline and to inform the scoping process.

Prehistoric

The identification of prehistoric sites remains challenging in any offshore environment. Therefore, onshore and intertidal sites, along with any geological context provided via local sediments, are used as a proxy, not only to try to identify direct archaeological evidence of the human occupation of the area, but also the palaeo-environmental context. This can then also provide understanding of the wider natural environment within which early humans lived.

The UK has been affected by several glacial events over the last 1 million years; including the Anglian (480-430 ka BP), the Wolstonian (350-132 ka BP), and the Devensian (122-11.7 ka BP); and intervening marine transgressions, all of which have influenced human occupation. Northwest Scotland experienced extensive glaciation over the Late Quaternary period, with multiple phases of advance and retreat of ice and sea, scouring the land surface and depositing sediment, potentially removing, and burying any potential sites of interest.

During the glaciation, lower sea levels meant dry land extended west of the current Island. However, the climate was not necessarily conducive to human occupation (<-5°C) (Ballantyne, 2019). Any Palaeolithic sites on the east of the Isle of Lewis would have been under intensive erosion through ice streaming from the main ice cap from the Last Glacial Maximum (LGM), identified to extend out along the Minch, up to the north and northwest of the Isle of Lewis, and into the north Atlantic (Bradwell *et al*., 2008). It is understood that over the Isle of Lewis itself, a Lewisian centred ice mass was present, situated to the south southeast of the Array Area. Erosion would still be occurring here, but to a lesser degree. The Lewisian ice sheet is thought to have become independent of the ice cap circa.19.5-18.5 ka BP, with its disappearance around 16-15 ka BP opening the land for potential occupation (Bradwell *et al*., 2021) (**Figure 6.8-2**).

The coastline migrated as the post glacial marine inundation occurred. On Harris, this has been dated to 7,982-8,348 Calibrated Years Before Present (cal. a BP) in the earliest instance, crossing -0.08 m Ordnance Datum Newlyn (ODN) (Jordan *et al*., 2010) (Chart Datum[18] at Stornoway is 2.71m ODN); whilst Smith *et al*. (2018) suggests after a plateau at -25 m ODN in 10-12 ka BP, there was a gradual rise from approximately -2 to -4 m ODN, around 6-7000 cal. a BP, to 0 to -2 m ODN at 4,000 cal. a BP (

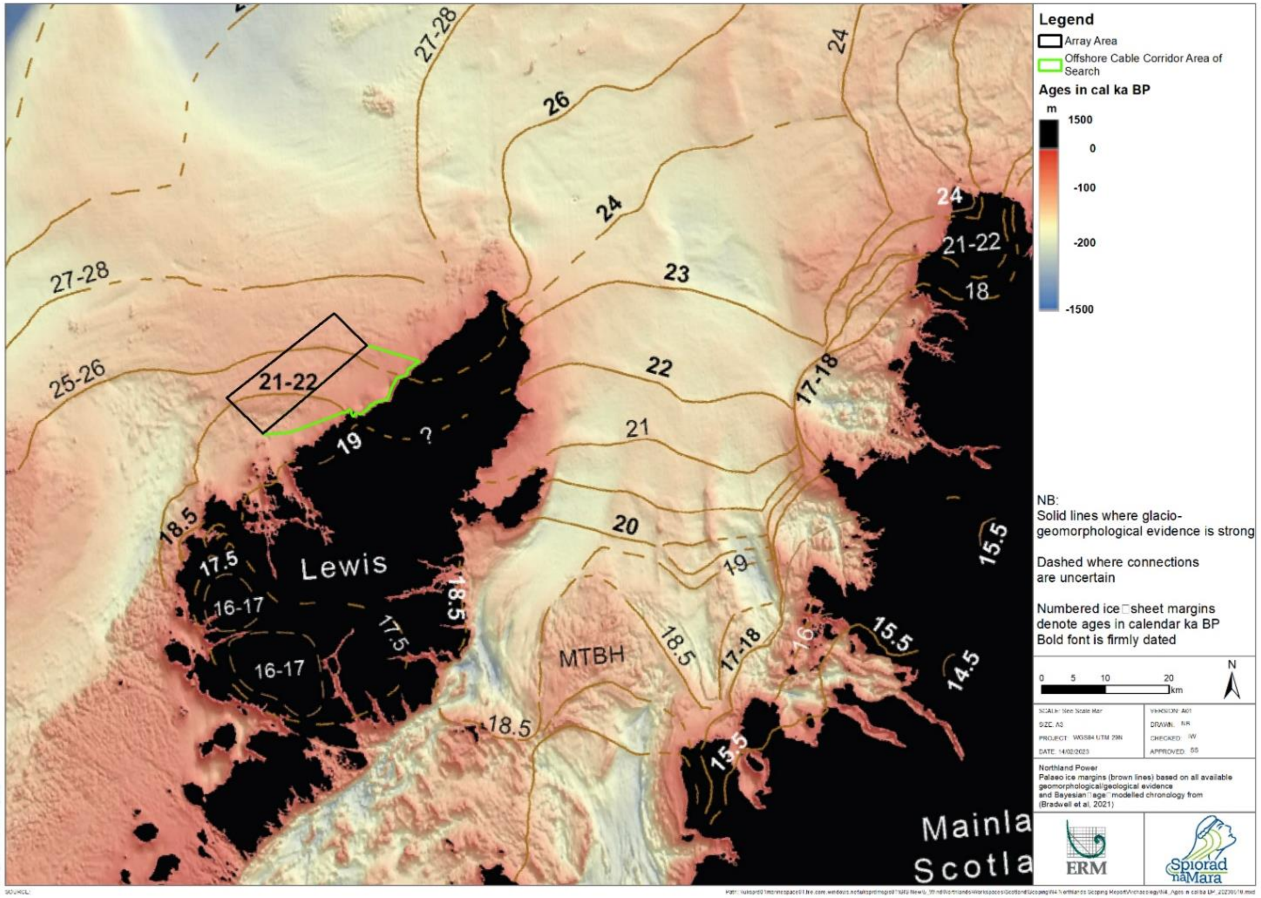
Figure 6.8-3). Whilst there is some variation, both indicate the coastline was shallow and close to the present coastline. Fluctuations are seen in relative sea level outside the general trend in the UK, such as the crossing of post glacial shorelines, which have been linked to local isostatic rebound and isolated events (storms or the Holocene Storegga Slide tsunami) (Jordan *et al*., 2010; Smith *et al*., 2018).

The isostatic rebound on the Isle of Lewis is complicated, with the Outer Hebrides lowering into the sea, as opposed to the rest of Scotland which has been steadily rising. This is in part thought to be due to the hinge effect of the fault found along the Minch, which may have accounted for up to a 5 m increase in local relative sea level in the last 5,000 cal. a BP (Burgess, 2008).

The current coastline is characterised by Lewisian gneiss bedrock bordered by stabilised dune systems known as machair (Gaelic for a low lying, grass-dominated coastal plain composed of calcareous sand) with a complex evolutionary history, terminating in recycling and degradation of pre-existing coastal sediments (Dawson *et al*., 2011) (further detail found in Chapter 6.1: Physical and Coastal Processes).

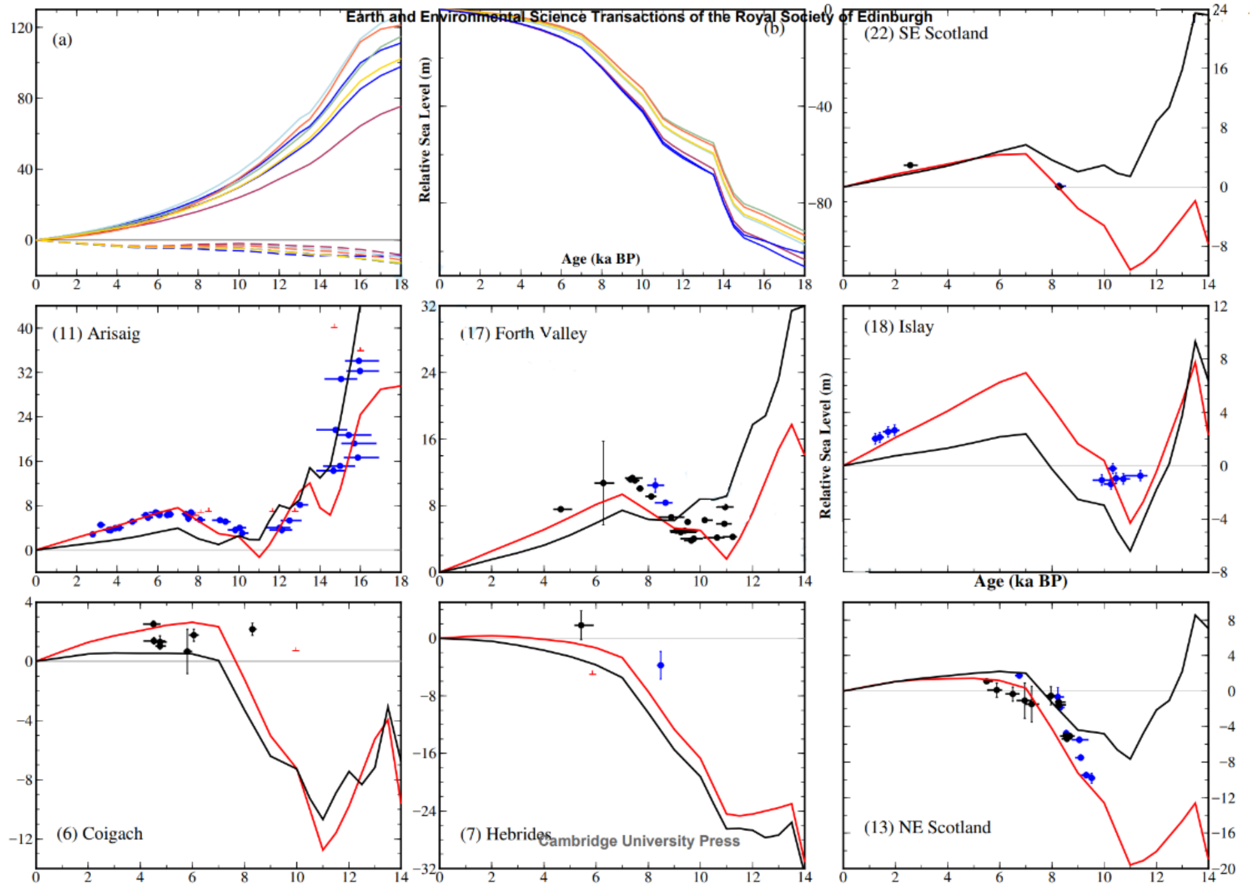
[18] For comparison, Chart Datum is within decimetres of both Lowest Astronomical Tide and Mean Low Water Springs.

Figure 6.8-2 Summary Palaeoglaciological Reconstruction of Ice Sheet and Ice Cap Deglaciation after the Last Glacial Maximum (Source: Bradwell et al., 2021)



(Panel a) British Ireland Ice Sheet only (solid line) and the SIS only (dashed line); (panel b) and Far-field ice sheets only [Coigach (green): NE Scotland (Blue): Arisaig (light blue): SE Scotland (yellow): Forth Valley (orange): Islay (dark green); Hebrides (purple)]; (remaining panels) The Bradley (red line) and Kuchar (black line) models compared to the observed primary sea level index points [blue circles: basal index points, black circles: intercalated points and red limiting data].

Figure 6.8-3 Predicted Relative Sea Level for 7 sites across Scotland (From: Smith et al., 2018)



Any potential Palaeolithic sites (such as middens or hearths) or objects (tools or weapons) that may have survived the glacial processes due to the rocky nature of the area would be either buried within sheltered areas, such as crevasses, or in previous lowstand sea caves (Bailey *et al.*, 2020). Any potential archaeological remains would be highly significant, due to the rarity of such sites across the region.

Taking into account these processes in the palaeolandscape, there is greater potential for the survival of post glacial late Upper Palaeolithic, Mesolithic and Neolithic archaeology (15-5 ka BP) within the Marine Archaeology and Cultural Heritage Study Area. Where the conditions are right for preservation (such as crevasses or the machair), this is likely to be shallower than -25 m ODN (

Figure 6.8-3; Smith *et al.*, 2018), which is within 2 km of the current coastline. There is also potential for submerged post glacial landscapes, again where preservation allows; several instances of intertidal peat deposits and buried tree stumps have been recorded along the western shores, particularly around the more sheltered shores of North Uist (Wickham-Jones and Dawson, 2006) and within machair, where present.

From the Middle Neolithic period onwards the sea level would have been comparative or lower (<5 m) than the current level (dependant on the rate of local isostatic rebalance calculated) and, therefore, there may be presence of later sites within the intertidal region, either in situ or as eroded remains.

No designated or known sites have currently been identified within the Marine Archaeology and Cultural Heritage Study Area. However, as mentioned in the Physical and Coastal Processes Chapter (see Chapter 6.1: Physical and Coastal Processes), there are sites that form part of the Northwest coast of Lewis candidate Sites of Special Scientific Interest (cSSSI), from the Geological Conservation Review (GCR), which have been identified as coastal sites of significant interest for Quaternary history. In particular, for providing evidence on pre-Devensian sea level change (raised rock platforms) and palaeoenvironmental conditions (including, peat deposits), which also link to features of interest within the Marine Archaeology and Cultural Heritage Chapter. These sites also indicate the potential for further sites of significance along the coastline.

Assets identified from the HER data (Historic Environment Scotland, 2020a), onshore along the coast (see Chapter 7.4: Onshore Archaeology and Cultural Heritage) indicate potential sites of archaeological interest in the intertidal region, and thus may be used as a proxy for potential offshore activity – see examples below:

- Early/Middle Neolithic tombs, mainly as passage graves or Clyde cairns;
- Early/Middle Neolithic settlements;
- Crannogs, with the Outer Hebrides representing a particular hotspot in distribution, with over 170 known sites (Garrow and Sturt, 2019).

The Crannogs were previously thought to be Iron Age, however, excavations at Loch Arnish, Loch Bhorgastail, and Loch Langabhat, with further excavation undertaken on and around the crannog in Loch Bhorgastail in July 2021 (Garrow and Sturt, 2019 Blankshein, Garrow and Sturt, 2022), confirmed that all 3 islets were indeed used within a narrow timeframe during the Neolithic period: 3,640-3,360 BC.

With clear human occupation over this period, there is potential for further sites of interest within the intertidal and offshore sections of the Marine Archaeology and Cultural Heritage Study Area.

Maritime

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 which 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.

Preservation of maritime heritage assets, particularly for organic and less robust materials, is more likely in lower energy environments and areas where the seabed contains a suitable depth of fine-grained marine sediments conducive to creating an anoxic environment. Conversely, higher energy environments (e.g. within the zones of wave action and stronger tidal energy) and areas of rocky seabed are less conducive to the preservation of maritime remains.

The Outer Hebrides, including the Isle of Lewis has been separated from mainland Scotland since at least the beginning of the Holocene. Due to the water depths within the Minch and the surrounding Islands, seaways would have been present for access to the mainland, between islands and even as far as Ireland (Blankshein, 2021). Prehistoric watercraft would take the form of stretched hide or log rafts, which require a certain environment for preservation, such as sheltered locations (crevasses) and anoxic layers (possible organics), which are not known to be prevalent within the current Marine Archaeology and Cultural Heritage Study Area. The evolution of watercraft into the modern metal structured vessel from the 20th century, which are more durable in extreme environments and more clearly defined using hydrographic and geophysical techniques, provides a bias towards later vessels.

Figure 6.8-4 shows the distribution of known heritage assets and loss records within and surrounding the Marine Archaeology and Cultural Heritage Study Area. No designated or known sites were identified within the Array Area or Offshore Cable Corridor Area of Search. Only one recorded wreck was identified on the boundary of the Marine Archaeology and Cultural Heritage Study Area; the *Borgin*, an auxiliary schooner that was abandoned ashore, along the coast; this known wreck is noted to fall along the intertidal and onshore boundary of the Marine Archaeology and Cultural Heritage Study Area. Upon refinement of the

Red Line Boundary, the asset may fall into either the onshore or offshore remit, either chapter will ensure that asset is assessed fully.

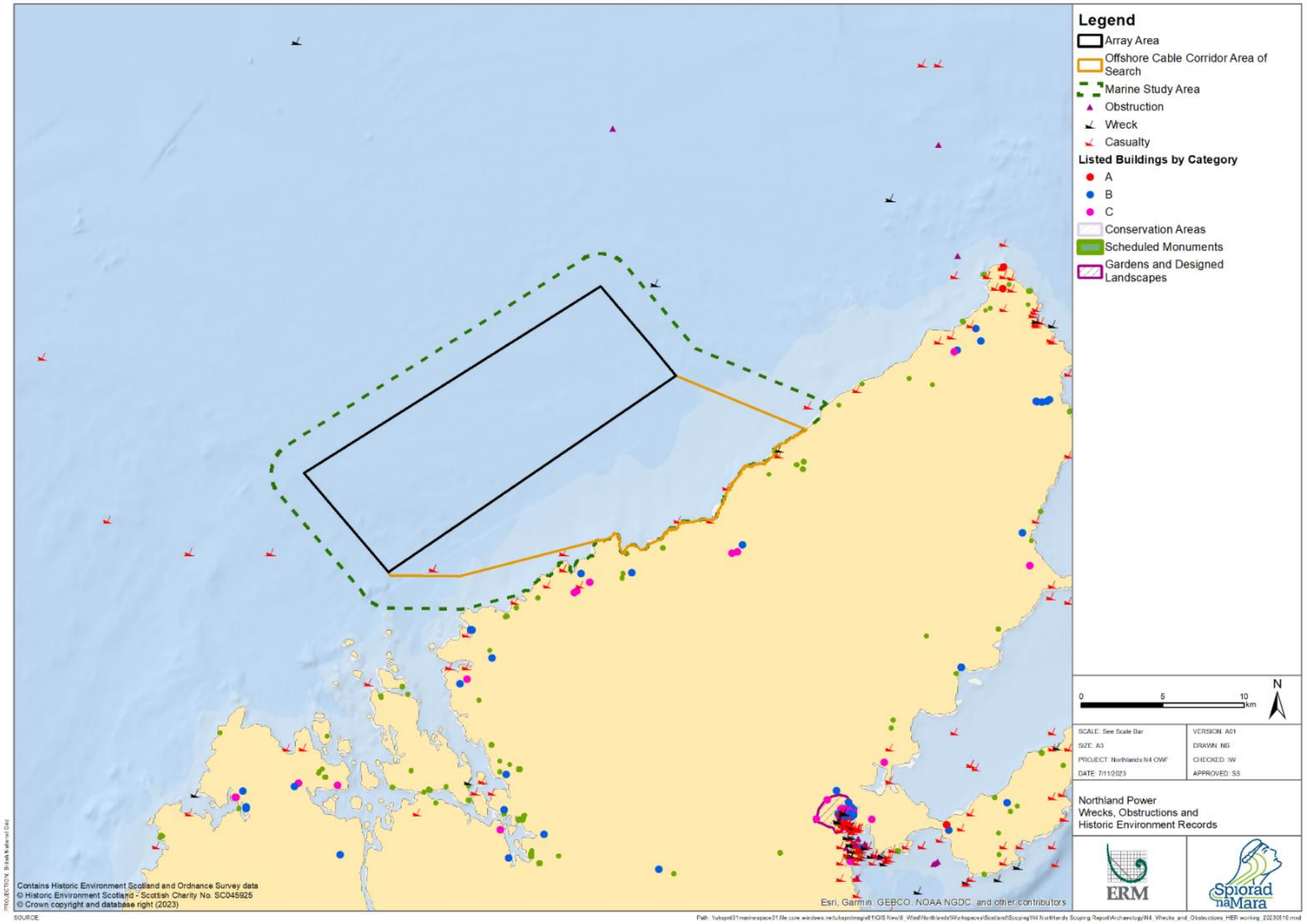
Up to 20 records, with no confirmed positions[19], are noted with potential to fall within the Marine Archaeology and Cultural Heritage Study Area. These records identify that the vessels were last reported in the general area and no confirmed physical structure has currently been associated with these losses. The records are listed below:

- 2 Steamships (*Clan MacQuarrie* and *Horda*; 20th century);
- 4 Luggers (*Standard, Maria D, Breadwinner,* and *Annie Gardener*; 19th and 20th century);
- 2 Brigantine (*Pheonix* and unknown 1809);
- 1 Brig (*Alexander* and *Mary*; 19th century);
- 1 Barque (*Maju*; 19th century);
- 4 general craft (*Ceres*, *Superb*, *Rucking* and unknown; 19th and 20th century);
- 1 18th century record (*Jean Girrel*);
- 5 unknown, 19th century craft.

To try to address the bias in existing records, along with ground truthing sites and archiving data, the Scotland-wide Samphire Project was proposed utilising local knowledge – 'crowd sourcing', to supplement standard methods (McCarthy and Benjamin, 2017). Previously undocumented local records of wrecks were reported to the Samphire Project from local activities, including fishing, dive clubs, and from local residents. These ranged from a wooden clinker-built vessel on Eigg to a steamship (the *Falcon*) lost in 1867. Other objects were also reported, including a stone anchor potentially of Bronze Age origin, iron anchors, cannons, and cannon balls. It is noted, therefore, that the review of records across several data sources and approaches helps to build a clear picture of the maritime environment.

[19] One location identified on the map may relate to one or more records. The position does not relate to the physical position of the recorded loss, this is not known, it is a suggested point to identify the loss was in the area; where a number of records have been reviewed together, they may all be placed under one position. A full review of known losses in the region will be provided in the EIAR.

Figure 6.8-4 Overview of wreck, obstructions, and Historic Environment data (Source: Historic Land use Assessment Map; Historic Environment Scotland, 2020a)



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.

No current HER records indicate the presence of any known sites of aviation wreckage within the Marine Archaeology and Cultural Heritage 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. The Samphire Project highlights that a group of previously unrecorded World War two (WWII) Flying Boats were discovered by recreational divers in the Firth of Lorn, south of Mull, after reviewing hydrographic data (McCarthy and Benjamin, 2017).

Settings

“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, 2020b).

Due to the location of marine heritage assets underwater, they have limited visual sensitivities. Any effects on the assets are assessed through other direct and indirect impacts. Therefore, the offshore settings assessment of marine heritage assets is proposed to be scoped out. Any changes to the setting of onshore heritage assets in relation to the offshore infrastructure will be reviewed within the Onshore Archaeology and Cultural Heritage Chapter (Chapter 7.4: Onshore Archaeology and Cultural Heritage).

6.8.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Marine Archaeology and Cultural Heritage assessment, which has been incorporated into the design of the Project **Table 6.8-3**. Embedded mitigation related to onshore heritage assets are discussed within Chapter 7.4: Onshore Archaeology and Cultural Heritage.

Table 6.8-3 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.12	Proactive management of the Marine Archaeology and Cultural Heritage throughout the project	Written Scheme of Investigations (WSI) and associated documents: A WSI will be in place during the Project, with method statements for specific activities identified and added throughout the project life cycle, along with reference to the Project Protocol (6.4). This will include oversight of activities including geophysical and geotechnical survey specification, planning and review of data, list of recommended mitigation, watching briefs and walkover surveys, where required, as well as consultations, and reporting. Involvement of Project archaeologist early in the project to ensure advise is able to be implemented in the site investigations, Project design, planning and communications.
6.13	Avoidance of known sites of archaeological significance	Use of Archaeological Exclusion Zones (AEZs), Temporary Exclusion Zones (TEZs) or Areas of Archaeological Interest (AAI) and micrositing: After a review of current site specific geophysical datasets, alongside local and national records, relevant papers and local knowledge, any sites of significant archaeological interest will be recommended the implementation of a proportional AEZ/TAEZ/AAI, in line with standard guidelines, which take into account significance of the asset and the local hydrodynamics and seabed level changes (possible scour). Micrositing will also be taken into consideration as part of the design and planning of the Project, to ensure that avoidance is first priority.
6.14	Identification of unknown sites of archaeological significance	Geophysical survey over development site to identify any unknown sites, undertaken in consultation with project archaeologists to advise on specifications and review data once complete. If any potential sites are identified, avoidance through implementation of AEZs and micro siting of the development infrastructure, as required. Geotechnical surveys will also be undertaken in consultation with project archaeologists to advise on specifications, if any potential micrositing of core locations would be beneficial, and review core data once complete to identify any potential for a staged review.
6.15	Reporting and recording of items of potential archaeological interest	Through the production of a Protocol of Archaeological Discoveries (PAD) for the project, any items of potential archaeological interest may be reported and recorded. This also ensures that where a number of finds are recorded, they may be assessed further and highlighted as a site of significant archaeological interest, where appropriate.

6.8.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.8.5.1 Likely Significant Effects

Potential likely significant effects on Marine Archaeology and Cultural Heritage receptors have been identified which may occur during the construction, operation (including maintenance), and decommissioning phases of the Project. These impacts are outlined in **Table 6.8-4.**

Table 6.8-4 EIA Scoping Assessment for Marine Archaeology and Cultural Heritage

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification
Construction and Decommissioning			
Direct impact (e.g. drilling, foundation construction or removal, seabed levelling, ploughing and cable lay, cable protection etc.)	6.12, 6.13, 6.14, 6.15	In	The physical impact of or removal 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.
Indirect impact (e.g. from drilling piles, suspended sediment, changes in current leading to scour/erosion or deposition, etc.)	6.12, 6.13, 6.14, 6.15	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.
Direct impact (visual) (e.g. from Offshore Infrastructure) on offshore heritage assets		**Out**	Offshore heritage assets, due to their location underwater, have limited visual sensitivities from the Project. Effects on the assets are assessed through other direct and indirect impacts. Onshore assets will be assessed as part of the onshore settings assessment.
Cumulative effects	6.12, 6.13, 6.14, 6.15	In	The installation and decommissioning of the offshore infrastructure and cable route and their associated effects, have the potential to generate cumulative effects, which either temporarily or permanently, affect the Marine Archaeology and Cultural Heritage assets. Whilst some may be expected to be fully reversible, others such as cable repair may have longer lasting effects; an assessment will be made during the EIA.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification
Operation and Maintenance			
Direct Impact (e.g. repairs, debris, cable protection)	6.12, 6.13, 6.14, 6.15	In	The physical impact of or removal linked to any operations or maintenance works on maritime, aviation, or prehistoric sites of known (identified through records and surveys) or unknown sites of archaeological potential.
Indirect impact (e.g. burial or scour/erosion)	6.12, 6.13, 6.14, 6.15	In	The changes in the hydrodynamics and sediment distribution linked to the 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.
Direct impact (visual) (e.g. from offshore infrastructure) on offshore heritage assets		**Out**	Offshore heritage assets, due to their location underwater, have limited visual sensitivities from the project. Effects on the assets are assessed through other direct and indirect impacts. Onshore assets will be assessed as part of the onshore settings assessment.
Cumulative effects	6.12, 6.13, 6.14, 6.15	In	The operation and maintenance of the offshore infrastructure and cable route and their associated effects, have the potential to generate cumulative effects, which either temporarily or permanently, affect the Marine Archaeology and Cultural Heritage assets. Whilst some may be expected to be fully reversible, others such as cable repair may have longer lasting effects; an assessment will be made during the EIA.

6.8.6 Proposed Approach to EIA

The proposed approach to assessment will take the following steps:

- Gathering of baseline data (primary survey, desk-based etc.) to characterise the site and to identify specific receptors;
- Identification of potential effects and impact pathways;
- Generation of ZTV and setting assessment (setting impacts to onshore assets to be assessed in Onshore Archaeology and Cultural Heritage Chapter of EIA);
- Assessment of impacts;
- Identification of any additional mitigation measures if significant impacts identified.

6.8.6.1 Relevant Data Sources

The data sources will include those listed in section 6.8.3.2, with further support provided by the use of local records (from Comhairle nan Eilean Siar), Receiver of Wreck records, further survey works where appropriate (**Table 6.8-1**), and a more detailed review of secondary sources, including journals and published/unpublished papers. The data sources may be supplemented by any of these additional support materials identified and suggested during stakeholder consultations.

It is understood that good collaboration and reviewing of local records and information are important, as is gathering information on local history from the residents – coined as 'crowd sourcing' and highlighted by Project Samphire (McCarthy and Benjamin, 2017); good local communications will be vital during the baseline review and assessment.

Further site-specific surveys will supplement the desk-based data sources; these are discussed in section 6.8.3.1.

6.8.7 Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. It is important that collaboration with the Project's engagement team is robust and ongoing. Key consultees will include:

- Marine Directorate Licensing and Operating Team;
- Marine Directorate Science;
- NatureScot;
- HES;
- Local council: Comhairle nan Eilean Siar.

Local groups and/or representatives may also be included as part of the consultation; potential groups will be discussed with the Western Isle Archaeologist (Comhairle nan Eilean Siar).

6.8.7.1 Policy, Legislation and Guidance

The assessment of Marine Archaeology and Cultural Heritage will consider appropriate policy and legislation, a full list utilised by the project is provided in Chapter 3: Policy and Legislation.

Table 6.8-5 Legislation, Policy and Guidance Relevant to the Marine Archaeology and Cultural Heritage assessment

Relevant Legislation, Policy and Guidance
Legislation
The United Nations Convention of the Law of the Sea (UNCLOS)
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 mean low water springs)
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
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)

Relevant Legislation, Policy and Guidance
The Chartered Institute for Archaeologists (CIfA) Codes, Standards and Guidance (various)
Scottish Natural Heritage & Historic Environment Scotland. 2018. Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland.
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)

6.8.7.2 Assessment Methodology

The assessment methodology will follow the general approach outlined in Chapter 4: Proposed Approach to EIA, of this Scoping Report. Further refining of the methodology and Marine Archaeology and Cultural Heritage Study Area will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement.

The main aim of the Marine Archaeology and Cultural Heritage assessment is to characterise and understand the marine baseline within the Project area, particularly with respect to any known and unknown/potential maritime, aviation, prehistoric 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.

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 effects significance. An assessment of the potential likely significant effects of the Project will be undertaken through application of the Evidence Base. Embedded mitigation will be considered within the assessment, and further mitigation recommended, where required. Should cumulative effects arise from the offshore elements of the Project at specific receptors these will be considered within the cumulative effects section of the 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 EIAR.

6.8.8 Scoping Questions for Consultees

Scoping questions for consultees in relation to Marine Archaeology and Cultural Heritage include:

1. Are consultees content with proposed data sources?
2. Are consultees content with the proposed baseline environment?
3. 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 Project, which may not yet be in the public domain?
4. Are there any other potential effects that you believe could be significant and which you wish to see assessed in the Marine Archaeology and Cultural Heritage Chapter of the EIAR for the Project?

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6.9 Commercial Fisheries

6.9.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Commercial Fisheries within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

6.9.2 Study Area

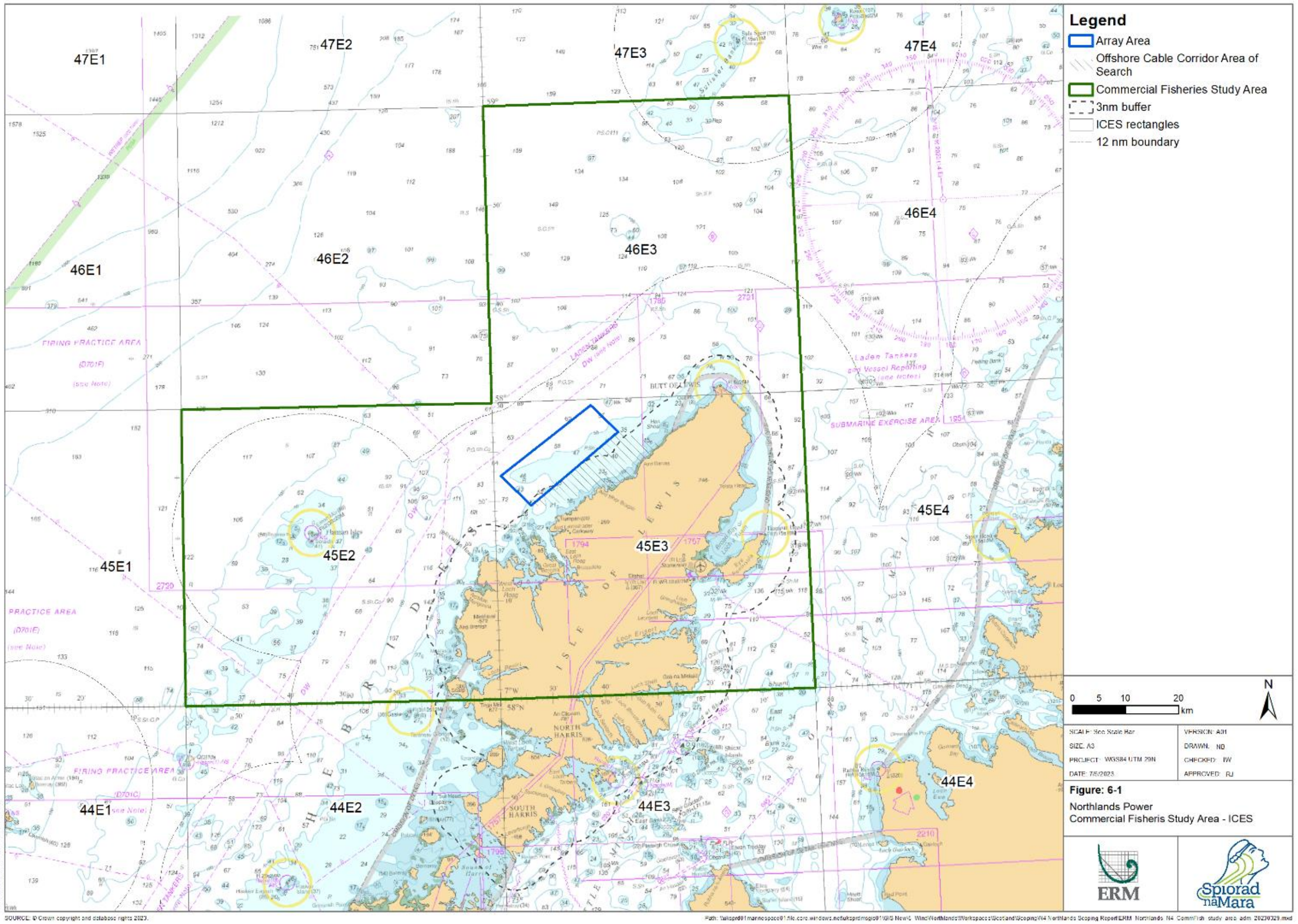
The Commercial Fisheries Study Area has been defined on the basis of International Council for the Exploration of the Sea (ICES) Statistical Rectangles.

The proposed Offshore Development Area of Search is located within the northeast portion of ICES Division 6a (West of Scotland) (ICES/CIEM, 2023), within the 12 NM limit, in United Kingdom (UK) Exclusive Economic Zone (EEZ) waters (Scottish Government, 2020).

For the purposes of recording and locating fisheries data, ICES divisions are further divided into statistical rectangles. These rectangles provide a grid covering the area between 36°N and 85°30'N, and 44°W and 68°30'E (ICES/CIEM, 1970). As a result, the Commercial Fisheries Study Area has been defined with reference to the ICES rectangles within which the Offshore Development Area of Search is located. This area lies within ICES rectangle 45E3 (ICES/CIEM, 2023), which covers both the sheltered east coast, and exposed northwestern coast of the Isle of Lewis. These waters within the rectangle offer very different commercial fishing opportunities. Additionally, ICES rectangles 45E2 (west of the proposed Array Area), and 46E3 (north of the Array Area), are also considered as part of the wider Commercial Fisheries Study Area (**Figure 6.9-1**). Data from these additional statistical rectangles will enable a regional analysis of activity in and around the Offshore Development Area of Search.

Rectangle 46E2 has been omitted as it does not adequately capture the characteristics of both coastal and offshore settings. Moreover, its distance of over 10 km from the Array Area means that it does not offer sufficient additional information to the baseline above that provided by rectangles 45E2 and 46E3.

Figure 6.9-1 The Commercial Fisheries Study Area



6.9.3 Baseline Environment

6.9.3.1 Data Sources

An initial desk-based review was undertaken to identify the data sources to be used to inform the Commercial Fisheries section of the Scoping Report. These are presented within **Table 6.9-1**. These data sources will be taken forward and used to inform the EIA, alongside any additional site-specific data that are collected for the Project. This will include detailed consultation with local commercial fishing organisations and individuals active in the Commercial Fisheries Study Area (see section 6.9.6.2).

Table 6.9-1 Summary of key publicly available datasets for Commercial Fisheries

Source	Spatial Coverage	Year	Summary
Scottish Sea Fisheries Statistics – Fishing Effort, Quantity and Value by ICES Rectangles	Complete coverage	2016-2020	Marine Directorate landings (tonnage and value), by UK vessels into the UK and abroad, and foreign vessels into the UK, by ICES rectangle and species type
Scottish Sea Fisheries Statistics -Fishing Effort, Quantity and Value by ICES Rectangles	Complete coverage	2016-2020	Marine Directorate, fishing effort by UK over 10 metre vessels, by ICES rectangle and gear type
Comhairle nan Eilean Siar aquaculture and fisheries data	Western Isles	N/A	Local legislation, data, schemes and fisheries management plans. Including pot limitations for the Outer Hebrides
Marine Directorate 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
Pelagic – Mackerel 2009-2013 amalgamated VMS intensity layer, Scotland's Marine Assessment 2020	Scottish Waters	2009-2016	Marine Directorate indication of effort for mackerel, by UK over 15 metre vessels
Marine Directorate datasets, Salmon and Sea Trout Fishery Statistics, Scottish Government	Scotland	1952-2020	Marine Directorate salmon and sea trout fishery statistics, and other associated reports

6.9.3.2 Overview of Baseline Environment

Based on an initial review of available data, undertaken to inform this Scoping Report, the fishing activities within the Commercial Fisheries Study Area are summarised below, based on analysis of landings values (£) per species (annual average 2016-2020) (Marine Directorate, 2020a); effort (days) per fishing method (gear) for UK vessels over 10 m in length (annual average 2016-2020) (Marine Directorate, 2020b); and vessel length trends, as reported by the Comhairle nan Eilean Siar (Comhairle nan Eilean Siar, 2017).

6.9.3.3 Landings Value and Effort by Species

A total of 74 species were reportedly landed across the Commercial Fisheries Study Area (ICES Rectangles 45E3, 45E2 and 46E3) (**Figure 6.9-2**). Mackerel accounted for the highest annual average landed weight (22,162 tonnes) and highest annual average landings value (£19,661,442), followed by crabs (C.P. mixed sexes) and Nephrops. Overall, ICES rectangle 46E3 accounted for the greatest landed weights across the topic-specific study area, of 19,073 tonnes **(Figure 6.9-3).** Despite ICES 45E3, where the Array Area is located, accounting for the lowest landed weights, significant landed values of £17,224,446 are recorded from this rectangle between 2016 and 2020.

A total of 57 species was reportedly landed in ICES rectangle 45E3 between 2016 and 2020 (the species with the highest average annual landings value in 45E3 was Nephrops *Nephrops norvegicus* (**Figure 6.9-3**) at £2,194,983 (51% of average annual landings value). This was followed by edible crab *Cancer pagurus* which accounted for £761,210 on average (18%). The only pelagic species featured in 45E3 landings was horse mackerel *Trachurus spp.,* with an annual average of £307,023 (8%). This was closely followed by shellfish landings of scallop *Pecten maximus*, with an average annual average of £296,235 (7%), and lobster *Homarus gammarus*, accounting for £279,142 (6%).

Figure 6.9-2 Annual average landings value of the top 10 most commercially fished species within the Commercial Fisheries Study Area between 2016-2020 (Source: Marine Directorate, 2020a)

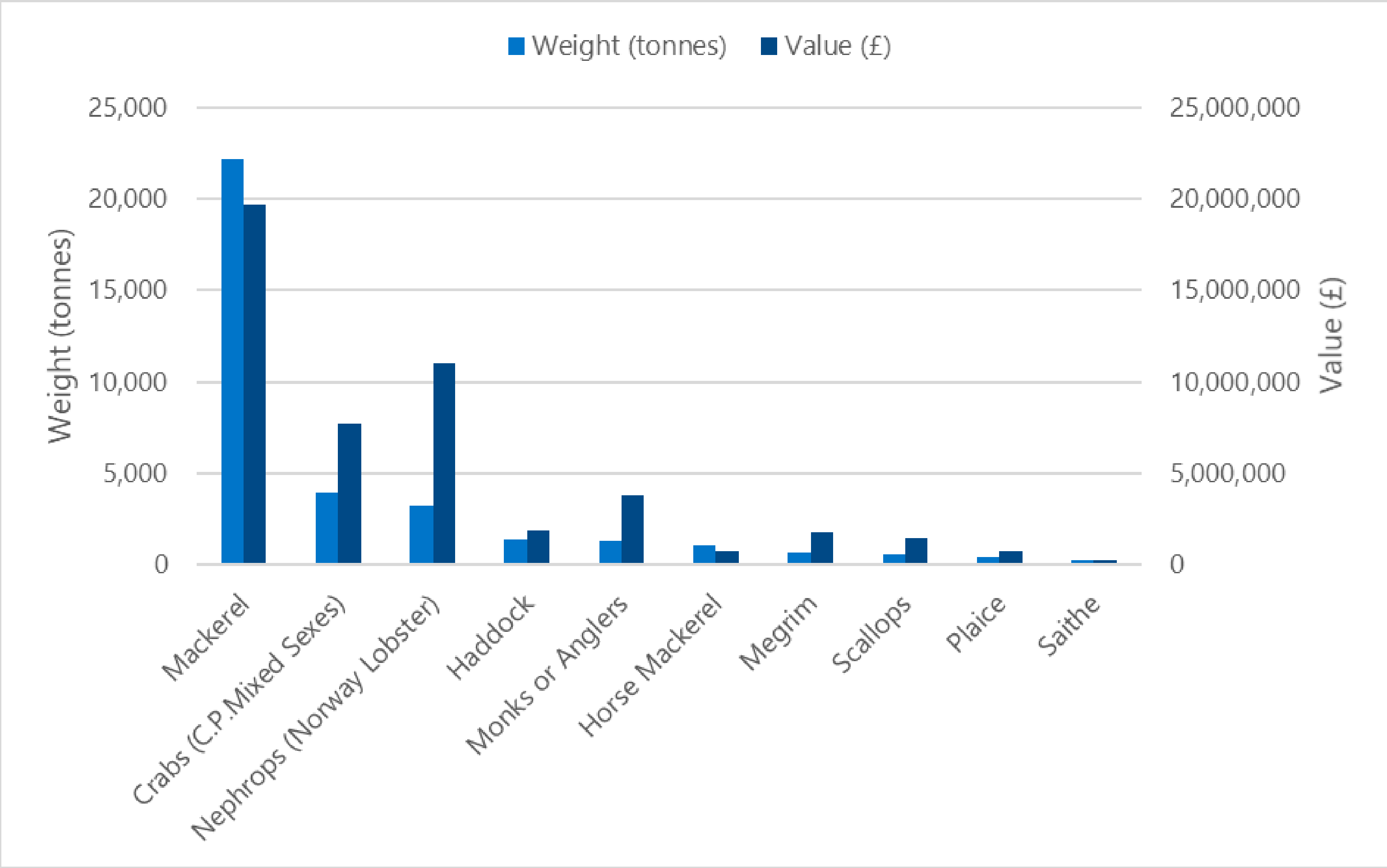
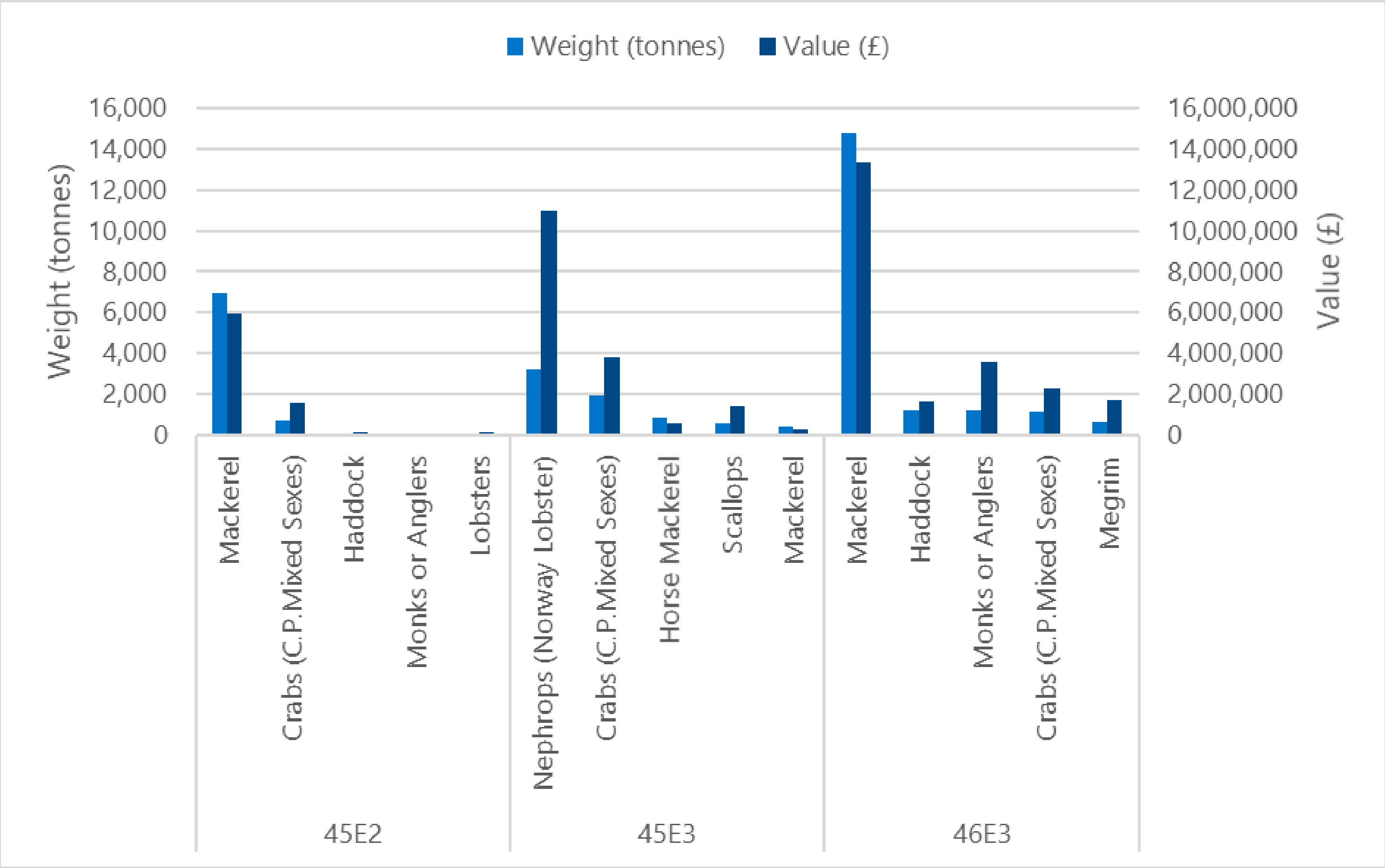


Figure 6.9-3 Annual average landings value of the top 5 most commercially fished species within the Commercial Fisheries Study Area (ICES 45E3, 45E2 and 46E3) between 2016-2020 (Source: Marine Directorate, 2020a)



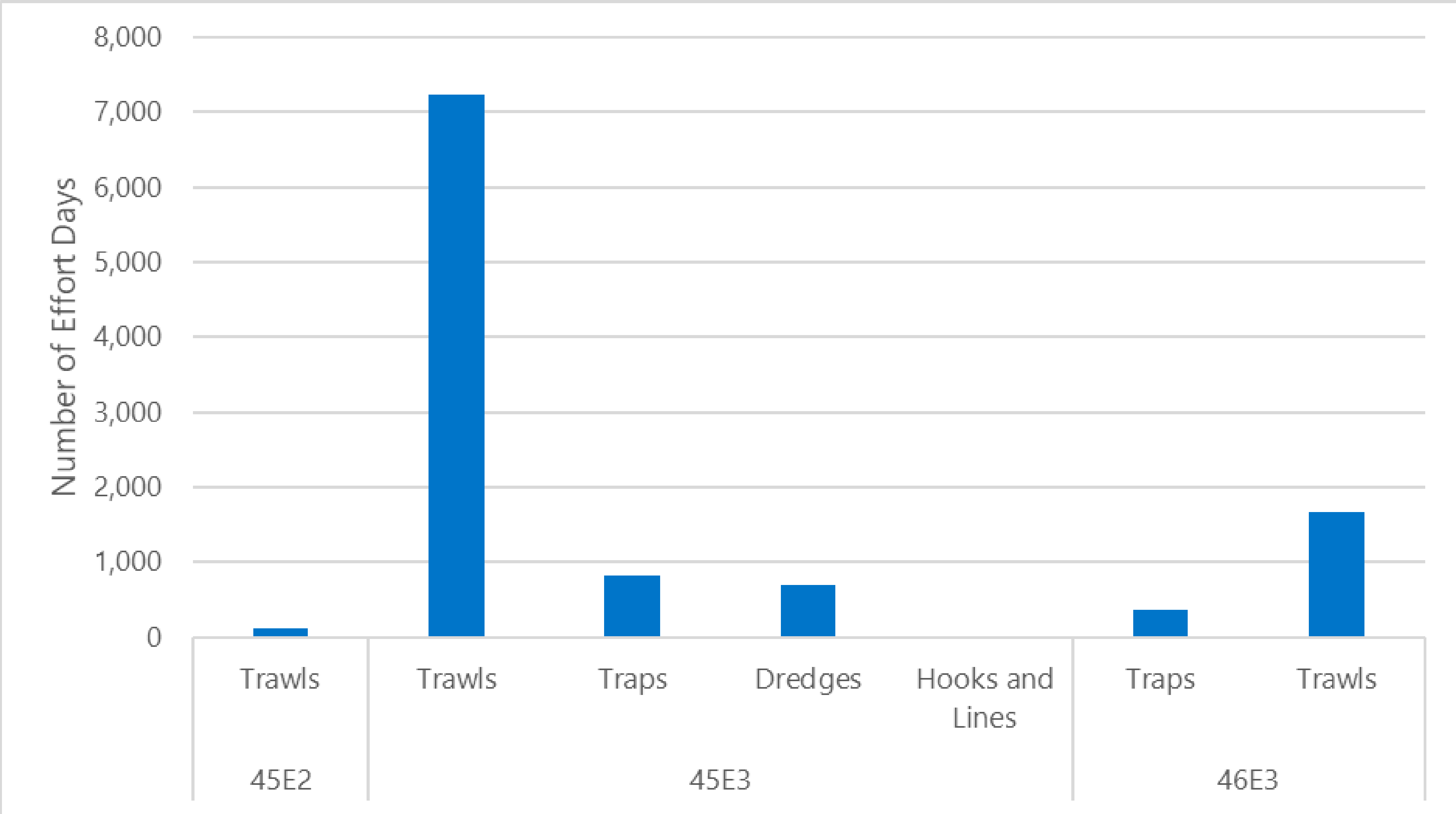
6.9.3.4 Effort by Fishing Method

Four fishing methods were reportedly used within the Commercial Fisheries Study Area (**Figure 6.9-4**) between 2016 and 2020 with trawling being the dominant method. Trawling accounted for most of the fishing effort within 45E3, with Nephrops being the key targeted species for that gear type, with an annual average total fishing effort days of 1,446 (82.6% of average annual effort). This effort is concentrated in the North Minch and does not take place within the Array Area and Offshore Cable Corridor Area of Search locations (**Figure 6.9-6**).

Traps are the dominant static gear fishery in the Commercial Fisheries Study Area for vessels over 10 m in length, with average annual effort accounting for 163 days (9.3%). This was closely followed by dredging, with an annual average of 139 days (7.9%). Hook and lines only accounted for an average of 4 days (0.2%) annually, while gill nets and drift nets, were not used within 45E3. It is important to note this data only included vessels over 10 m in length, and that these gear types are utilised by the local under 10 m fleet working within the nearshore areas of the Offshore Development Area of Search. Due to the exposed position of the Array Area and Offshore Cable Corridor Area of Search and fishing restrictions imposed under the Bragar to Dell protected area, these vessels are restricted to activity in the majority of the area between the 1st April and 31st October[20].

[20] The Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Outer Hebrides) Order 2017. Available online at: http://www.legislation.gov.uk/ssi/2017/48/made

Figure 6.9-4 Annual average fishing effort by gear type within the Commercial Fisheries Study Area (ICES Rectangles 45E3, 45E2 and 46E3) between 2016-2020 (Source: Marine Directorate, 2020b)



In addition to landings and effort data, VMS data on the type of fishing activity within the Commercial Fisheries Study Area have also been obtained **Figure 6.9-5** The data suggest that fishing intensity is highest within a southeastern section of ICES rectangle 45E3, located southeast of the Isle of Lewis, and across the North Minch. Relatively high levels of fishing intensity deploying bottom trawls are also observed within ICES rectangle 46E3, north of the Isle of Lewis, and beyond 12 NM. Relatively low levels of bottom trawl intensity by UK vessels are observed to overlap with the Array Area and Offshore Cable Corridor Area of Search (**Figure 6.9-5**and **Figure 6.9-6**).

The shellfish industry is of great local economic importance to commercial fishers within the Commercial Fisheries Study Area, particularly within ICES rectangle 45E3. **Figure 6.9-6** illustrates the average intensity (hours) of fishing for Nephrops and crustaceans by UK vessels deploying bottom otter trawls between 2010 and 2020. Although this data set is listed as being for Nephrops and crustaceans, there is no evidence of any other crustacean species being landed by this gear type. Such fishing intensity is observed at highest levels within a southeastern section of ICES rectangle 45E3, located southeast of the Isle of Lewis and across the North Minch (**Figure 6.9-6**). The Array Area and Offshore Cable Corridor Area of Search are mostly located with a northwestern section of ICES rectangle 45E3, northwest of the Isle of Lewis (<1% of the Array Area and Offshore Cable Corridor Area of Search is located in ICES rectangles 45E2 and 46E3). Within this area, fishing intensity for Nephrops and crustaceans by vessels deploying bottom otter trawls is not observed to overlap with the Array Area and Offshore Cable Corridor Area of Search. Other shellfish species landed in the Commercial Fisheries Study Area, targeted by the 8-10 m vessels are razor clam, velvet swimming crab and, to a lesser extent, crawfish and whelks (MMO, 2021).

With regard to the dredge fishery within the Commercial Fisheries Study Area, **Figure 6.9-7** illustrates the average fishing intensity (hours) by UK vessels deploying dredges. While areas of particular importance can be observed to the south of the Isle of Lewis, and in discreet areas within 3 NM to the west, no fishing intensity for UK vessels deploying dredges is observed to overlap with the Array Area and Offshore Cable Corridor Area of Search.

Between 2009 and 2013, pelagic trawling for mackerel in the Commercial Fisheries Study Area, by UK registered vessels over 15 m in length, shows that the highest relative intensity of activity occurs within ICES rectangle 46E3, to the north of the Array Area and Offshore Cable Corridor Area of Search (**Figure 6.9-8**). The data show low activity for pelagic trawling within rectangle 42E2 and the Array Area and Offshore Cable Corridor Area of Search (ICES rectangle 45E3).

Figure 6.9-5 VMS Data Showing Average Fishing Intensity (hours) of Fishing by UK Vessels Deploying Bottom Trawls Between 2010 To 2020 within the Commercial Fisheries Study Area (ICES, 2021)

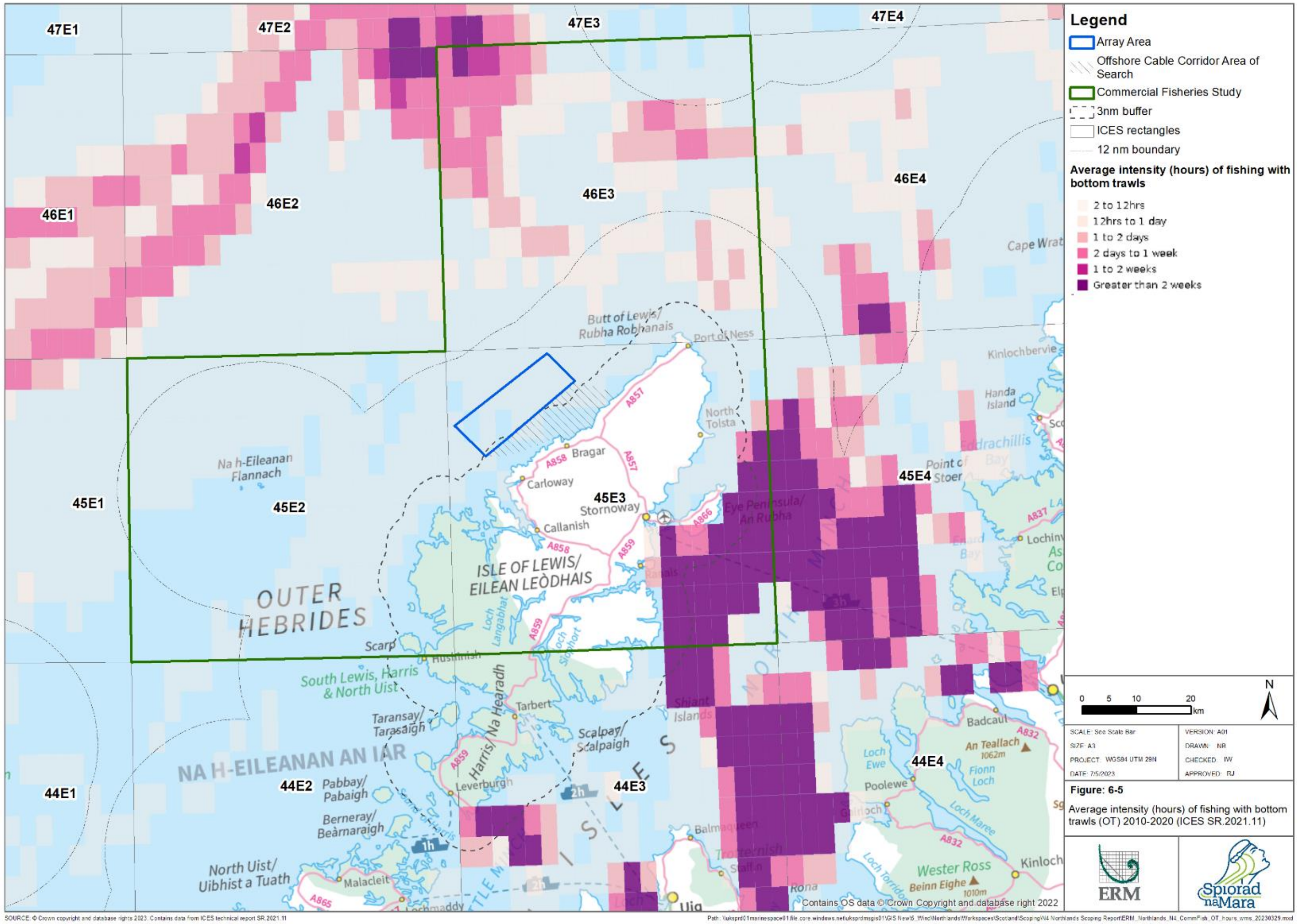


Figure 6.9-6 VMS Data Showing Average Fishing Intensity (hours) of Fishing for Nephrops and Crustaceans by UK Vessels Deploying Bottom Trawls within the Commercial Fisheries Study Area Between 2010 to 2020 (Marine Directorate, 2022)

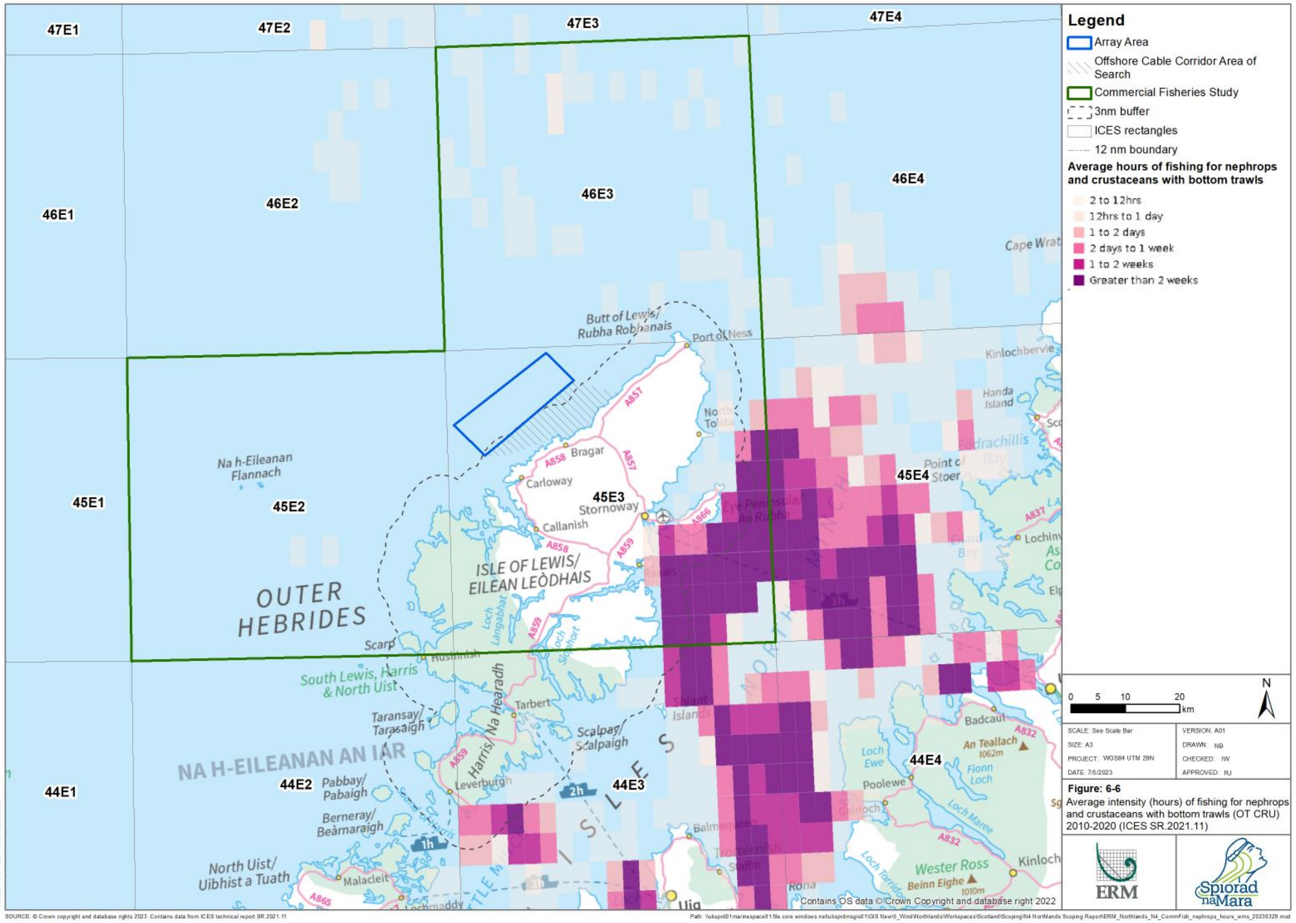


Figure 6.9-7 VMS Data Showing Average Fishing Intensity (hours) of Fishing by UK Vessels Deploying Dredges within the Commercial Fisheries Study Area Between 2010 to 2020 (Marine Directorate, 2022)

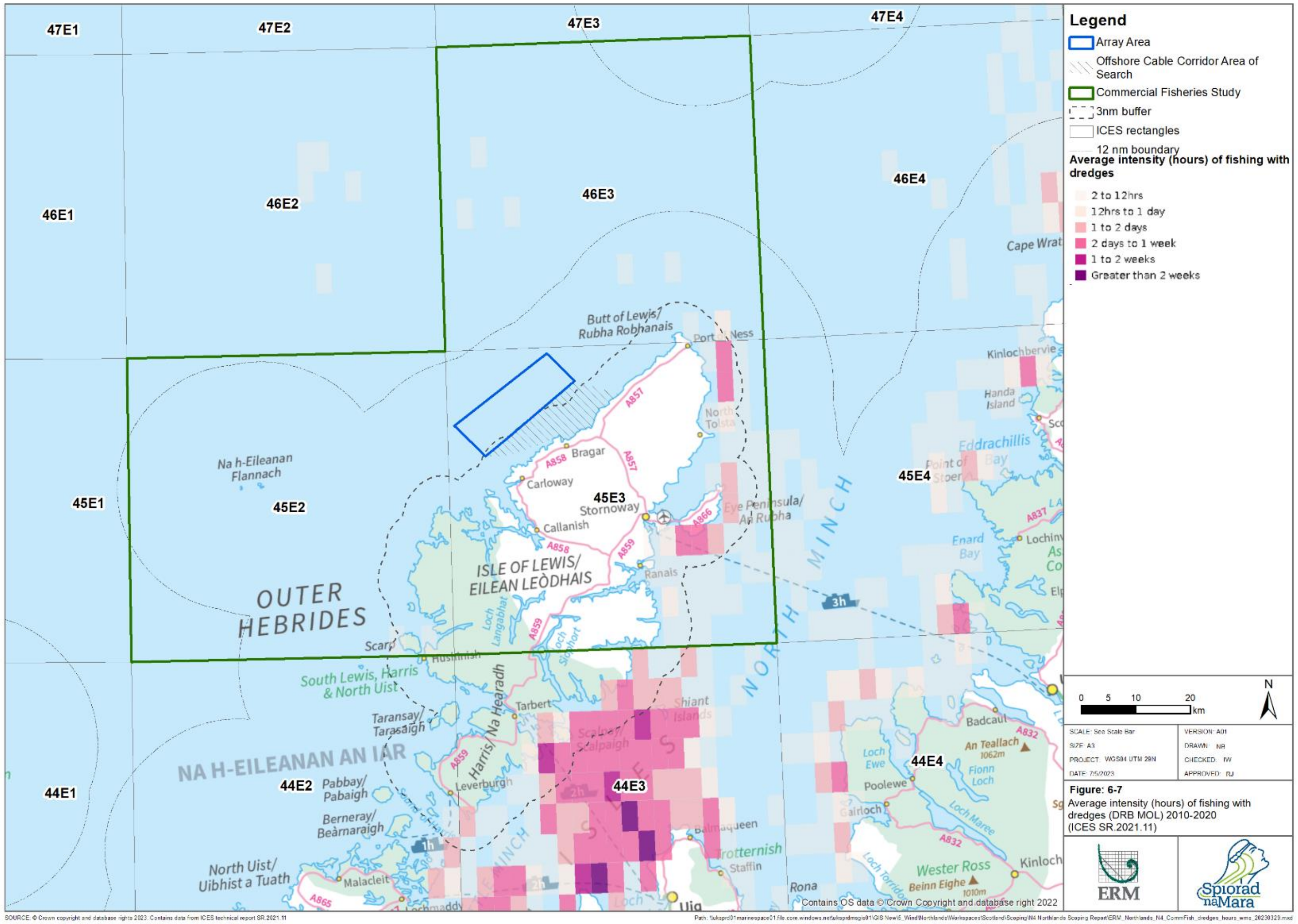
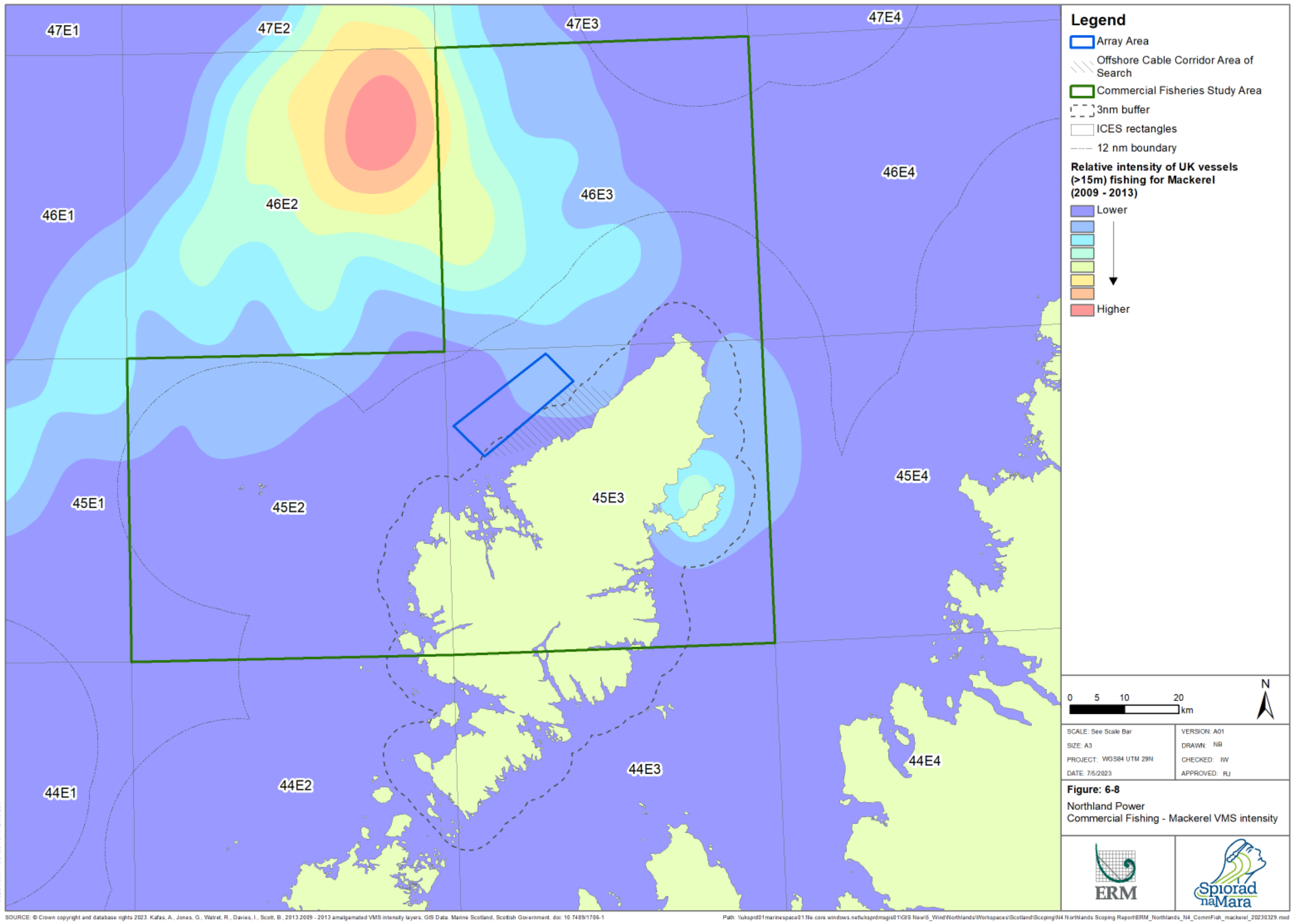
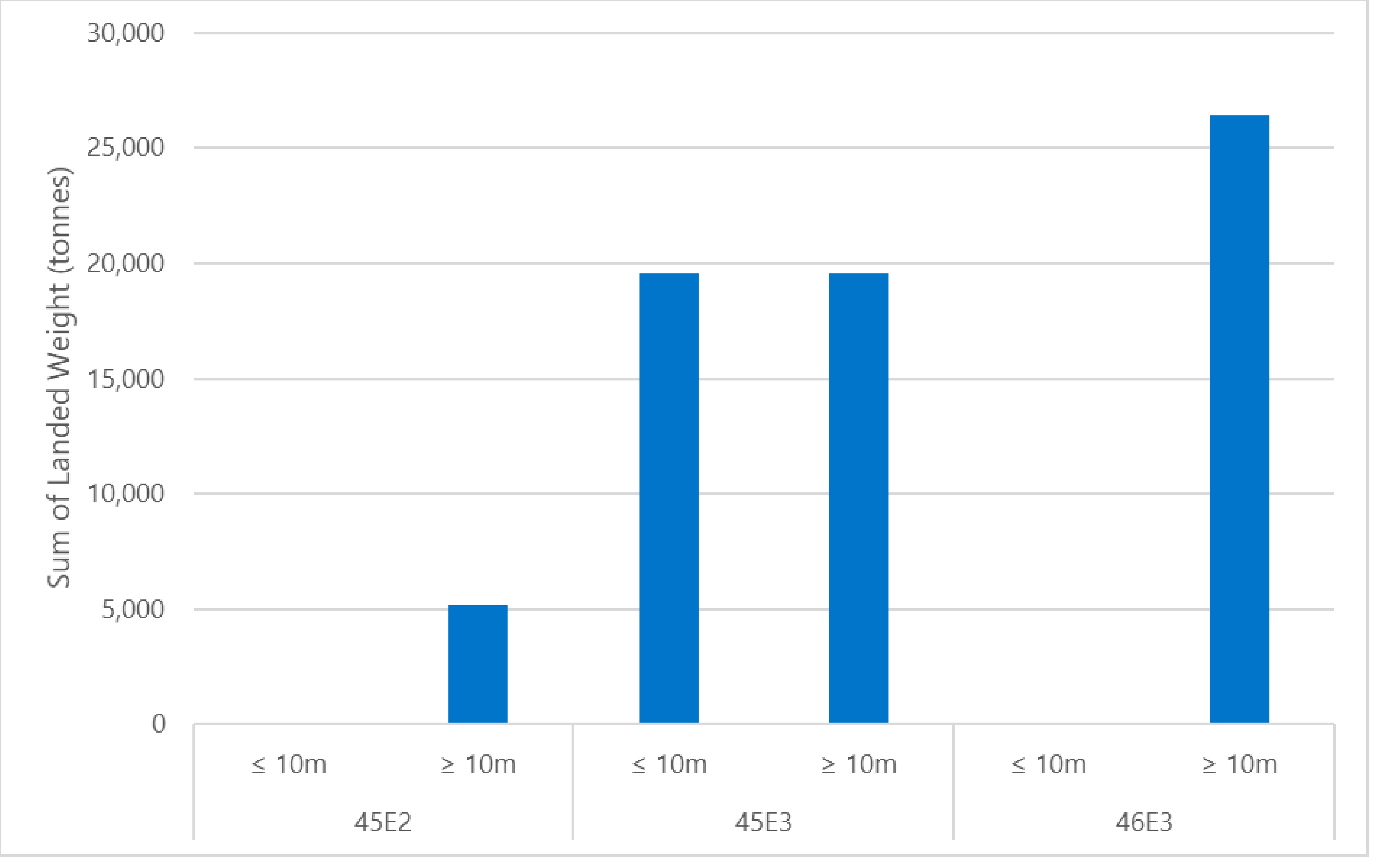


Figure 6.9-8 Amalgamated VMS and ICES Landings Data Showing an Indication of Pelagic Mackerel Fishing (relative intensity) by UK Vessels >15m within the Commercial Fisheries Study Area between 2009 to 2013 (Source: Kafas et al., 2013)



The Comhairle nan Eilean Siar (Comhairle nan Eilean Siar, 2017) reports the most significant change in the fleet composition of the Western Isles, over the past decade, has been the decline in the number of vessels in the 10-15 m category, which reflects the changing economics of the inshore fisheries sector. Decommissioning of larger vessels has resulted in retirements within the sector, and 'trading down' to smaller vessels with lower associated costs. Similarly, due to the high costs of fishing vessels and licences for quota species, incomers to the industry are mostly in the under 10 m sector. Vessels under 10 m are not required to submit their landing statistics; therefore they are likely to be underreported in the Marine Directorate (2020a) data, which show equal landings across both vessel size classes within ICES rectangle 45E3, and vessels greater than 10 m dominating landings within ICES rectangles 45E2 and 46E3 (**Figure 6.9-9**). At the time of writing, UK Government data for vessels under 10 m in length show 55 vessels with Stornoway registered as their home port. Only 4 of these are not registered with a shellfish licence (MMO, 2023).

Figure 6.9-9 Sum of landed weight by vessel size class within the Commercial Fisheries Study Area (ICES 45E3, 45E2 and 46E3) between 2016-2020 (Source: Marine Directorate, 2020a)



6.9.3.5 Salmon and Sea Trout

Scotland is divided into 41 statutory Salmon Fishery districts which include a catchment area, river or set of rivers. The Western Isles District Salmon Fisheries Board (WIDSFB) is the statutory body responsible for the management of salmon and sea trout in the Western Isles district, which includes the Isle of Lewis, Isle of Harris, Isle of North Uist, Isle of South Uist, Isle of Benbecula and Barra.

The Association of Salmon Fisheries Boards (ASFB), which represents the 41 District Salmon Fishery Boards (DSFB), and Marine Directorate, oversee and regulate the fishery. There are currently no commercial fisheries activities for salmon and sea trout permissible within UK waters.

6.9.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Commercial Fisheries assessment, which has been incorporated into the design of the Project (**Table 6.9-2**).

Table 6.9-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.16	Consultation via implementation of an Offshore Fisheries Liaison Officer (OFLO), Company Fisheries Liaison Officer (CFLO) and Fishing Industry Representative (FIR)	To mitigate data gaps, consultation with local, regional and national fishing organisations, as well as individual fishers will be undertaken. Engagement with the fishing community will be established via implementation of an OFLO, CFLO and FIR.
6.17	Promulgation of information	Timely promulgation of information via Notices to Mariners (NtM), Notice to Fishermen (NtF) and marking on nautical charts.
6.18	Advisory safety distances	Standard industry practice and protocols will be adhered to, including application for safety zones during construction and major maintenance activities and implementation of advisory clearance distances from vessels working on the Project.

6.9.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

Potential likely significant effects on Commercial Fisheries have been identified which may occur during the construction, operation (including maintenance), and decommissioning phases of the Project. These impacts are outlined in **Table 6.9-3.**

Table 6.9-3 EIA Scoping Assessment for Commercial Fisheries

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Adverse effects on commercial fish and shellfish populations	6.16	In	Increased underwater noise, and increased anthropogenic activity disturbing mobile species, and potential direct damage to sessile species.	Desktop assessment of commercially fished species using landings data and impacts to fish and shellfish species identified within Chapter 6.5: Fish and Shellfish Ecology.
Temporary or complete loss, or restricted access to, traditional fishing grounds	6.16, 6.17	In	Implementation of approved Safety zones and advisory clearance distances will need to be complied with to meet health and safety requirements.	Desktop assessment of the fisheries using landings and mapped effort data and consultation with fishermen, further supplemented with VMS and Automatic Identification System (AISy) data sources.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Displacement of fishing vessels into other areas	6.16, 6.17	In	Safety zones and advisory clearance distances will need to be implemented, potentially displacing fishers into other areas.	Desktop assessment of the fisheries using landings and mapped effort data and consultation with fishermen, further supplemented with VMS and AISy data sources.
Increased steaming times to fishing grounds	6.16, 6.17	In	Approved Safety zones and advisory clearance distances will need to be implemented, potentially preventing routes to preferred fishing grounds.	Vessel traffic surveys identified in Chapter 6.10: Shipping and Navigation and consultation with fishermen will be used to assess the Project impact on vessel traffic.
Safety issues for fishing vessels	6.18	In	Potential for gear snagging can cause vessel capsize, and financial loss to fishermen.	Consultation with fishermen, and analysis of gear types used within the area, will be used to assess the potential for safety issues.
Potential cumulative impacts	6.16, 6.17, 6.18	In	A number of other offshore developments are proposed which pose the potential for cumulative effects to arise.	Consultation with other offshore developments, and fisheries liaison, will be incorporated to avoid and mitigate potential cumulative effects.
Operation and Maintenance				
Physical presence of infrastructure on the seabed post construction	6.16, 6.17, 6.18	In	Potential accidental damage or snagging during trawling activities poses risks to fishers.	Consultation with fishermen, and analysis of gear types and fishing methods used within the area, will be used to assess the potential for gear snagging.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Adverse effects on commercial fish and shellfish populations	6.16	In	Loss of habitat, electromagnetic fields (EMF) in the marine environment, and increased anthropogenic activity disturbing mobile species, and potential direct damage to sessile species.	Desktop assessment of commercially fished species using landings data and impacts to fish and shellfish species identified within Chapter 6.5: Fish and Shellfish Ecology.
Temporary or complete loss, or restricted access to, traditional fishing grounds	6.16, 6.17	In	Accessibility within the Array Area may be dependent on gear type used. Foundation type, infrastructure spacing and orientation may restrict access of commercial fishing fleets and affect the ability to deploy mobile gear.	Desktop assessment of the fisheries using landings and mapped effort data and consultation with fishermen, further supplemented with VMS and Automatic Identification System (AISy) data sources.
Displacement of fishing vessels into other areas	6.16, 6.17	In	Potential for reduced access to fishing grounds creating possible displacement of fishing activities.	Desktop assessment of the fisheries using landings and mapped effort data and consultation with fishermen, further supplemented with VMS and AISy data sources.
Increased steaming times to fishing grounds	6.16, 6.17	**Out**	Localised safety zones associated with maintenance activities are likely to cause minimal deviations to steaming routes. As minimal impact on steaming times is anticipated the impact has been scoped out of the EIA.	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Accidental damage, including to subsea cables	6.18	In	Potential accidental damage to subsea cable during trawling activities.	Consultation with fishermen, and analysis of gear types used within the area, will be used to assess the potential for damage to Project infrastructure.
Potential cumulative impacts	6.16, 6.17, 6.18	In	A number of other offshore developments are proposed which pose the potential for cumulative effects to arise.	Consultation with other offshore developments, and fisheries liaison, will be incorporated to avoid and mitigate potential cumulative effects.

6.9.6 Proposed Approach to EIA

6.9.6.1 Relevant Data Sources

Baseline data sources highlighted in section 6.9.3.1 will be reviewed, and the latest available versions shall be compiled for analysis and interpretation in order to assess landings and effort statistics across the Commercial Fisheries Study Area.

6.9.6.2 Consultation

In addition to the desk-based review, consultation will also be conducted with relevant commercial fisheries stakeholders. This is of particular importance, as smaller vessels are typically under-represented in commercial fisheries datasets. Therefore, this targeted consultation will be key to developing a full understanding of the actual level, type, and distribution of fishing activity in, and around, the Offshore Development Area of Search. **Table 6.9-4** identifies a preliminary list of relevant stakeholder groups.

Table 6.9-4 Preliminary list of consultees

Consultee	Description
The Outer Hebrides Regional Inshore Fisheries Group (RIFG)	Part of the Scottish RIFG network, which aims to improve management of the 0–12 NM fishing zone.
Marine Directorate (MS)	Department of Scottish Government responsible for managing Scotland’s marine environment.
Mallaig and Northwest Fishermen’s Association (MNWFA)	Area Fishermen's Association, with headquarters in Inverness.
Local Fishing Skippers	To be identified by the Project FIR, commercial fisheries associations, and organisations.
Scottish Fishermen's Organisation (SFO)	A Scottish Fish Producer Organisation
Scottish Pelagic Fishermen’s Association Ltd (SPFA)	Association with membership of predominantly large pelagic mackerel vessels.
Scottish Fishermen’s Federation (SFF)	Federation of Scottish fishermen representing >400 vessels from all sectors.
Comhairle nan Eilean Siar	Local Government council for the Outer Hebrides area of Scotland, based in Stornoway, Isle of Lewis
Scottish White Fish Producers Association Ltd (SWFPA)	Association with a diverse membership, representing a wide range of vessels and gear types.
Scottish Seafood Association (SSA)	Association of seafood processors and members of other Scottish seafood bodies.
Seafish	Public body supporting the UK seafood sector.

Consultee	Description
Scottish Creel Fishermen's Federation	North Minch Shellfish Association representative at national level
The Western Isles District Salmon Fisheries Board	Statutory body responsible for the management of salmon and sea trout in the Western Isles district.

6.9.6.3 Policy, Legislation and Guidance

All relevant policy, legislation and guidance will be collated and used to inform the Commercial Fisheries EIA process, including:

Table 6.9-5 Legislation, Policy and Guidance Relevant to the Commercial Fisheries assessment

Relevant Legislation and Policy
Guidance notes for Environmental Impact Assessment In respect of FEPA and CPA requirements (CEFAS, 2004)
Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (Poseidon Aquatic Resource Management Ltd. and Seafish, 2012)
FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW, 2014)
Options and opportunities for marine fisheries mitigation associated with windfarms (Blyth-Skyrme, 2010)

6.9.6.4 Assessment Methodology

The EIA methodology for Commercial Fisheries will follow that outlined in Chapter 4: Proposed Approach to EIA, i.e. receptors (fishing activity types) will be identified and their sensitivity determined; magnitude of impact will be assessed; and the significance of any impact will be concluded. If significant residual impacts remain, then specific mitigation and monitoring may be proposed.

With respect to the identification of key receptor groups, this will be done via consultation with key Commercial Fisheries stakeholders, to ensure the most appropriate groups are assessed. As an example, for previous projects, the following receptor groups have been used within the assessment process: nearshore (<10 m) static gear vessels; offshore (>15 m) static gear vessels; Isle of Man registered scallop vessels; Belgium beam trawlers.

This approach ensures that the potential likely significant effects of any proposed project, which may differ for different fishing vessel types/sizes, is robustly assessed.

The approach to assessing potential cumulative and transboundary impacts is also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will also apply to Commercial Fisheries.

In summary, the following approach to the Commercial Fisheries assessment will be undertaken:

- Review of existing relevant data and information and consultation with fisheries stakeholders;
- Acquisition of additional project-specific data to fill any gaps;
- Formulation of a conceptual understanding of receiving environment conditions;
- Consultation and agreement with the fisheries stakeholders regarding proposed assessment approaches (including identification of most relevant receptor groups);
- Determination of the potential Project Design Envelope;
- Assessment of effects using data analysis, stakeholder feedback, and expert-based judgements by the EIA Team.

6.9.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to commercial fisheries include:

1. Do you agree that the data sources identified are sufficient to inform the Commercial Fisheries baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all Commercial Fisheries receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Commercial Fisheries?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Project on Commercial Fisheries receptors?
5. Are there any additional stakeholders who should be consulted?

6.9.8 References

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Scotland Marine Assessment 2020, Pelagic – Mackerel 2009-2013 amalgamated VMS intensity layer. Available online at: https://marine.gov.scot/sma/maps/775 [Accessed 12/06/2023].

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Comhairle nan Eilean Siar, 2017. Aquaculture and Fisheries. Available online at: https://www.cne-siar.gov.uk/strategy-performance-and-research/outer-hebrides-factfile/economy/aquaculture-and-fisheries/ [Accessed 12/07/2023].

The Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Outer Hebrides) Order 2017 Available online at: The Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Outer Hebrides) Order 2017 (legislation.gov.uk) [Accessed 18/07/2023].

6.10 Shipping and Navigation

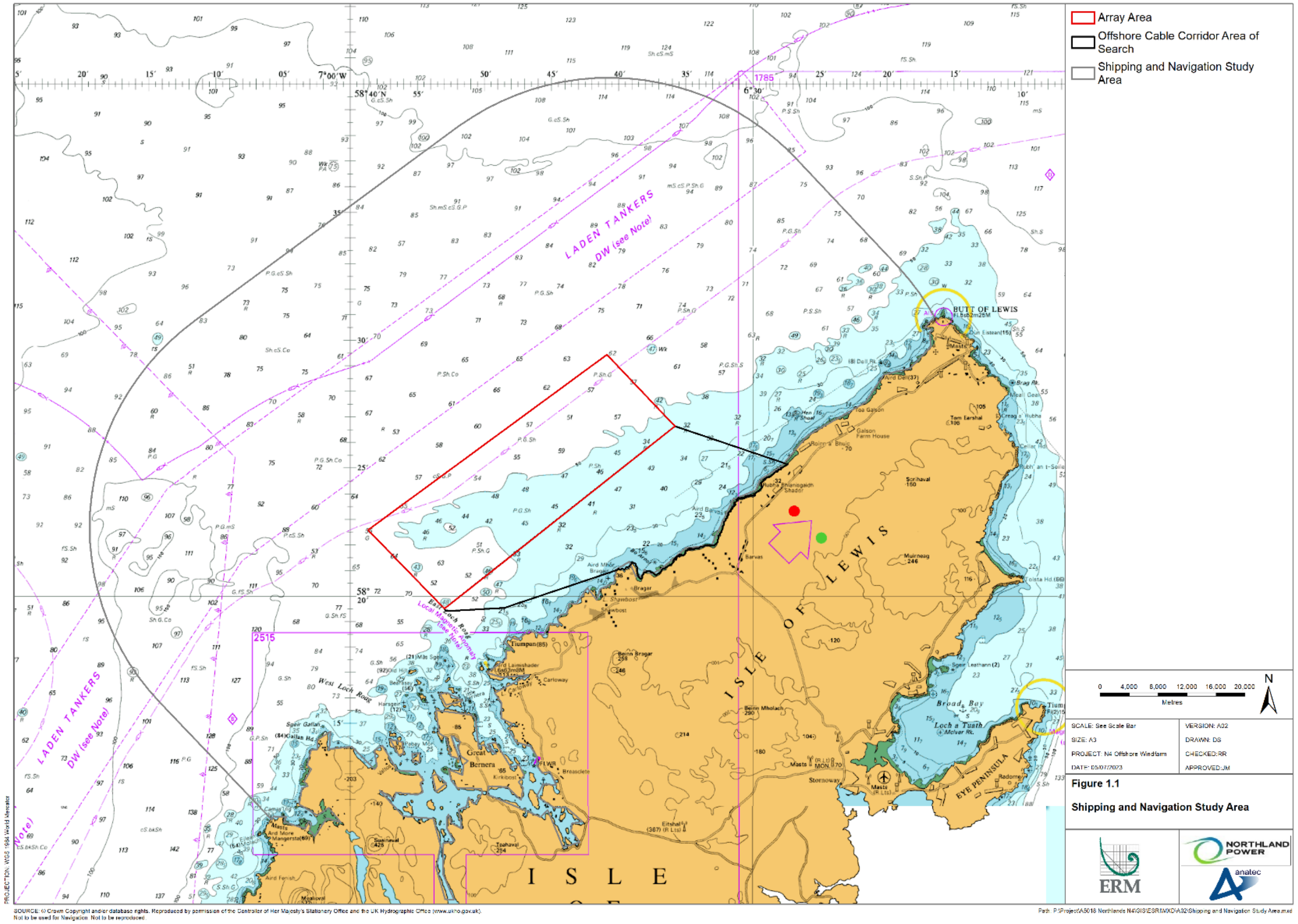
6.10.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Shipping and Navigation within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

6.10.2 Study Area

The Shipping and Navigation Study Area has been defined as a minimum 10 nautical mile (NM) buffer around the Array Area. This Shipping and Navigation Study Area is standard for marine navigation assessments as it is considered to be large enough to capture all relevant features and vessel routeing which may be impacted, all while still remaining site specific to the Project being studied. It should be considered that the 10 NM buffer is based on the N4 plan option and as such extends beyond 10 NM from certain boundaries of the Array Area. **Figure 6.10-1** presents the Shipping and Navigation Study Area along with the Array Area and Offshore Cable Corridor Area of Search which is encompassed within the Shipping and Navigation Study Area.

Figure 6.10-1 Shipping and Navigation Study Area



6.10.3 Baseline Environment

6.10.3.1 Data Sources

The data sources that have been used to inform this Shipping and Navigation Chapter of the Scoping Report are presented within **Table 6.10-1.** These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside any additional site-specific data that is collected for the Project.

Table 6.10-1 Summary of key publicly available datasets for Shipping and Navigation

Source	Spatial Coverage	Year	Summary
Automatic Identification System (AISy) Vessel Traffic	Shipping and Navigation Study Area	2022	14 days of AISy data collected from satellite receivers during 01-14 July 2022 (summer data period).
AISy Vessel Traffic	Shipping and Navigation Study Area	2022	14 days of AISy data collected from satellite receivers during 01-14 December 2022 (winter data period).
United Kingdom Hydrographic Office (UKHO) Admiralty charts 2720 and 2721	International dataset providing coverage throughout the Hebrides	2022	Admiralty charts and historic mapping relevant to the defined Shipping and Navigation Study Area.
UKHO Admiralty Sailing Directions - NP66 (UKHO, 2011)	International dataset providing coverage throughout the Hebrides	2011	Pilot book with information on the surrounding area.

Vessel data was analysed for any vessels associated with temporary operations and deemed non-routine. It is normal to remove such vessels from the Shipping and Navigation analysis to ensure that the focus of the assessment is on permanent traffic within the surrounding area but as no vessel traffic was deemed to be temporary from the 2 x 14 day data sets, no traffic was removed from the analysis.

The AISy data considered within this Scoping Chapter provides coverage of the Shipping and Navigation Study Area and is considered to provide sufficient detail of vessel traffic movements at this stage. However, AISy carriage and broadcast is not compulsory for certain vessels as set out by Regulation 19 of the International Convention for the Safety of Life at Sea (SOLAS) Chapter V which sets out navigational equipment to be carried out on board vessels, according to vessel type.

The regulation requires AISy to be fitted aboard all vessels of 300 Gross Tonnage (GT) and upwards, engaged on international voyages, cargo vessels of 500 GT and upwards, not engaged on international voyages and passenger vessels irrespective of size, built on or after 1 July 2002. It also applies to vessels engaged on international voyages, constructed before 1 July 2002, according to the following timetable:

- Passenger vessels, not later than 1 July 2003;
- Tankers, not later than the first survey for safety equipment on or after 1 July 2003;
- Vessels, other than passenger vessels and tankers, of 50,000 GT and upwards, not later than 1 July 2004.

AISy carriage and broadcast is not compulsory for fishing vessels of less than 15 metres (m), or recreational vessels. Fishing vessels of 15 m length and over are required to carry Class A AISy and the recreational vessels within this report include sailing and motor craft of between 2.4 m and 24 m length, with any such vessels over 24 m or carrying more than 12 passengers classified as passenger vessels. It should therefore be considered that such traffic is likely to be underrepresented within the assessment undertaken for this scoping exercise; however, it is noted that smaller vessels are increasingly observed to utilise AISy voluntarily given the associated safety benefits.

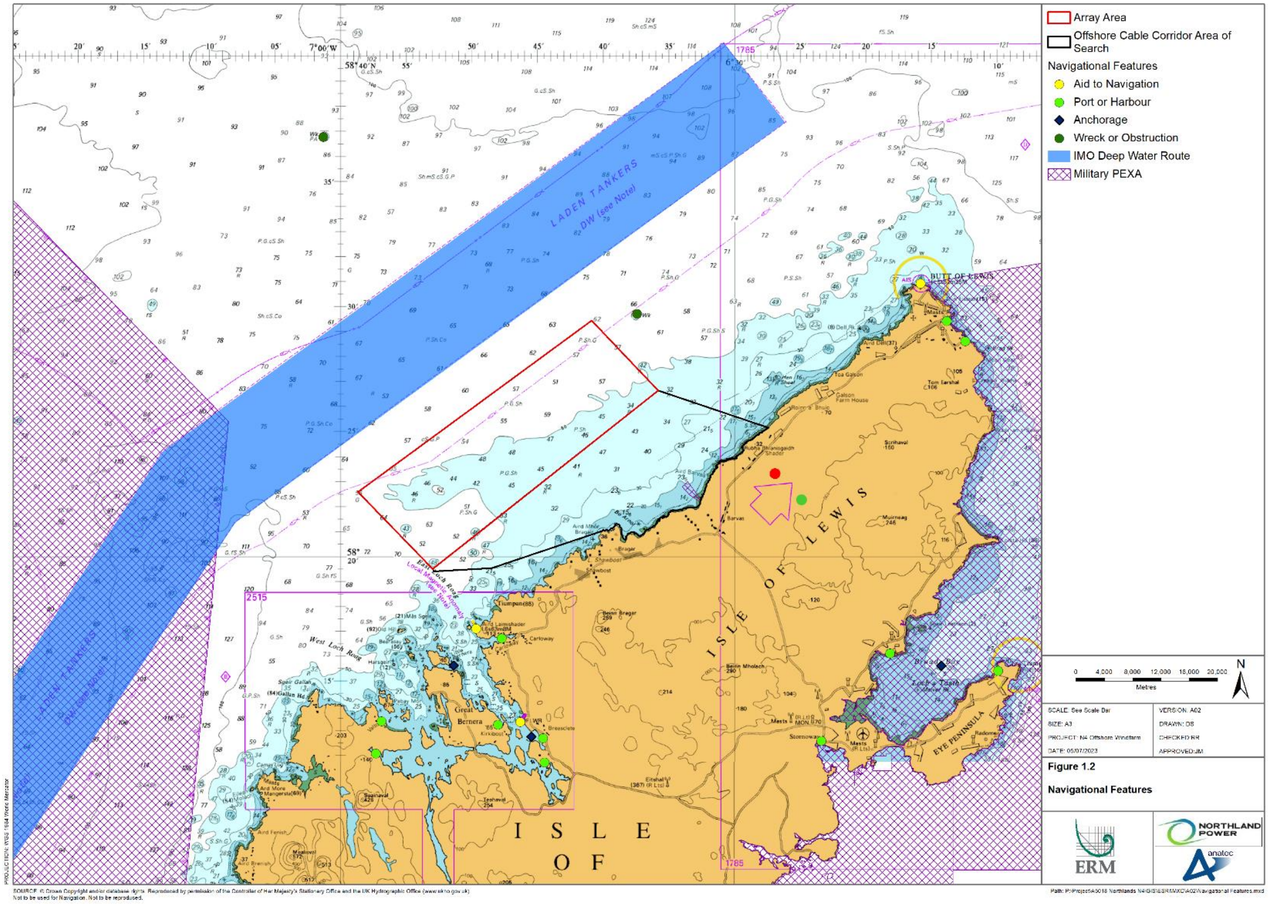
On this basis, the available data are considered as fit for purpose for providing the high-level baseline assessment presented in this scoping exercise.

6.10.3.2 Overview of Baseline Environment

Navigational Features

This section presents the baseline environment for navigational features, which have been identified via a review of Admiralty Charts and UKHO Admiralty Sailing Directions as per section 6.10.3.1. An overview of navigational features deemed relevant to the Shipping and Navigation Study Area are shown in **Figure 6.10-2.**

Figure 6.10-2 Navigational Features



There are 3 charted Aids to Navigation (AtoN) on the northwest coast of the Isle of Lewis as can be seen from **Figure 6.10-2**. The closest AtoN to the Array Area is situated at Aird Laimishader lighthouse, approximately 3 NM south at the mouth of East Loch Roag. The other AtoN are situated on the Butt of Lewis lighthouse, approximately 11 NM to the northeast of the Array Area and on Tidal Rock, approximately 7 NM south within East Loch Roag.

Several small fishing and recreational harbours are located along the coastline within proximity to the Project with the closest to the Array Area being Carloway Harbour and Pier, approximately 4 NM to the south. Carloway Harbour is mainly used by local fishing vessels and small leisure craft. The closest commercial port or harbour is Stornoway Harbour, on the east coast of the Isle of Lewis, which is the main port of the Outer Hebrides for commercial and leisure vessels (Stornoway Port Authority, 2022).

An International Maritime Organization (IMO) Deep Water Route (DWR) is positioned between the Isle of Lewis and the Flannan Islands and runs from Cape Wrath to Skerryvore. It is recommended that laden tankers of 10,000 GT and over use this route which at no point is shallower than 34 m. Use of this DWR is weather permitting but functions to avoid vessels transiting through the restricted waters of the Minches to the east of the Isle of Lewis. The DWR is approximately 2 NM from the Array Area at all points of its northern boundary.

There are 2 charted anchorage points within the surrounding area, 1 north of Callanish in Breasclete Bay, and the other situated in Kyles Little Bernera between Little and Great Bernera. Both anchorage points are recommended for small vessels and both, although sheltered, are weather permitting.

To the west of the Array Area is a Ministry of Defence (MoD) Practice and Exercise Area (PEXA). This area is the firing practice area D701F and is situated approximately 5 NM from the Array Area. There are no restrictions in place on the right to transit within the area as it is only operational when the area is considered to be clear of all shipping.

There is 1 charted[21] wreck approximately 1 NM to the northeast of the Array Area, no wrecks or obstructions were charted within the Array Area itself.

There are no subsea pipelines or cables within proximity to the Project or any foul or spoil grounds.

[21] It is noted not all wrecks are charted, although all those considered a danger to the safety of navigation (and therefore relevant to Shipping and Navigation) are charted.

Vessel Traffic

The vessel traffic data collected during the summer and winter data periods (see section 6.10.3.1) are presented in **Figure 6.10-3** and **Figure 6.10-4** respectively.

Figure 6.10-3 14 Day Vessel Traffic Data by Vessel Type (Summer 2022)

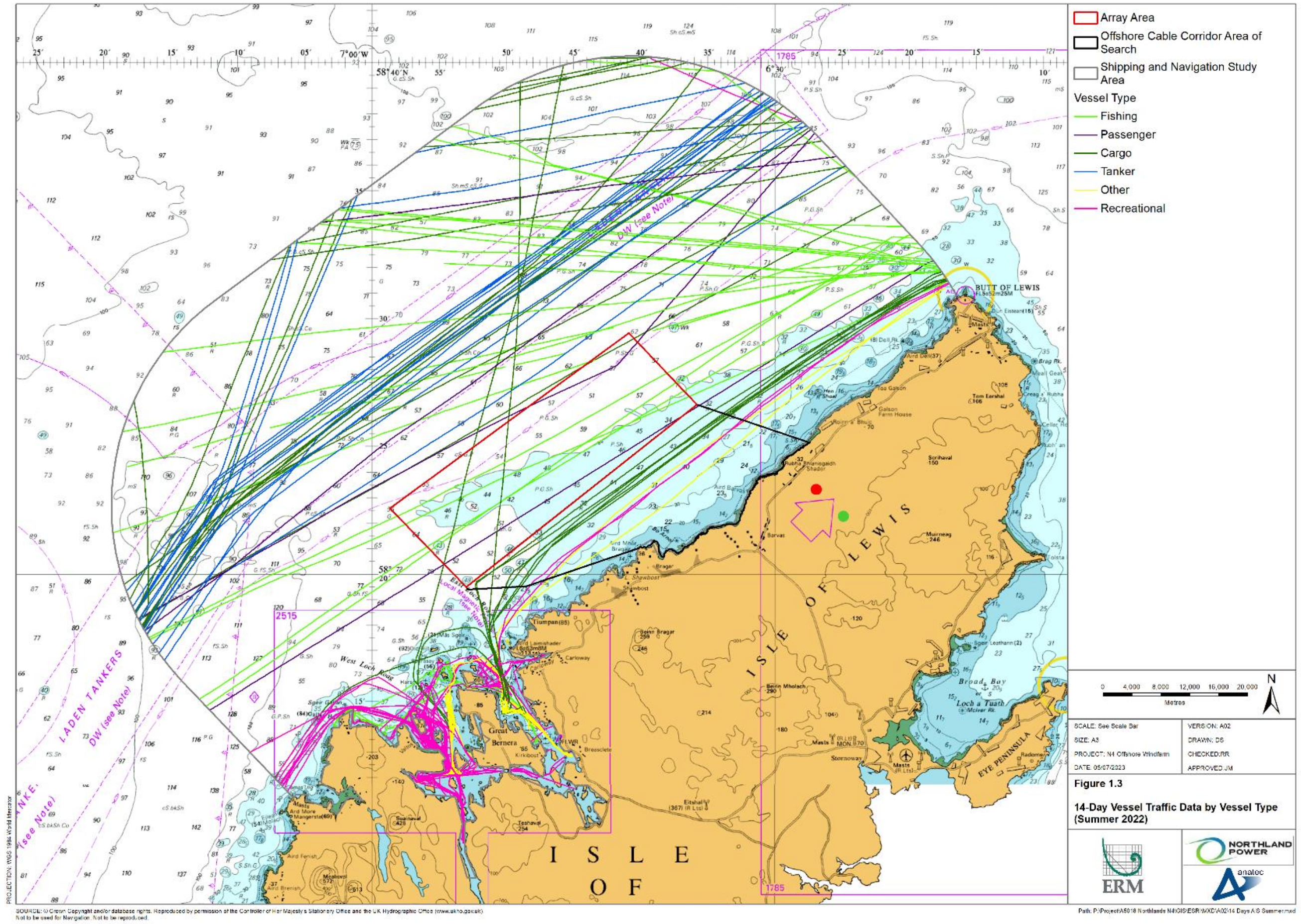
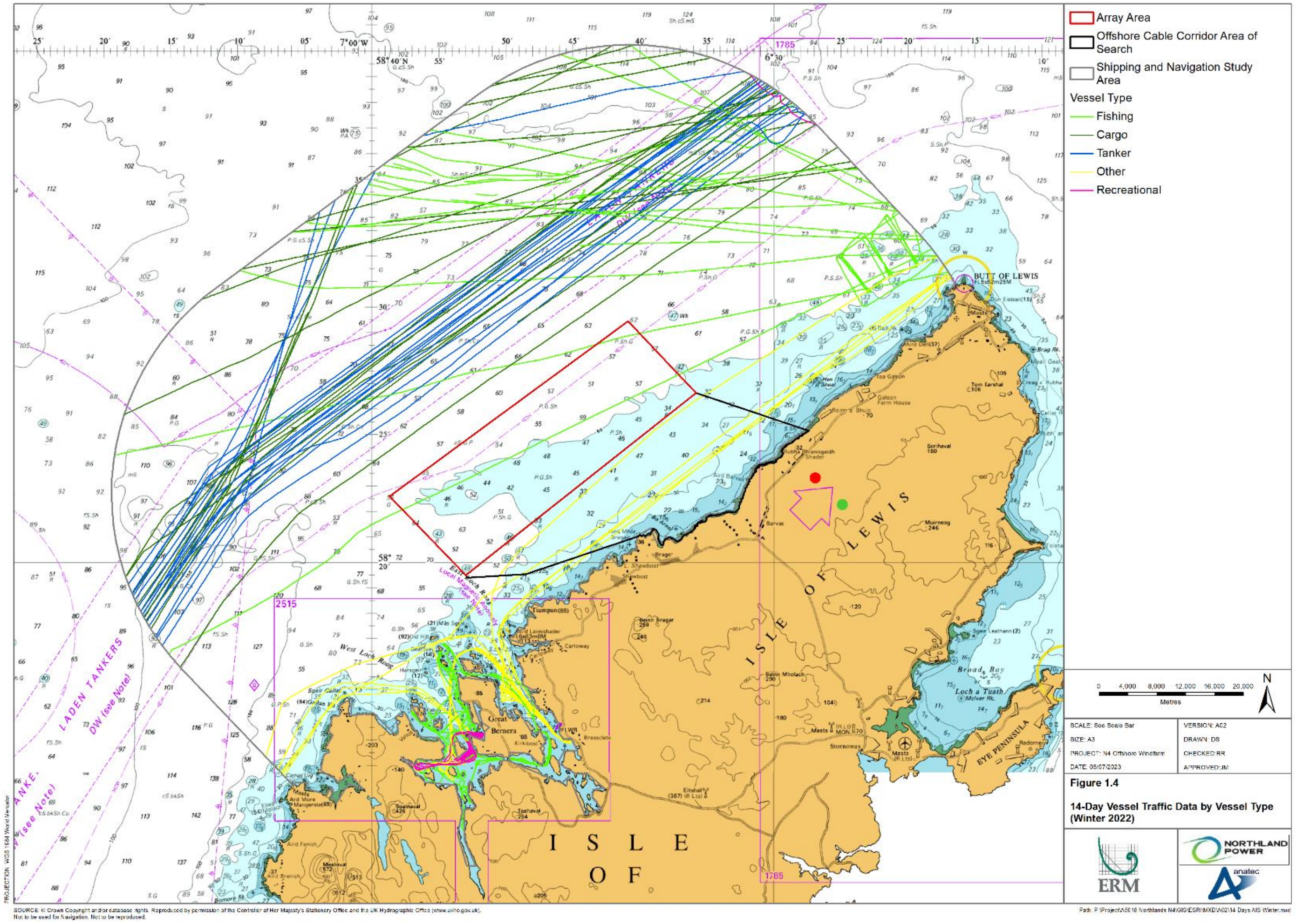


Figure 6.10-4 14 Day Vessel Traffic Data by Vessel Type (Winter 2022)



During the summer data period, an average of 10 unique vessels were recorded within the Shipping and Navigation Study Area per day with an average of 1 unique vessel per day intersecting the Array Area.

During the winter period, an average of 7 unique vessels were recorded during the winter period with an average of 0-1 unique vessel per day intersecting the Array Area. This difference in vessel numbers per day between data periods is a result of the higher volume of recreational vessels present during the summer period.

Commercial traffic, cargo vessels and tankers, were noted on defined routes within the Shipping and Navigation Study Area throughout the summer and winter data periods. Details of these routes include:

- The busiest and most defined route comprised tankers and cargo vessels transiting over the north of the Isle of Lewis, while following the west coast, and using the DWR north of the Array Area during both data periods;
- Vessels transiting to/from the north were also recorded utilising the DWR with vessels either joining or leaving the DWR to the west of the Array Area before the designated route heads northeast during both data periods;
- Cargo vessels were noted transiting east to west at the north of the Shipping and Navigation Study Area during both data periods;
- Cargo vessels (general and bulk) were also recorded transiting further inland during the summer data period passing to the south of the Array Area heading to aquaculture sites within Loch Roag.

No commercial vessels were noted transiting any further inland than the DWR limits during the winter data period. As for passenger vessels, only 4 unique vessels were noted during the summer data period with 2 vessels passing through the Array Area. Of these vessels, 1 was a cruise liner with a Length Overall (LOA) of 139 m heading for Stornoway (United Kingdom (UK)) and the other a private yacht.

Fishing vessels were noted mainly in transit within the Shipping and Navigation Study Area with some vessels engaged in likely fishing activity during the winter data period. Those vessels engaged in likely fishing activity were noted to the eastern extremities of the Shipping and Navigation Study Area as well as within Loch Roag. All vessels engaged in likely fishing activity were potters. Fishing vessels on transit were recorded transiting over the Butt of Lewis mainly to/from the west and southwest with some vessels transiting through the Array Area.

Recreational vessels were recorded during both data periods with substantially higher numbers noted during the summer data period. The majority of these vessels were involved in local recreational island and wildlife tours in Loch Roag and the surrounding coastline, all operating from Miavaig in Uig. During the winter data period, vessels were generally between Miavaig and Great Bernera whereas during summer, vessels were noted all over the Loch and also transiting south following the main coastline. Recreational vessels noted to the north of the Loch and immediately south of the Array Area were all sailing vessels. A single sailing vessel was also noted intersecting the northeast of the Shipping and Navigation Study Area during both the summer and winter data periods. No recreational vessels intersected the Array Area. It is also noted that on occasions rig moves take place along the west coast of the island this involves a non-propelled semi-submersible rig or jack up rig being towed to/from a location by a tug(s) or anchor handler(s).

6.10.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Shipping and Navigation assessment, which has been incorporated into the design of the Project (**Table 6.10-2**).

Table 6.10-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.19	Project as a whole	Compliance with Marine Guidance Note (MGN) 654 and its annexes (particularly Search and Rescue (SAR) annex 5 (MCA, 2021c) and completion of a SAR checklist).
6.20	All Project infrastructure inclusive of surface piercing structures and subsea cables	Appropriate marking on UKHO Admiralty Charts.
6.21	Project vessels and surface piercing structures	Promulgation of information for vessel routes, timings and locations, safety zones (around surface piercing infrastructure) and advisory passing distances as required via Notices to Mariners and Kingfisher bulletins.
6.22	Array Area	Construction buoyage in agreement with Northern Lighthouse Board (NLB).
6.23	Surface piercing structures	Application for safety zones of up to 500 m during construction and periods of major maintenance, and up to 50 m during operation (subject to risk-based justification being carried out).
6.24	Project vessels	Marine coordination and communication to manage project vessel movements.
6.25	Subsea cables	Suitable implementation and monitoring of cable protection in line with MGN 654 (via burial, or external protection where adequate burial depth as identified via risk assessment is not feasible).
6.26	Array Area	Marking and lighting of the site in agreement with NLB and as per the requirements of International Association of Lighthouse Authorities (IALA) Recommendation O-139 (IALA, 2021a) and Guidance G1162 (IALA, 2021b).
6.27	Project vessels	Compliance of all Project vessels with international marine regulations as adopted by the Flag State, notably the International Regulations for

ID	Parameter	Mitigation Measures Embedded into the Project Design
		Preventing Collisions at Sea (COLREGs) (IMO, 1974) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974).
6.28	Project as a whole	Production of a Marine Pollution Contingency Plan.
6.29	Wind turbines	Blade clearance of at least 22 m above sea level.

6.10.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.10.5.1 Likely Significant Effects

Potential likely significant effects on Shipping and Navigation have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 6.10-3.**

Table 6.10-3 EIA Scoping Assessment for Shipping and Navigation

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Vessel displacement due to construction activities	6.19, 6.20, 6.21, 6.22, 6.24, 6.26	In	Vessels may be displaced from their existing routes due to construction activities associated with the Project. AISy data shows a number of routes currently passing through the Project.	Desk Study Stakeholder Consultation Hazard Workshop COLLRISK Model
Vessel to vessel collision between a third party vessel and a project vessel	6.19, 6.21, 6.22, 6.23, 6.24, 6.27, 6.28	In	The presence of project vessels during construction may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third party and project vessels.	Desk Study Stakeholder Consultation Hazard Workshop
Increased vessel to vessel collision risk between third party vessels due to vessel displacement	6.19, 6.20, 6.21, 6.22, 6.26	In	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in encounters and collision risk between third party vessels.	Desk Study Stakeholder Consultation Hazard Workshop COLLRISK Model
Reduced access to local ports, harbours and facilities due to construction activities associated with the Project	6.19, 6.20, 6.21, 6.22, 6.24, 6.29	In	Access to local ports, harbours and facilities may be impacted due to construction activities associated with the Project. The extent of the impact will depend on the final landfall location.	Desk Study Stakeholder Consultation Hazard Workshop

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Operation and Maintenance				
Commercial traffic due to the presence of the Project	6.19, 6.20, 6.21, 6.26	In	Commercial vessels may be displaced from their existing routes due to the presence of the Project.	Desk Study Stakeholder Consultation Hazard Workshop COLLRISK Model
Fishing vessel and recreational vessel displacement due to the presence of the Project	6.19, 6.20, 6.21, 6.26	In	Fishing vessels and recreational vessel activity may be displaced due to the presence of the Project.	Desk Study Stakeholder Consultation Hazard Workshop
Vessel to vessel collision risk between a third party vessel and a project vessel	6.19, 6.21, 6.24, 6.27, 6.28, 6.29	In	The presence of project vessels during maintenance may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third party and project vessels.	Desk Study Stakeholder Consultation Hazard Workshop
Increased vessel to vessel collision risk between third party vessels (route-based) due to the displacement	6.19, 6.20, 6.21, 6.26	In	Displaced vessels may lead to increased traffic densities displacement in certain areas and a subsequent increase in collision risk between third party commercial vessels.	Desk Study Stakeholder Consultation Hazard Workshop COLLRISK Model
Increased vessel to vessel collision risk	6.19, 6.20, 6.21, 6.25, 6.26, 6.29	In	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in	Desk Study Stakeholder Consultation

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
involving fishing vessels and/or recreational vessels due to displacement			encounters/collisions, especially if smaller vessels are displaced towards commercial shipping routes.	Hazard Workshop
Vessel to structure allision risk for commercial shipping due to the presence of Project structures	6.19, 6.20, 6.21, 6.23, 6.24, 6.26, 6.28	In	Structures within the Array Area will pose a potential allision risk (powered or drifting) to passing commercial vessels.	Desk Study Stakeholder Consultation Hazard Workshop COLLRISK Model
Vessel to structure allision risk for fishing vessels in transit due to the presence of Project structures	6.19, 6.20, 6.21, 6.22, 6.23, 6.24, 6.26, 6.28	In	Structures within the Array Area will pose a potential allision risk (powered or drifting) to passing fishing vessels.	Desk Study Stakeholder Consultation Hazard Workshop COLLRISK Model
Vessel to structure allision risk for recreational vessels due to the presence of Project structures	6.19, 6.20, 6.21, 6.22, 6.23, 6.24, 6.28, 6.29	In	Structures within the Array Area will pose a potential allision risk to recreational vessels. This includes the risk of yacht mast interaction with rotor blades.	Desk Study Stakeholder Consultation Hazard Workshop
Reduced access to local ports, harbours and facilities due to the presence of Project structures and	6.19, 6.20, 6.21, 6.24, 6.27, 6.29	In	Access to local ports, harbours and facilities may be impacted due to maintenance activities associated with the Project	Desk Study Stakeholder Consultation Hazard Workshop

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
operation and maintenance activities with the Project				
Reduction in under keel clearance due to the presence of cable protection	6.19, 6.20, 6.21, 6.25	In	The implementation of cable protection may reduce existing water depths and available under keel clearance available to third party vessels.	Desk Study Stakeholder Consultation Hazard Workshop
Vessel interaction with subsea cables associated with the Project	6.19, 6.20, 6.21, 6.25, 6.26	In	The presence of subsea cables associated with the Project 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.	Desk Study Stakeholder Consultation Hazard Workshop
Interference with communications and position fixing equipment from the development	6.19, 6.20, 6.25, 6.26	In	Marine navigation equipment such as radar may be affected by the presence of structures within the Array Area, or Offshore Development Area of Search.	Desk Study Stakeholder Consultation Hazard Workshop
Reduction of emergency response capability due to increased incident rates and/or reduced access for Search and Rescue (SAR) responders	6.19, 6.20, 6.21, 6.24, 6.26, 6.28	In	The presence of the Project may result in an increased number of incidents requiring emergency response associated with work vessels or third party vessels. Also, the presence of the structures may reduce access for SAR responders, such as helicopters.	Desk Study Stakeholder Consultation Hazard Workshop

6.10.6 Proposed Approach to EIA

6.10.6.1 Relevant Data Sources

The assessment of impacts arising from the Project on Shipping and Navigation will utilise site specific vessel traffic survey data, historical incident data and sources such as those outlined in **Table 6.10-1**, and will be supplemented by consultation during the Navigational Risk Assessment (NRA) / EIA Report (EIAR) phase.

AISy data over 2 x 14 days have been used to inform the baseline for this Scoping Report. AISy data can be limited in terms of tracking small vessels (section 6.10.3.1), particularly fishing and recreational vessels. This will be supplemented by conducting site-specific surveys for the EIA to collect additional AISy, radar and visual observation data. Site specific shore-based vessel traffic surveys will be undertaken line with MGN 654 with 14 days of data collected between November and March and 14 days between June and August. Stakeholder consultation will also be undertaken to support the baseline environment (the survey is planned to be carried out using land based radar due to the proximity of the site to shore).

The most recent Royal Yachting Association (RYA) Coastal Atlas will be reviewed to further identify recreational vessel activity in the area, along with sailing directions and almanacs such as those published by the Clyde Cruising Club (CCCl).

Marine Accident Investigation Branch (MAIB) and Royal National Lifeboat Institution (RNLI) historical incident data will be updated based on the latest available data at the time of the NRA and assessed in detail to inform the risk assessment process.

Other data sources will include Admiralty Charts and UKHO Admiralty Sailing Directions for the Shipping and Navigation Study Area, as well as data and feedback from nearby ports, harbours, and other facilities, where available.

6.10.6.2 Consultation

Consultation with various stakeholders will also be used to verify the baseline environment to be considered in the assessment, and to identify additional data sources and impacts to be considered in the EIAR.
In-depth consultation will be undertaken during the EIA process with key stakeholders relevant to Shipping and Navigation, including:

- Maritime and Coastguard Agency (MCA);
- NLB;
- Royal Yachting Association Scotland;
- UK Chamber of Shipping;

- RNLI;
- Cruising Association;
- Local ports, harbours and facilities as required;
- Liaison with relevant fishing users/organisations via the Company Fisheries Liaison Officer (CFLO) and Fishing Industry Representative (FIR);
- Regular vessel operators identified by the vessel traffic surveys;
- Ministry of Defence (MOD);
- Local marinas and yacht clubs, including CCCI.

6.10.6.3 Policy, Legislation and Guidance

The Shipping and Navigation NRA and EIA will be undertaken in line with the following guidance:

Table 6.10-4 Legislation and Guidance relevant to the Shipping and Navigation assessment

Relevant Legislation and Guidance
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 (2021). Annex 1 to MGN 654, Methodology for Assessing Marine Navigational Safety & Emergency Response Risks of OREI.
MCA (2021). Annex 5 to MGN 654, Offshore Renewable Energy Installations: Requirements Guidance and Operational Considerations for SAR and Emergency Response
MCA (2008). MGN 372 Amendment 1 (M+F) OREI: Guidance to Mariners Operating in the Vicinity of UK OREI.
IMO (2018). Revised Guidelines for Formal Safety Assessment (FSA).
IMO (1972/77). COLREGs – Annex 3.
IMO (1974). International Convention for the Safety of Life at Sea (SOLAS).
IALA (2021a and 2021b). O-139 the Marking of Man-Made Offshore Structures and Guidance G1162
RYA (2019). The RYA's Position on Offshore Renewable Energy Developments: Paper 1 – Wind Energy.

6.10.6.4 Assessment Methodology

The baseline data (section 6.10.3.1) will be supported by a formal consultation process including a Hazard Workshop. The Hazard Workshop is a standard and effective consultation activity, as recommended under MGN 654, undertaken as part of the development of an NRA for offshore wind farm developments. The workshop allows a working group of local users and stakeholders (identified from the baseline and statutory consultees) to further risk assess vessel traffic movements and the potential interactions within the Project area. The output of the Hazard Workshop, and the then produced Hazard Log, will be used as the basis of the impact assessment undertaken within the NRA and EIAR.

The findings of the NRA will then inform the EIA for Shipping and Navigation receptors, and the EIA for Shipping and Navigation will use the IMO FSA Methodology (IMO, 2018) which is an internationally recognised approach for assessing impacts to marine navigation receptors.

The methodology centres on risk control and will assess each impact in terms of both frequency and consequence in order to determine whether its significance is 'broadly acceptable', 'tolerable', or 'unacceptable'. Impacts assessed as 'unacceptable' will require additional mitigation measures beyond the embedded mitigations discussed in section 6.10.4 in order to bring the impact within the 'tolerable' or 'broadly acceptable' parameters. This is the ALARP approach.

Impact significance will be determined using a risk-ranking matrix assessing frequency and consequence. The frequency and consequence, as part of the NRA process, will be related to the parameters required by the FSA and will be agreed with stakeholders at the Hazard Workshop. The risk-ranking matrix is presented in **Table 6.10-5**.

The frequency and consequence rankings per impact will be determined using a number of inputs, including:

- Quantitative modelling undertaken in the NRA (Anatec's COLLRISK software);
- Hazard Review Workshop feedback from a cross-section of maritime users;
- Other stakeholder consultation feedback;
- Output of the baseline characterisation, including the site specific vessel traffic surveys;
- Consideration of embedded mitigation measures;
- Lessons learnt from other offshore developments;
- Expert Opinion.

Table 6.10-5 Risk-Ranking Matrix

Consequence	**Major**	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	**Extremely Unlikely**	**Remote**	**Reasonably Probable**	**Frequent**
		Frequency				

6.10.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Shipping and Navigation include:

1. Do you agree that the Shipping and Navigation Study Area, data sources identified (**Table 6.11-1**) and the proposed site specific vessel traffic surveys are sufficient to characterise the Shipping and Navigation baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Are there any additional or specific organisations which should be included in the consultation outreach?
3. Have all the potential likely significant effects resulting from the Project been identified for Shipping and Navigation users?
4. Is the EIAR methodology for Shipping and Navigation appropriate for assessing the potential likely significant effects resulting for the Project?

6.10.8 References

IALA (International Association of Lighthouse Authorities) (2021a). Recommendation O-139 the Marking of Man-Made Offshore Structures. Edition 3.0. Saint Germaine en Laye, France: IALA.

IALA (International Association of Lighthouse Authorities) (2021b). G1162 The Marking of Offshore Man-Made Structures. Edition 1.0. Saint Germaine en Laye, France: IALA.

IMO (International Maritime Organization) (1972/77). Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) – Annex 3. London: IMO.

IMO (International Maritime Organization) (1974). International Convention for the Safety of Life at Sea. London: IMO.

IMO (International Maritime Organization) (2018). Revised Guidelines for Formal Safety Assessment. London: IMO.

MCA (Maritime and Coastguard Agency) (2008). MGN 372 (Merchant and Fishing) Offshore Renewable Energy Installations (OREI) – Guidance to Mariners Operating in the Vicinity of UK OREI, Southampton: MCA.

MCA (Maritime and Coastguard Agency) (2021). MGN 654 (Merchant and Fishing) Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response, Southampton: MCA.

RYA (Royal yachting Association) (2019). The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy. Southampton: RYA.

UKHO (United Kingdom Hydrographic Office) (2021). NP54 Admiralty Sailing Directions North Sea (West) Pilot Book 12th Edition: UKHO.

6.11 Military and Civil Aviation

6.11.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Military and Civil Aviation within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

6.11.2 Study Area

The Military and Civil Aviation Study Area and assessment has been determined by, and is dependent on, the maximum operating ranges of each of the radar systems scoped into the assessment. The operational range of the radar system is dependent on the function of the radar, the operational requirement of the radar and on the type of radar used. The ranges of those radars and, subsequently, the Military and Civil Aviation Study Area will vary depending on the technical specification of each radar system and, possibly, between different installations of the same system. The same factors apply to other aviation infrastructure (radios/beacons).

Consequently, the Military and Civil Aviation Study Area is defined in relation to the varying radar systems in operation in the extended area surrounding the Array Area including civil, military and National Air Traffic Services (NATS) facilities and following relevant Military and Civil aviation guidance. The Military and Civil Aviation Study Area will include the radar systems illustrated in **Figure 6.11-1** which is based on guidance laid down in Civil Aviation Authority (CAA) Publication (Civil Aviation Publication (CAP)) 764 Policy and Guidelines on Wind Turbines Version 6, dated February 2016. Consultation criteria for aviation stakeholders is defined in Chapter 4 of CAP 764 which states distances from airfields where consultation should take place, these criteria have been used to identify military and civil aviation receptors:

- Airfield with a surveillance radar – 30 kilometers (km);
- Non radar licensed aerodrome with a runway of more than 1,100 metres (m) – 17 km;
- Non radar licensed aerodrome with a runway of less than 1,100 m – 5 km;
- Licensed aerodromes where the turbines would lie within airspace coincidental with any published Instrument Flight Procedure (IFP);
- Unlicensed aerodromes with runways of more than 800 m – 4 km;
- Unlicensed aerodromes with runways of less than 800 m – 3 km;
- Gliding sites – 10 km;
- Other aviation activity such as parachute sites and microlight sites within 3 km – in such instances developers are referred to appropriate organisations.

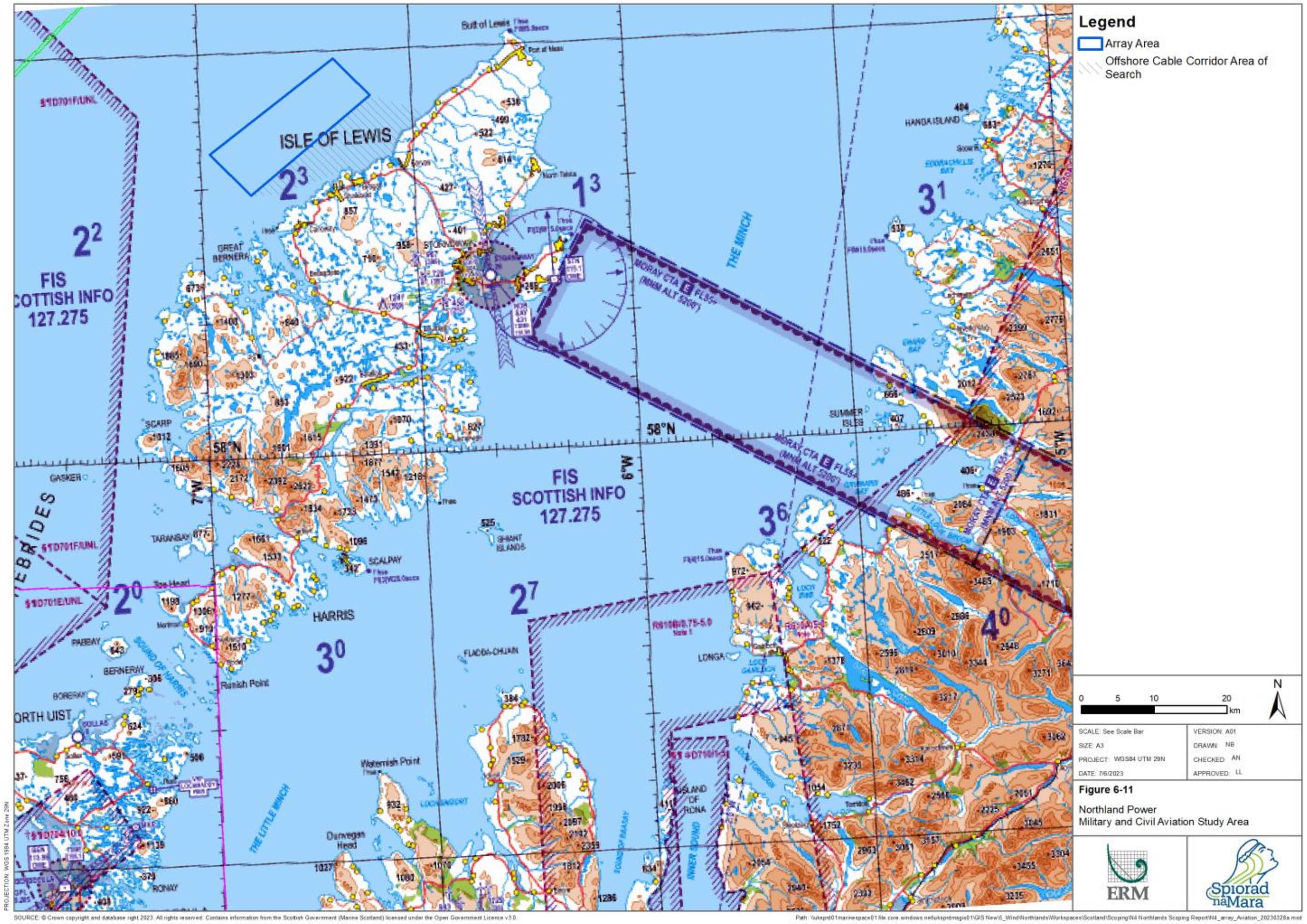
CAP 764 goes on to state that these distances are for guidance purposes only and do not represent ranges beyond which all wind turbine developments will be approved or within which they will always be objected to. These ranges are intended as a prompt for further discussion between developers and aviation stakeholders and will be reported upon in the Environmental Impact Assessment (EIA) Report. For example, Highlands and Islands Airports Ltd (HIAL) are normally consulted on all proposals in the vicinity of airports which they operate.

It is necessary to take into account the aviation and air defence activities of the Ministry of Defence (MoD) as safeguarded by the Defence Infrastructure Organisation (DIO). The activities that will be addressed in the EIA Report include:

- MoD Airfields, both radar and non-radar equipped;
- MoD Air Defence Radars;
- United Kingdom (UK) Met Office Meteorological Radars;
- Military Low Flying.

It is necessary to take into account the possible effects of wind turbines upon the National Air Traffic Services En Route Ltd (NERL) communications, navigation and surveillance systems – a network of primary and secondary radars and navigation facilities around the country. It is necessary to take into account the operations of HM Coastguard (HMC) within the Array Area. The Military and Civil Aviation Study Area will be refined based on site assessments in line with the above criteria.

Figure 6.11-1 The Military and Civil Aviation Study Area



6.11.3 Baseline Environment

The analysis completed involved a thorough review of aviation charts, the aviation database held by Wind Farm Aviation Safeguarding Ltd and regulations and guidance as listed at **Table 6.11-1** below. Having identified all potential aviation stakeholders and potential effects on their operations this scoping exercise focussed on any possible options that could mitigate the effect on those operations, if required.

6.11.3.1 Data Sources

The data sources that have been used to inform this Military and Civil Aviation section of the Scoping Report are presented within **Table 6.11-1.** These data sources will be taken forward and used to inform the EIA, alongside any additional site-specific data that is collected for the Project.

Table 6.11-1 Summary of key publicly available datasets for Military and Civil Aviation

Source	Spatial Coverage	Year	Summary
Civil Aviation Authority	CAP 764 CAA Policy and Guidance on Wind Turbines	2016	This document provides CAA policy and guidance on a range of issues associated with wind turbines and their effect on aviation that will need to be considered by aviation stakeholders, wind energy developers and Local Planning Authorities (LPAs) when assessing the viability of wind turbine developments.
Civil Aviation Authority	CAP 168 Licensing of Aerodromes	2022	CAP 168 sets out the standards required at UK National licensed aerodromes relating to management systems, operational procedures, physical characteristics, assessment and treatment of obstacles, visual aids, rescue and fire-fighting services and medical services.
Civil Aviation Authority	CAP 670 ATS Safety Requirements	2019	This document provides an overview of requirements and the regulatory framework as well as requirements and guidance for Air Traffic Services, Communication, Navigation, Surveillance, Meteorological and Information and Alerting Systems, as well Air Traffic Control (ATC) unit staffing.
Civil Aviation Authority	CAP 774 UK Flight Information Services	2021	The UK Flight Information Services (CAP 774) details the suite of air traffic services which are the only services provided in

Source	Spatial Coverage	Year	Summary
			class G airspace within the UK Flight Information Region. This document is equally applicable to all civilian and military pilots, air traffic controllers, and flight information service officers.
Civil Aviation Authority	CAP 738 Safeguarding of Aerodromes	2020	This document offers guidance to those responsible for the safe operation of an aerodrome or a technical site, to help them assess what impact a proposed development or construction might have on that operation.
Civil Aviation Authority	CAP 793 Safe Operating Practices at Unlicensed Aerodromes	2010	Provides guidance on the recommended layout, physical characteristics and visual aids appropriate to safe operating practices at unlicensed aerodromes.
Civil Aviation Authority	CAP 493 Manual of Air Traffic Services Part 1	2022	The Manual of Air Traffic Services contains procedures, instructions and information which are intended to form the basis of air traffic services within the United Kingdom. It is published for the guidance of civil air traffic controllers and may also be of general interest to others associated with civil aviation.
Civil Aviation Authority	UK Aeronautical Information Publications (AIP)	2023	This document provides detailed information on all National Regulations, Requirements and Services for en-route air traffic and those at aerodromes.
Civil Aviation Authority	CAA 1:500,000 VFR Chart	2022	One of a series of maps detailing the structure of UK airspace.
Military Aviation Authority	Military Aviation Authority Regulatory Article 2330 (Low Flying)	2021	This is the Regulation pertaining to military low flying.
Military Aviation Authority	UK Military Aeronautical Information Publication	2023	This document provides detailed information on all military Regulations, Requirements and Services for military operations.

6.11.3.2 Overview of Baseline Environment

The Project is in an area that is relatively remote from significant aviation facilities. **Figure 6.11-1** shows the airspace up to 19,500 feet (ft). There are no areas of controlled or regulated airspace affecting the Military and Aviation Study Area, it is within Class G unregulated airspace. However, above that height there is a significant amount of transatlantic traffic. It will be essential, therefore, to ascertain if the Project is likely to be visible to, and affect the performance of, any civil 'en-route' surveillance systems.

Stornoway Airport, on the Isle of Lewis is approximately 38 km to the east and is shown in **Figure 6.11-1,** by the small ring of purple dots surrounding a grey circle. The Moray Control Area (CTA) is shown by the corridor represented by blue hashed lines. There are no military airfields in the vicinity of the Array Area, the nearest is at RAF Lossiemouth over 160 km to the east and the array will be outside the range of the surveillance systems at that airfield.

To the east and to the west are military Danger Areas shown by dashed purple lines with internal hashing. The Danger Area complex D701 is visible to the southwest of the Array Area which is used for a number of purposes including aerial towed targets, unmanned aerial vehicle (UAV) operations, gunnery and calibrated firings and trials. The range is operated by QinetiQ under contract to the MOD Defence Equipment and Support organisation (DE&S) and operations are supported by a network of ATC radars on South Uist and St Kilda.

The UK maintains a network of radars around the country to provide a policing and security service for the airspace for which it is responsible under international agreements and for National security. The nearest Air Defence radar is located at Benbecula, on North Uist.

6.11.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Aviation and Radar assessment, which has been incorporated into the design of the Project. Where other mitigation measures are proposed, these will be detailed in the impact assessment.

In respect of a physical obstruction to flight Renewables UK guidance, which reflects civil and military requirements, is that to facilitate safe visual flight, day or night, in the vicinity of anemometer masts and/or wind turbines, information regarding construction should be passed to the Defence Geographic Centre (DGC) and the General Aviation Awareness Council (GAAC) at least 10 weeks in advance of the erection or removal of any anemometer mast or first turbine. This should then be followed up with confirmation that the activity has taken place on the day. Data should include location, height (of all structures over 150 ft), date of erection, date of removal and lighting type and information on the proposed development should be circulated to relevant military and aviation stakeholders including NATS and the MOD. Information on potential aviation obstructions will be disseminated within the civil UK Integrated Aeronautical Information

Package (IAIP) the main resource for information and flight procedures at all licensed UK airports as well as airspace, en-route procedures, charts and other air navigation information and the Military Aeronautical Information Publication (Mil AIP).

6.11.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

The effects of wind turbines on either military or civil aviation safeguarding fall into 2 categories:

- Effects on an aerodrome and the associated safeguarded surfaces which surround it i.e. the presence of structures and obstacles that could potentially cause physical harm through risk of collision or lead to an increase in instrument approach minima;
- Effects on the CNS systems used to enable the provision of air traffic control terminal and "en route" services and air defence.

Primary radar relies on transmitted and reflected electromagnetic radiation and does not require any cooperation or response by the aircraft target under surveillance. The radar emits a signal and times how long it takes the signal to be reflected which allows the system to measure the distance between the radar and the object. The amount of energy that is reflected back by that object is a result of the object's Radar Cross Section (RCS). Where the time for the reflected energy to be received by the radar is constant i.e. the object is stationary, then algorithms are employed within the radar system to remove that from the airspace information displayed on an air traffic controller's radar screen.

In consideration of wind turbines, these are moving objects and, generally, the larger a wind turbine is, the larger its RCS will be. Once the wind turbine is operational and rotating, the moving blades will result in more energy being reflected and an increased chance of it creating unwanted returns, known as 'clutter' to be presented on the radar display. Under some circumstances/conditions ATC operators cannot differentiate between clutter and real aircraft and are required to assume that the clutter is an aircraft and to ensure a minimum separation on that or, for larger developments, that an aircraft return could be masked by wind turbine returns and avoid the development as a whole. Additionally, wind turbines may represent a physical obstruction to flight in the area.

Furthermore, where turbines are in the vicinity of air to ground transmitters and receivers, they can give rise to degradation of air/ground communications due to an effect called multi-path scattering. That multi-path scattering or propagation results in a delayed version of the required signal to arrive at the receiver. In simple terms, the larger the RCS of the turbine and the closer that turbine is to a Receiver (Rx) or Transmitter (Tx) then the greater potential for interference.

This Scoping Report considers all the detectability (impact) of proposed wind turbines placed within the Array Area on radars and radios as well as Military and Civil operations. For each identified receptor, the physical obstruction and/or radar effect and then, subsequently, the operational impacts are considered along with any other potential effects. This assessment has been informed by the results of baseline studies, responses to consultation and with reference to the existing evidence regarding the effects of offshore wind farm development.

6.11.5.1 Likely Significant Effects

Potential likely significant effects on Military and Civil Aviation have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 6.11-2**.

The aviation infrastructure and receptors considered for the assessment of effects were based upon detailed desktop screening exercises. Each receptor has been considered and scoped in or out on the basis of the results on the effect/-receptor pathway, professional knowledge, data confidence and the current project design envelope.

Within aviation the sensitivity of a receptor can be subjective and, therefore difficult to quantify. Direct line of sight from a development to a radar may not, necessarily, result in an objection if there is no operational or safety implication. The differing roles of radars will require a different emphasis on the effect and an aerodrome/airfield might require differing considerations than that of another aerodrome nearby depending on the importance of that facility to military operations or to a local airport and effects need to be considered accordingly. Similarly, a nearby radar might not warrant a significant effect but the air defence radar hundreds of miles away might be crucial to national security. The guidance laid down in CAP 764 encourages a dialogue between the developer and aviation stakeholders to agree what effect, if any, there will be on operations, to determine if that effect is acceptable within an operational context and, if not, then to agree mitigation if any is feasible. The receptors identified within this assessment are considered to have a potential sensitivity to effects in terms of the safety of aviation operations.

Table 6.11-2 EIA Scoping Assessment for Military and Civil Aviation

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Interference with PRIMARY radar systems		**Out**	During construction/ decommissioning the rotor blades will be static. Radar algorithms are established to prevent static objects being detected and presented to the controllers as a radar return, therefore, there should be no interference with Primary radar systems.	
Interference with SECONDARY radar systems		**Out**	The rotor blades will be static and do not transmit a secondary radar code and, therefore, there should be no interference with Secondary radar systems. Secondary radar systems detect a code transmitted by aircraft and technical interference on the Receiver is subject to a shorter range which the Array Area is outside.	
Physical obstruction to aviation within the area	See section 6.11.4.	**Out**	There are mandated procedures for dissemination of information considered necessary for flying operations, both military and civil, to allow such operations to be planned accordingly and avoid an array becoming a physical obstruction.	
Operation and Maintenance				

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
"Clutter" on civil controllers' radar screens		In	Operating wind turbines can result in reflected energy appearing as clutter on civil controllers' radar screens, which can represent, or mask, actual aircraft radar returns. It should also be noted that HIAL have previously announced the installation of a primary radar at Stornoway Airport.	Radar modelling will be conducted using RView software which utilises a comprehensive systems database incorporating the safeguarding criteria for a wide range of radar and radio navigation systems. RView models terrain using the latest Ordnance Survey (OS) Terrain 50 digital terrain model and verified using the Shuttle Radar Topography Mission (SRTM) dataset. By using 2 separate and independently generated digital terrain models, anomalies are identified, and consistent results assured. The final array layout will be subjected to radar modelling against the proposed radar to be installed at Stornoway Airport. Results will need to be confirmed in consultation with HIAL.
"Clutter" on MoD ATC radar screens and military Air Defence radar screens		In	Operating wind turbines can result in reflected energy appearing as "clutter" on military ATC radar screens which can represent, or mask, actual aircraft radar returns.	The final array layout will be subjected to radar modelling using Review and the results confirmed in consultation with MoD. Results will need to be confirmed in consultation with MoD.
Physical presence and operation of the turbines effecting Licensed Airfields where the turbines		In	The physical presence and operation of the WTGs may have an effect on Licensed Airfields where the turbines are within airspace with published Instrument Flight Procedures. Some Stornoway Airport published procedures will route in close proximity to the Project.	Desk study; Consultation with HIAL; Subjected to modelling/procedural assessment.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
are within airspace with published Instrument Flight Procedures				
Physical presence and operation of the turbines having an effect on non-radar Licensed Airfields		**Out**	There are no non-radar Licensed Airfields within mandated consultation distances.	
Physical presence and operation of the turbines having an effect on other civil aviation activities		**Out**	There are no other civil aviation airfields likely to experience any significant effect due to the distance from the proposed development. Furthermore, the array will be notified on aviation charts for those transiting the area.	
Physical obstruction to aviation within the area	See section 6.11.4.	**Out**	There are mandated procedures for dissemination of information considered necessary for flying operations, both Military and Civil, to allow such operations to be planned accordingly.	
Impact on military operations		In	The proposed array will be in close proximity to the Danger Area complexes, in particular the D701 complex to the southwest of the Array Area, which are	Desk study; Subject to consultation with the MoD.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			used for bombing and gunnery serials. The physical presence and operation of turbines can represent a physical hazard to low-level flight operations and may also affect maritime patrol operations. It should be expected that there will be a requirement for Aviation Obstruction Lighting complying with CAA and MoD requirements. The fitting of such lighting may mitigate any potential effect.	
HM Coastguard operations		In	The proposed array will be located in an area where the HM Coastguard operate and the physical presence and operation of turbines can represent a physical hazard to low-level flight operations and may also affect maritime patrol operations. It should be expected that there will be a requirement for Aviation Obstruction Lighting complying with CAA and MoD requirements. The fitting of such lighting may mitigate any potential effect.	Desk study; Subject to consultation with the MoD/HMC/CAA.
Met Office Radar		**Out**	There are no Met Radars within mandated consultation distance.	
NATS		In	NATS provides air traffic control services in the UK and across the globe, and "en-route" air traffic services for aircraft flying through UK airspace.	The final array layout will be subjected to radar modelling and the results confirmed including consultation with NATS.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			The proposed array will be located in an area where the NATS operate, and the physical presence and operation of turbines can represent a physical hazard to low-level flight operations.	

6.11.6 Proposed Approach to EIA

The Military and Civil Aviation assessment will determine likely significant aviation effects resulting from the Project and will continue to focus on safety of aviation in identifying hazards, risks and potential mitigations for affected receptors.

In assessing the significance of the effects from the Project on aviation operations it is necessary to undertake an assessment of the potential technical effects on Communication, Navigation and Surveillance (CNS) systems and to then determine if the technical effect would lead to a significant effect on operations or flight safety.

6.11.6.1 Relevant Data Sources

The data sources listed is section 6.11.3.1 will be used as a minimum.

6.11.6.2 Consultation

Early stakeholder engagement regarding the project design and turbine layout is considered to be essential and the most effective form of early non-technical mitigation to inform the EIAR. Consultation will be held with relevant statutory and non-statutory organisations as necessary and as part of mandated consultation activities. Key consultees of relevance to the aviation assessment include the CAA, NATS, HIAL, the MoD and HM Coastguard and effective and timely consultation will be undertaken with all relevant stakeholders.

6.11.6.3 Policy, Legislation and Guidance

The Policy, Regulation and Guidance that will inform the assessment is contained within the documents listed at **Table 6.11-1.**

6.11.6.4 Assessment Methodology

The EIA methodology for Military and Civil Aviation will follow that outlined in Chapter 4: Proposed Approach to EIA, establishing receptor sensitivity, magnitude of impact, and evaluation of significance, and consideration of mitigation and monitoring if required. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA and assessment of these will apply where relevant to Military and Civil Aviation.

However, there are key requirements relating to this topic and the following section clarifies how the methodology will be amended and applied to consider the specific needs of the Military and Civil Aviation assessment.

The assessment of potential likely significant effects on Military and Civil Aviation will be based on the maximum development scenario and will be supported by ongoing desk based- studies that will identify and examine in greater detail Military and Civil Aviation receptors. Studies will be undertaken in parallel with, and/or in response to, consultation and meetings with specific stakeholders in order to provide a detailed understanding of potential likely significant effects. The operational impacts will be assessed by considering the orientation of approach and departure flight paths, physical safeguarding of flight, airspace characteristics and relevant flight procedures.

The assessment will also consider all radar and radio systems within operational range of the Project, in addition to military areas of operation. Radar modelling will be undertaken using RView software which utilises a comprehensive systems database incorporating the safeguarding criteria for a wide range of radar and radio navigation systems. RView models terrain using the latest OS Terrain 50 digital terrain model, which has a post spacing of 50 m and has a root mean square (RMS) error of 4 m. The results are verified using the SRTM dataset, a separate smoothed digital terrain model with data spacing of 3 arc seconds. By using 2 separate and independently generated digital terrain models, anomalies are identified, and consistent results assured. RView models the refractive effects of the atmosphere on radio waves and the First Fresnel Zone. RView models the trajectory of radar signals at different elevations enabling modelling of both volume surveillance and pencil beam radars as well as the effects of angular sterilisation as applied.

For each identified receptor, the physical obstruction and/or technical effect and the potential, subsequent operational impacts will be considered, together with any other potential likely significant effects. The operational impacts will be assessed by considering operational activities and flight paths (both military and civil), physical safeguarding of flight, airspace characteristics and flight procedures as published in the CAA Integrated Aeronautical Information Package (AIP) and available military aeronautical information.

The aviation industry and the provision of Air Navigation Services (ANS) (including radar services) are regulated through extensive legislation. However, the main mechanism for regulating the relationship between aviation and the wind power industry is through the consenting system and the guidance outlined in **Table 6.11-1.**

Subsequently any potential operational impacts, and their severity, will be considered. The EIA chapter for Military and Civil Aviation will be supported by more detailed desk-based studies, consultation and information gathering that will identify and examine, in greater detail, the Military and Civil Aviation receptors. Radar modelling studies will be undertaken, supplemented with consultation and meetings with specific stakeholders, in order to provide a detailed understanding of potential likely significant effects on operational processes.

Significance criteria for aviation impacts are typically difficult to establish; they are not strictly based on the sensitivity of the receptor or magnitude of change but on whether the industry regulations for technical safeguarding, safe obstacle avoidance or radar separation (from radar clutter) can be maintained in the presence of wind turbines., e.g. there may be Line of Site (LoS) between a radar and a wind farm but that does not necessarily mean that there will be a significant effect or objection on the part of the affected stakeholder. Any anticipated impact upon aviation stakeholders which results in restricted operations will be considered to be of significance.

The assessment will also consider possible cumulative effects and an assessment of the extent of any transboundary effects across the UK Flight Information Region.

The Military and Civil Aviation Chapter will conclude with a high-level summary of potential effects, an overview of any radar, technical or operational mitigation requirements, together with options for mitigation, if available.

6.11.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Military and Civil Aviation include:

1. Have the potential likely significant effects on any future Stornoway Airport radar been adequately considered?
2. Have the potential likely significant effects on MoD ATC and Air Defence radars been adequately considered?
3. Have the potential likely significant effects on NATS radars and operations been adequately considered?
4. Do you agree with the identified potential likely significant effects on extant HIAL procedures at Stornoway Airport?
5. Have the potential likely significant effects and extent of effects on military operations within the nearby Danger Area complexes, in particular the D701 complex, been adequately considered?
6. Have the potential likely significant effects on HM Coastguard operations been identified?

6.11.8 References

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6.12 Offshore Infrastructure, Other Sea Users, Tourism and Recreation

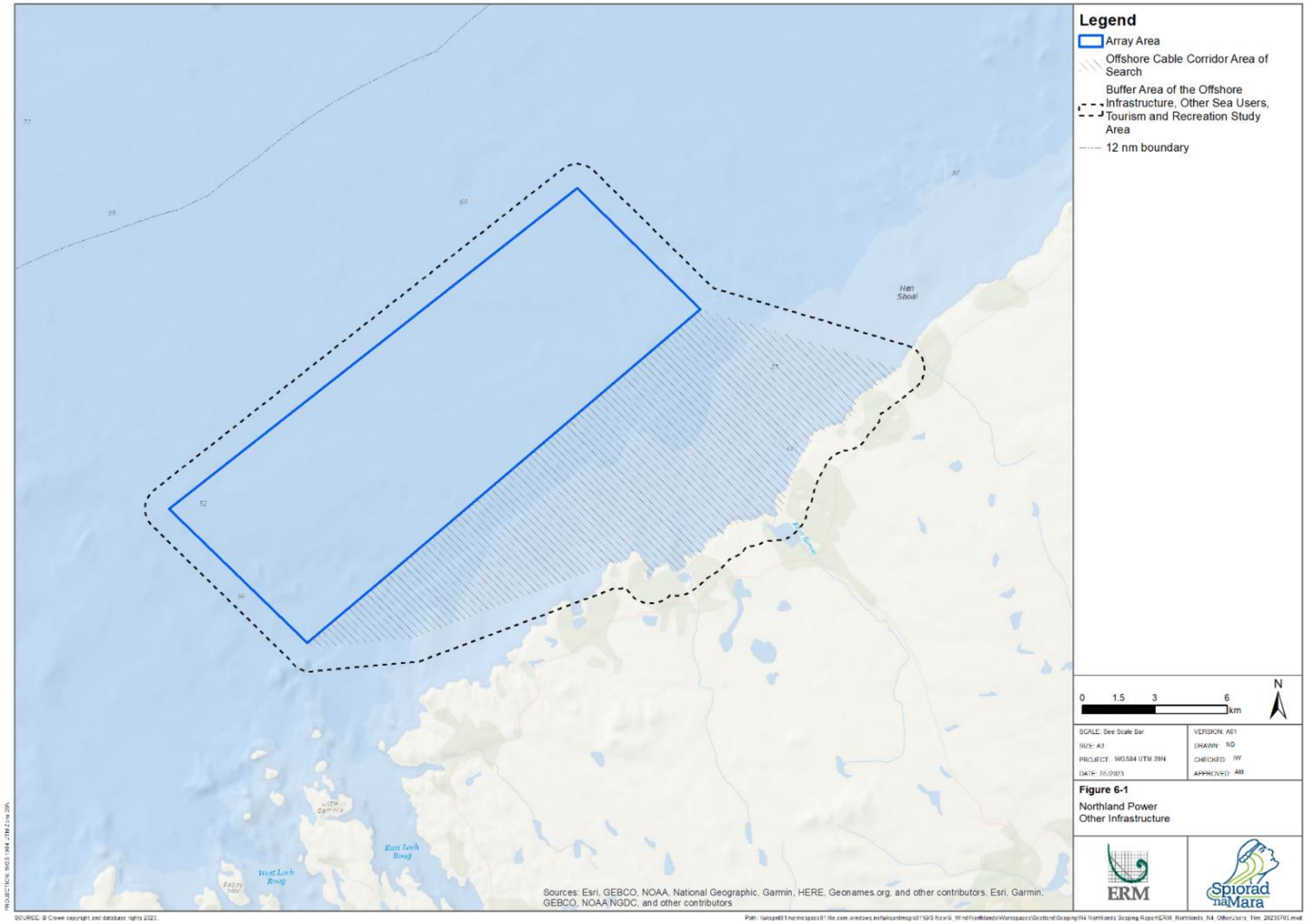
6.12.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Offshore Infrastructure, Other Sea Users, Tourism and Recreation within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

6.12.2 Study Area

The Offshore 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 1 kilometer (km) boundary. The Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area is considered adequate to capture relevant receptors that fall within the scope of Offshore Infrastructure, Other Sea Users, Tourism and Recreation that are not assessed elsewhere in this Scoping Report. The Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area is presented in **Figure 6.12-1**.

Figure 6.12-1 Offshore Infrastructure, Other Sea Users, Tourism, and Recreation Study Area



6.12.3 Baseline Environment

6.12.3.1 Data Sources

Data sources used to inform the Offshore Infrastructure, Other Sea Users, Tourism and Recreation section of the Scoping Report are presented within **Table 6.12-1**. These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside any additional site-specific data that are collected for the Project.

Table 6.12-1 Summary of key publicly available datasets for Offshore Infrastructure, Other Sea Users, Tourism and Recreation

Source	Spatial Coverage	Year	Summary
North Scotland Sectoral Marine Plan	North Scotland	2020	North Scotland sectoral marine plan, which includes mapped aquaculture, subsea cables, Carbon Capture and Storage (CCS), and oil and gas in North Scottish waters.
Marine Directorate Interactive Map	Scotland	2022	Marine Directorate interactive map data portal, including renewable energy projects, cables and pipelines, oil and gas, and aggregates spatial data layers.
Crown Estate Scotland	Scotland	2022a	Crown Estate Scotland asset maps for energy, aquaculture, infrastructure and ScotWind offers.
North Sea Transition Authority (NSTA)	United Kingdom (UK) waters and North Sea	2022	North Sea Transition Authority offshore interactive map, including spatial data for CCS, oil and gas, and pipelines.
Kingfisher Information Service - Offshore Renewable Cable Awareness (KIS-ORCA) interactive map	UK and Europe	2023	KIS-ORCA telecommunications and subsea power cable interactive map.
Scottish Marine Recreation and Tourism Survey	Scottish coast	2015	Scottish marine recreation and tourism survey for 23 different activities.
Outer Hebrides Tourism	Outer Hebrides	2023	Outer Hebrides tourist industry website.
Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating	UK coverage	2004-2019	RYA Geographical Information System (GIS) spatial dataset of recreational boating activities, including intensity indicators and locations of clubs, training centres, and marinas.

6.12.3.2 Overview of Baseline Environment

The following receptors have been considered as part of the baseline for Offshore Infrastructure, Other Sea Users, Tourism and Recreation and are illustrated in **Figure 6.12-2**:

- Aquaculture;
- Other offshore renewable energy projects;
- Cable and pipeline operators;
- Oil and gas developments;
- CCS projects;
- Aggregate extraction and disposal sites;
- Boat tour operators;
- Surfing;
- Recreational angling;
- Kayaking, canoeing and paddleboarding;
- Sailing.

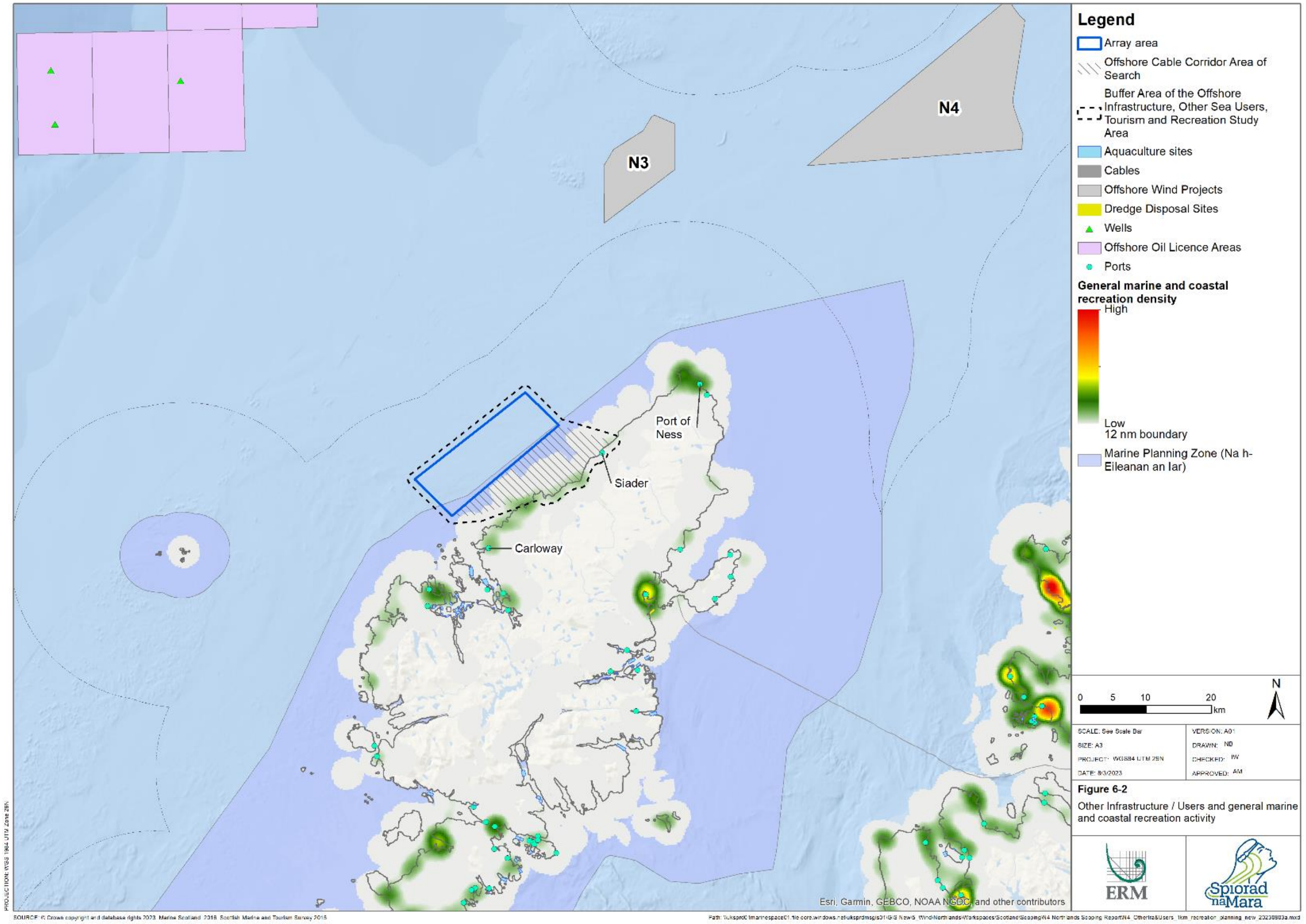
In addition to those receptors identified above, consideration should also be given to the assessment of:

- Chapter 6.9: Commercial Fisheries;
- Chapter 6.10: Shipping and Navigation;
- Chapter 6.11: Military and Civil Aviation;
- Chapter 8.2: Socio-Economics.

Aquaculture

The Outer Hebrides regional Na h-Eileanan an Iar aquaculture planning zone for marine fish farming overlaps a small proportion of the southeastern boundary of the Array Area and Offshore Cable Corridor Area of Search (Marine Directorate, 2022). There are no active aquaculture sites located within the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area. The closest site is Eughlam, Loch Roag (RC4-21-9) (Marine Directorate, 2022), 5.4 km southwest of the Array Area and Offshore Cable Corridor Area of Search. Loch Roag is an aquaculture resource area and holds several active aquaculture sites for finfish and shellfish (Crown Estate Scotland, 2022).

Figure 6.12-2 Overview of Offshore Infrastructure, Other Sea Users, Tourism and Recreation



Other Offshore Renewable Energy Projects

There are no currently operational renewable energy projects within, or adjacent to, the Offshore Infrastructure, Other Users, Tourism and Recreation Study Area (**Figure 6.12-2**).

The Crown Estate granted Lewis Wave Power (a subsidiary of Aquamarine Power) a seabed lease option, in March 2011, for the development of the Lewis Wave Array, 4-5 km off the northwest coast of the Isle of Lewis. The project was given consent by Marine Directorate in 2013, and granted a marine licence for development, however the project was cancelled amidst financial difficulties. Construction was not completed, and the wave devices were never deployed (Tethys, 2016). The marine licence application expired in December 2021, and the project is no longer included within Crown Estate Scotland's Wave and Tidal Asset Profile (Crown Estate Scotland, 2022b).

The Sectoral Marine Plan for Offshore Wind Energy, Option area N3, awarded to Magnora Offshore Wind in the ScotWind Leasing Round, and N2, awarded to Northland Power, are located 27.1 km and 53.9 km to the northeast respectively. Both are outside the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area. Magnora aims to achieve consent for N3 in 2026, with construction commencing in 2030 (Magnora Offshore Wind, 2022). As this project is still in the early phases of consent, landfall options have not yet been disclosed, however, the project is in consultation with the Comhairle nan Eilean Siar and considering potential grid connection points on the Isle of Lewis. Northland Power, as the developer of Spiorad na Mara and Havbredey, is prioritising the development of Spiorad na Mara through the production of this Scoping Report and subsequent EIA (Northland Power, 2022). No preferred landfall or grid connection points have been identified by Northland Power for Havbredey.

Subsea Cables and Pipelines

There are no subsea cables, telecommunications cables, or pipelines that intersect with the Offshore Infrastructure, Other Users, Tourism and Recreation Study Area (Marine Directorate, 2020; KIS-ORCA, 2022). The closest telecommunication cables, BT-HIE Seg1.14, and BT-HIE Seg1.13, are located on the opposite, southeast, side of the Isle of Lewis, at a distance of 61.5 km and 27.5 km, respectively from the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area (**Figure 6.12-2**).

Oil and Gas Developments

The extant oil and gas licence area, 154/3, is operated by OMV UK Ltd, and is located 55.6 km north of the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area (Marine Directorate, 2022). There are a number of offshore oil installations and wells located within the licence area (**Figure 6.12-2**) although none is located in the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area. 2 historical petroleum licence blocks lie to the northeast and northwest of the Project; however, both are abandoned and decommissioned (NSTA, 2022).

Aggregate Extraction and Disposal Sites and Carbon Capture and Storage Projects

No aggregate/mineral resource areas, dredge disposal sites, or CCS projects, have been identified within the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area (Marine Directorate, 2022; Crown Estate Scotland, 2022). Only 1 marine waste disposal site, owned by Atlantic Fish Waste, has been identified, however this site is closed and 137 km away from the Project (Marine Directorate, 2022).

Boat Tour Operators

There are several boat tour operators currently active on the Isle of Lewis, with tours including sea angling, and bird, dolphin, basking shark and whale watching (Outer Hebrides Tourism, 2023). Tour operators are predominantly based out of ports in Stornoway, on the eastern side of the island, and Miavaig, located in West Loch Roag, approximately 15 km southwest of the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area. The North Scotland Sectoral Marine Plan (2020) shows low-density vessel tour routes crossing the Array Area, however the majority of tour routes depart from Stornoway, focusing on the seas between Stornoway, the Shiant Isles and The Minch. From Miavaig, vessel tours operate in the vicinity of Loch Roag, southwest of the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area.

A desk-based study of Automatic Identification System (AISy) recreational vessel transits through the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area, for the years 2012-2017, shows an average of 2-10 vessel transits per week. A full review of recreational vessel activity is presented within the Shipping and Navigation Chapter (see Chapter 6.10: Shipping and Navigation).

There is one port in the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area, Port Siader. The closest ports are Loch Carloway to the south, and Port of Ness to the north, approximately 7 km and 13 km away, respectively.

Beaches

There are several popular tourist beaches within, or in the vicinity of, the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area (Outer Hebrides Tourism, 2023), comprising:

- Ness beach and Eoropie beach (also known as Traigh Sanda), both popular visitor beaches and renowned surf spots;
- Dailbeag beach and Dalmore beach, which are both popular for swimming and sightseeing. Although located approximately 10 km south of the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area, the Sectoral Marine Plan for Offshore Wind Energy (2020) identifies that the development of Spiorad na Mara may have potential visual, landscape and seascape impacts on tourism on the Isle of Lewis;

- Barvas Beach and Machair, a renowned surf spot that is also popular for bird watching and sightseeing;
- Bosta beach (Traigh Bostadh), in Great Bernera;
- Reef Beach.

Recreational Activities

The Scottish National Marine Plan (NMP) interactive map (2022) and North Scotland Sectoral Marine Plan (2020) illustrate various recreational activities around the Scottish coast. The general marine and coastal recreation density data illustrated on **Figure 6.12-3** is relative to the entire Scottish coastline. Although this indicates a "low" level of recreational activity within the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area, the area is known to be important for a number of recreational activities as discussed below.

Kayaking, canoeing and paddle boarding have been identified as having moderate to high activity levels within, and to the south of, the Array Area and Offshore Cable Corridor Area of Search.

The North Scotland Sectoral Marine Plan (2020) identified a high-density kayaking/canoeing route through the Array Area, as well as high levels of paddle boarding within the Offshore Cable Corridor Area of Search, and low paddle boarding activity levels recorded in the Array Area.

The Outer Hebrides Tourism website (2023) highlights the Western Isles as a key surfing location, with Barvas Beach being a renowned surf spot due to its large swells. Surfing has also been identified as having moderate to high activity levels within and to the south of the Array Area and Offshore Cable Corridor Area of Search. Other key surf spots located on the northwest coast of Lewis, in the vicinity of the Offshore Development Area of Search, include:

- Eoropie beach;
- Shawbost Shore;
- Bragar Shore;
- Dalmore Beach.

Scuba diving is not recorded in high levels within the Array Area or Offshore Cable Corridor Area of Search. A high concentration of scuba diving is recorded around Carloway, approximately 5 km south from the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area (North Scotland Sectoral Marine Plan, 2020).

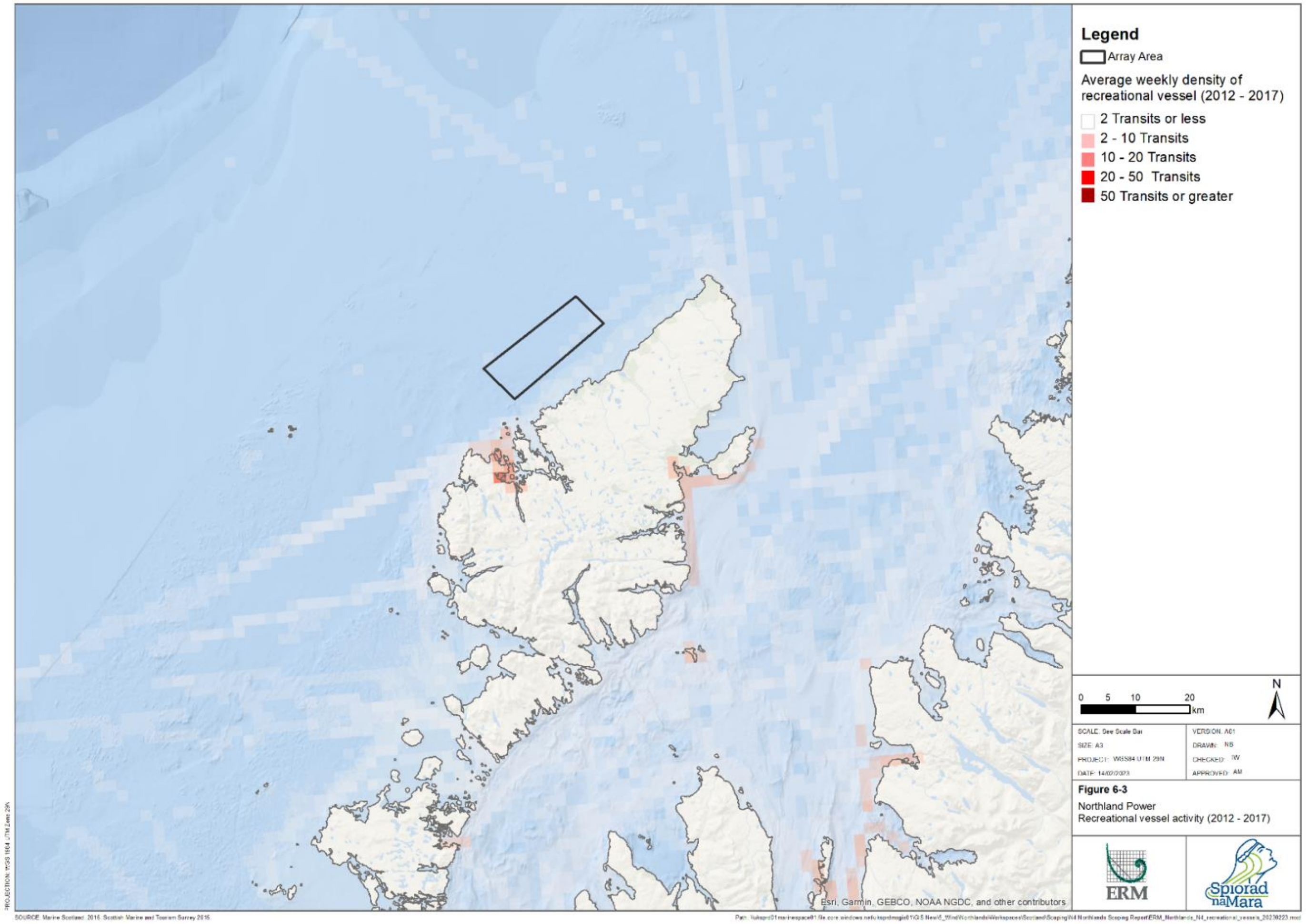
Low activity levels of sea angling are associated with the Offshore Development Area of Search. However, big game sports fishing is growing in popularity, with an estimated 300 kilogram (kg) bluefin tuna being caught at Great Bernera in Loch Roag, approximately 9 km from the southern extent of the Array Area.

Currently, there is no evidence of any catches recorded within the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area.

High value sea angling tours for wild salmon are run from Stornoway harbour and take place around the Outer Hebrides (Outer Hebrides Tourism Board, 2023). Although outside of the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area, salmon migration routes will be considered by the project and findings on any impact on catch rate will be considered. Chapter 6.9: Commercial Fisheries of this Scoping Report provides a review of the impacts on wild salmon fishing activity.

The Outer Hebrides Tourism (2023) website cites open-water swimming, coasteering, snorkelling, kitesurfing, and sailing as other popular recreational activities undertaken on the Isle of Lewis. Companies such as Immerse Hebrides are providing open water swimming and guided boat tours. Stornoway Sailing Club, although currently focussing on dinghy sailing, is welcoming individuals with larger keeled boats, and intends to expand on that aspect of club sailing in the future.

Figure 6.12-3 Average weekly density of recreational vessels, 2012-2017



6.12.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Offshore Infrastructure, Other Sea Users, Tourism and Recreation assessment, which has been incorporated into the design of the Project (**Table 6.12-2**).

Table 6.12-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
6.17	Promulgation of information	Promulgation of information: timely and efficient distribution of Notices to Mariners (NtMs), Kingfisher notifications, and other navigational warnings of the position and nature of works associated with the Project.
6.18	Advisory safety distances	Application of safety zones and advisory safety distances around vessels undertaking construction, maintenance and decommissioning activities will be adhered to e.g. Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) and International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1972 and IMO, 1974).
6.30	Manned vessels	On site manned vessels will be present to monitor and advise other marine users of activities associated with the Project during construction, maintenance and decommissioning.

6.12.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.12.5.1 Likely Significant Effects

Potential likely significant effects on Offshore Infrastructure, Other Sea Users, Tourism and Recreation receptors have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 6.12-3**.

Table 6.12-3 EIA Scoping Assessment for Offshore Infrasructure, Other Sea Users, Tourism and Recreation

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Temporary disturbance to infrastructure and other sea users		**Out**	No infrastructure or other sea users (aquaculture, subsea cables, pipelines, oil and gas developments, aggregate extraction/disposal sites) have been recorded in the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area. Other offshore renewable energy projects are early concept stage and Cable Corridor and Landfall options are not available to assess therefore no risk of disturbance.	
Temporary displacement/disturbance to boat tour operators and recreational activities	6.17, 6.18, 6.30	**In**	Boat tour operators and recreational activity may be displaced due to the construction of the project.	Desktop assessment of RYA recreational boating data and AISy marine traffic data. Engagement with stakeholders.
Increased turbidity as a result of construction activities smothering aquaculture resource areas		**Out**	The closest aquaculture site is over 5 km south of the Array Area, located in Loch Roag.	
Operation and Maintenance				

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Barrier to other offshore renewable development projects		**Out**	Other offshore renewable energy projects are early concept stage, and Cable Corridor/Landfall options are not available to assess. Spiorad na Mara does not conflict with any known or proposed array or cable corridor areas of search.	
Temporary/permanent displacement to boat tour operators	6.17, 6.18, 6.30	**In**	Potential temporary/permanent displacement due to the presence of servicing vessels for Project infrastructure during maintenance and repair. The Array Area is bisected by low-density boat tour routes.	Desktop assessment and utilisation of vessel traffic surveys coordinated in the Shipping and Navigation chapter (see Chapter 6.10: Shipping and Navigation). Stakeholder engagement.
Temporary/permanent displacement to tourism/recreational activities	6.17, 6.18, 6.30	**In**	Potential permanent displacement due to the physical presence of Project infrastructure or change in marine conditions (e.g. wave patterns, water quality etc) that may impact recreational users. Various recreational activities recorded within the Offshore Infrastructure, Other Sea Users, Tourism and Recreation Study Area, with high activity levels recorded along the coast.	Desktop assessment using data and consultation from the RYA and Marine Directorate. Outputs from the Marine Water and Sediment Quality Chapter and Coastal (Chapter 6.3: Marine Sediment and Water Quality) and Physical Processes Chapter (Chapter 6.1: Physical and Coastal Processes) will also be considered.

6.12.6 Proposed Approach to EIA

6.12.6.1 Relevant Data Sources

No modelling or site-specific surveys are proposed for the assessment of Offshore Infrastructure, Other Sea Users, Tourism and Recreation. Data sources identified within this Chapter of the Scoping Report will be utilised, as well as additional sources highlighted within scoping responses, to characterise the baseline environment. There is also potential to draw on survey data included in other chapters of this Scoping Report, such as the vessel traffic surveys required to inform the Navigational Risk Assessment and discussed further in Chapter 6.10: Shipping and Navigation, as well as outputs of the Physical and Coastal Processes studies (Chapter 6.1: Physical and Coastal Processes).

6.12.6.2 Consultation

Consultation with relevant Offshore Infrastructure, Other Sea Users, Tourism and Recreation stakeholders will be undertaken to ensure the key impacts and receptors have been clearly identified prior to submission of the Environmental Impact Assessment Report (EIAR). Key consultees will include:

- Marine Directorate;
- Comhairle nan Eilean Siar;
- Scottish Environmental Protection Agency;
- North Sea Transition Authority;
- British Telecom;
- Aquaculture operators; RYA Scotland and local sailing groups;
- Sport Scotland;
- Local Stakeholders, such as boat tour operators;
- Outer Hebrides Chamber of Commerce;
- Immerse Hebrides
- Scottish Surfing Federation;
- Surfers Against Sewage;
- Surf Lewis and other local surf clubs;
- Scottish Canoe Association and local canoe clubs;
- Federation of Sea Anglers and local sea angling clubs.

It is recognised that there is overlap with Chapter 7.9: Land Use, Tourism and Recreation. For clarity, the potential indirect amenity effects on onshore tourism and recreation receptors located within 10 km of the Array Area are addressed within Chapter 7.9: Land Use, Tourism and Recreation.

6.12.6.3 Policy, Legislation and Guidance

The following summarises policy, legislation and guidance relevant to Offshore Infrastructure, Other Sea Users, Tourism and Recreation:

Table 6.12-4 Legislation, Policy and Guidance relevant to the Offshore Infrastructure, Other Sea Users, Tourism and Recreation assessment

<table>
<tr><th colspan="2">Relevant Legislation, Policy and Guidance</th></tr>
<tr><td colspan="2">Scottish Planning Policy (Scottish Government, 2014a)</td></tr>
<tr><td colspan="2">Scottish National Planning Framework (NPF) (Scottish Government, 2014b)</td></tr>
<tr><td colspan="2">Scotland’s National Marine Plan (Marine Directorate, 2015b</td></tr>
<tr><td colspan="2">Regional and locational guidance for offshore wind energy in Scottish waters (ABPmer and Marine Directorate, 2020)</td></tr>
<tr><td colspan="2">Guidance on Environmental Impact Assessment of Offshore Renewable Energy Development on Surfing Resources and Recreation (Surfers Against Sewage (SAS), 2009);</td></tr>
<tr><td colspan="2">Marine Protected Areas in inshore waters: guidance for undertaking Socio-Economic Impact Assessments (SEIA) (Scottish Government, 2022)</td></tr>
<tr><td colspan="2">The RYA’s Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019b)</td></tr>
<tr><td rowspan="3">European Subsea Cables Association (ESCA) guidelines on:</td><td>The proximity of offshore renewable energy installations and submarine cable infrastructure in UK waters (ESCA, 2016)</td></tr>
<tr><td>Marine aggregate extraction proximity guidelines (ESCA, 2017)</td></tr>
<tr><td>Notifications to vessels operating in close proximity to subsea assets (ESCA, 2020)</td></tr>
<tr><td rowspan="2">The Crown Estate (TCE) guidance on:</td><td>Export transmission cables for offshore renewable installations (TCE, 2012a)</td></tr>
<tr><td>Submarine cables and offshore renewable energy installation – proximity study (TCE, 2012b)</td></tr>
<tr><td colspan="2">Department of energy and climate change guidance notes on applying for safety zones around offshore renewable energy installations (DECC, 2011).</td></tr>
</table>

6.12.6.4 Assessment Methodology

The assessment methodology will follow the proposed approach to the EIA outlined in Chapter 4: Proposed Approach to EIA. A qualitative assessment will be undertaken and presented within the EIAR. This will be based on a detailed desk-based review of data sources and supported by consultation with relevant stakeholders and operators. Any potential likely significant effects scoped in will be identified and assessed to consider the maximum design envelope of the Project and considered the sensitivity of receptors, defined by their value and capacity to accommodate change. The assessment therefore uses professional judgement rather than formal guidelines for a methodology and assesses impacts on a case by case basis.

The potential for cumulative effects to occur as a result of the Project with other plans or projects will also be assessed.

Appropriate conclusions from Chapter 7.9: Land Use, Tourism and Recreation, Chapter 6.13: Seascape, Landscape and Visual Impact Assessment (SLVIA); Chapter 7.1: Landscape and Visual Impact Assessment; and Chapter 8.2: Socio-Economics will be utilised to inform the assessments within the Offshore Infrastructure, Other Sea Users, Tourism and Recreation EIAR chapter.

As no potential Offshore Infrastructure, Other Sea Users, Tourism and Recreation receptors associated with other States have been identified, and the Project is set to occur entirely within Scottish waters, it is considered that there is no potential for transboundary impacts to occur during the construction, operation and decommissioning phases of the Project.

6.12.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Tourism, Recreation, Infrastructure and Other Sea Users include:

1. Do you agree that the data sources identified are sufficient to inform the Offshore Infrastructure, Other Sea Users, Tourism and Recreation baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all Offshore Infrastructure, Other Sea Users, Tourism and Recreation receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the potential likely significant effects in the EIA Scoping Assessment table for Offshore Infrastructure, Other Sea Users, Tourism and Recreation?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential likely significant effects of the Project on Offshore Infrastructure, Other Sea Users, Tourism and Recreation receptors?

6.12.8 References

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6.13 Seascape, Landscape and Visual Impact Assessment (SLVIA)

6.13.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Seascape, Landscape and Visual Impact Assessment (SLVIA) within the Offshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

This chapter focusses on the effects of the Offshore Infrastructure components of the Project which includes the wind turbine generators (WTG) and their associated foundations, Offshore Substation Platforms (within the Array Area, if required), the inter-array cables, offshore export cables, and Landfall (below mean-high water springs). The effects of the Onshore Infrastructure of the Project are covered in Chapter 7 Landscape and Visual Impact Assessment.

This Chapter is supported by the following figures:

- **Figure 6.13-1** SLVIA Study Area.
- **Figure 6.13-2** Blade tip Zone of Theoretical Visibility (ZTV) with Proposed Viewpoints.
- **Figure 6.13-3** Coastal Character Types and Landscape Character.
- **Figure 6.13-4** Landscape Planning Designations and Defined Areas with ZTV.
- **Appendix A** Blade tip ZTV with Key Visual Receptors and Proposed Viewpoints (A3 extracts with 1:50,000 Ordnance Survey base mapping).

6.13.2 Study Area

The SLVIA Study Area has been defined on the basis of the extent of potential significant effects arising from the key operational elements of the Offshore Infrastructure of the Project which are the Wind Turbine Generators (WTGs), and is defined by a radius of 60 kilometres (km) from the Array Area boundary, as illustrated in **Figure 6.13-1**. Broadly, the SLVIA Study Area covers an area of the Atlantic Ocean and the adjoining northern coast of the Isle of Lewis. Informed by professional judgement, a 60 km SLVIA Study Area is defined as the outer limit of the area where significant visual effects could occur.

Institute of Environmental Management and Assessment (IEMA) Guidance (IEMA, 2015; 2017) recommends a proportionate Environmental Impact Assessment (EIA) focused on the significant effects and a proportionate EIA Report chapter. An overly large SLVIA Study Area may be considered disproportionate if it makes the understanding of the key impacts of the Project more difficult.

This is supported by Landscape and Visual Impact Assessment (LVIA) Guidance produced by the Landscape Institute (GLVIA3) (Landscape Institute, 2013). This guidance recommends that:

"the level of detail provided should be that which is reasonably required to assess the likely significant effects". It also states that *"the study area should include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner"*.

Other wind farm specific guidance, such as NatureScot's Visual Representation of Wind Farms Guidance (NatureScot, 2017) recommends that ZTV distances are used for defining the Study Area based on WTG (Wind Turbine Generator) height. This guidance recommends a 45 km radius for WTGs greater than 150 metres (m) to blade tip but doesn't cover turbines above 150 m in height. The height of current offshore WTG models now exceeds the heights covered in this guidance. The NatureScot guidance recognises that greater distances may need to be considered for larger WTGs used offshore, as is the case for the SLVIA Study Area for the Project. A precautionary approach is taken in defining a 60 km radius Study Area for the Project due to the 380 m blade tip height (above Mean Sea Level (MSL)) of the proposed WTGs.

The SLVIA will generally focus on locations from where it may be possible to see the Project, as defined by the Blade Tip ZTV (see **Figure 6.13-2**, **Figure 6.13-4** and **Appendix A**).

The Blade Tip ZTV indicates that theoretical visibility of the Project mainly occurs within 60 km and that beyond this distance, the geographic extent of visibility will become increasingly restricted. At distances over 60 km, the lateral (or horizontal) spread of the Project will also occupy a small 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.

The influence of earth curvature begins to limit the apparent height and visual influence of the WTGs visible at long distances (such as over 60 km), as the lower parts of the turbines would be partially hidden behind the apparent horizon, leaving only the upper parts visible above the skyline.

In considering the SLVIA Study Area, the sensitivity of the receiving seascape, landscape and visual receptors has also been reviewed, taking account of landscape designations (see **Figure 6.13-4**) and other visual receptors. The principle issue for the SLVIA is the Array Area location, which is near to the coast of the Isle of Lewis and Harris. Visibility of the Project from locations within this nearby coastal area, which includes the South Lewis, Harris and North Uist National Scenic Area (NSA) makes this area particularly susceptible to the effects of the Project.

It is proposed that effects arising from the Project beyond 60 km of the Array Area are omitted from the SLVIA chapter of the EIA, as they are unlikely to be significant. The SLVIA Study Area will be reviewed and amended in response to such matters as refinement of the Project, the identification of additional impact pathways and in response, where appropriate, to feedback from consultation. Feedback from consultees is requested specifically on the SLVIA Study Area.

6.13.2.1 Design Envelope Approach

Due to the nature of the Project and evolving technology there is uncertainty regarding the detail of the final project. To accommodate this, it is proposed that the SLVIA will be based on a 'Design Envelope' approach following Scottish Government (2022) Guidance for applicants on using the design envelope for applications under Section 36 of the Electricity Act 1989.

In accordance with the guidance the SLVIA will:

- Be undertaken on the basis of the relevant design parameters applicable to the characteristics of the Project included in the application documents;
- For each of the different receptors, establish those parameters likely to result in the maximum adverse effect (the worst-case scenario) and be undertaken accordingly to determine significance.

Figure 6.13-1 Seascape, Landscape and Visual Impact Assessment Study Area

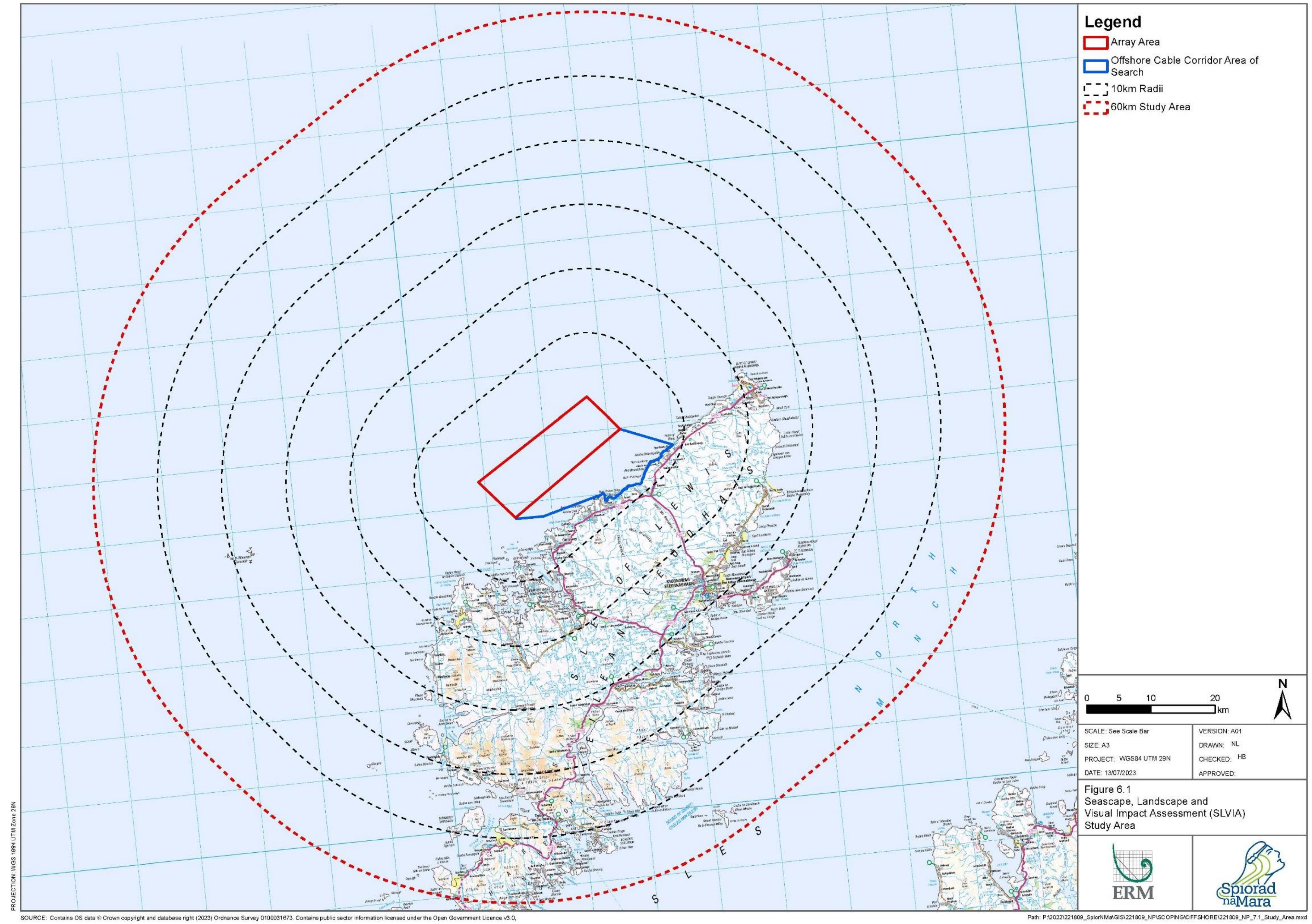


Figure 6.13-2 Blade tip Zone of Theoretical Visibility (ZTV) with Key Visual Receptors and Proposed Viewpoints

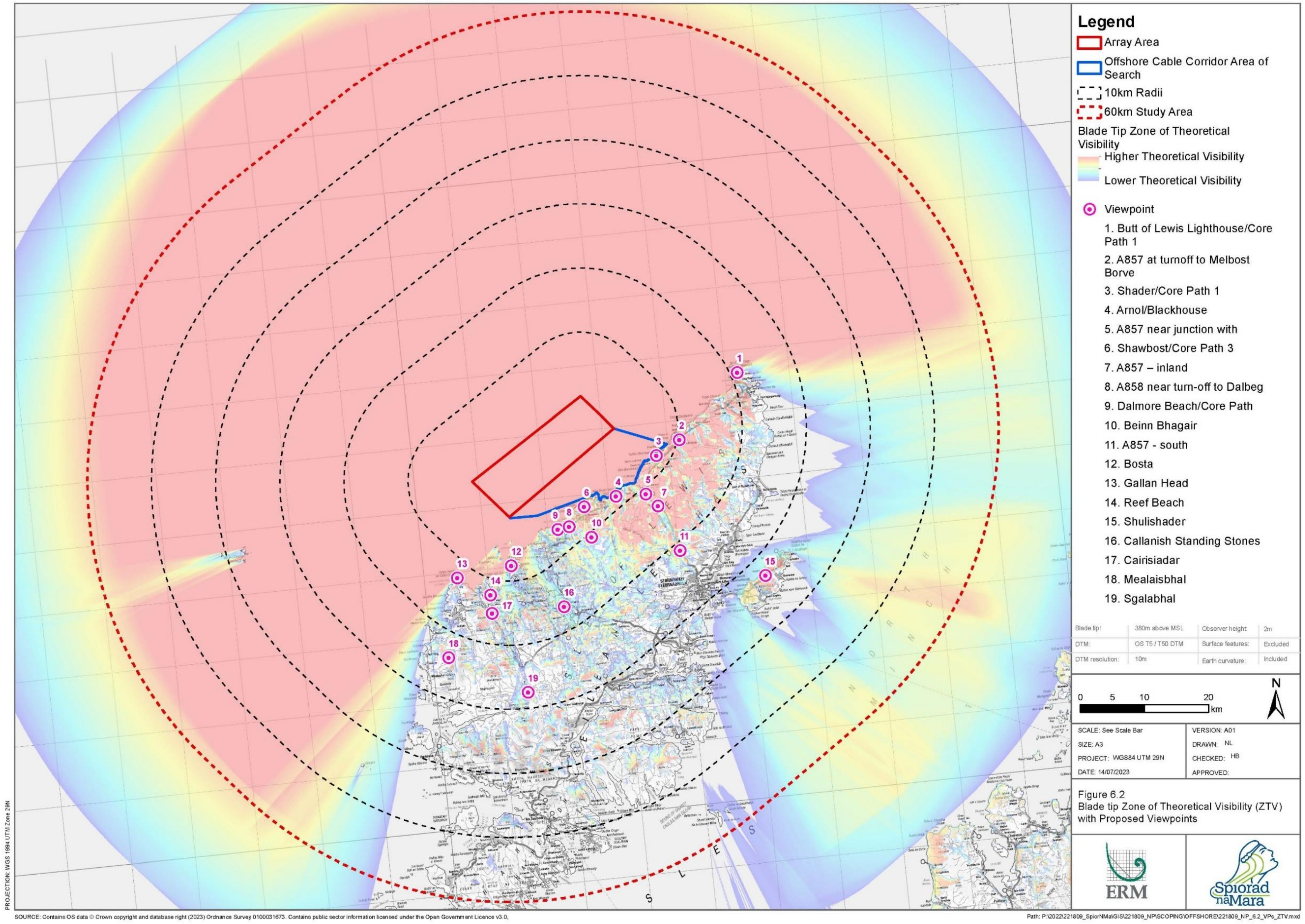
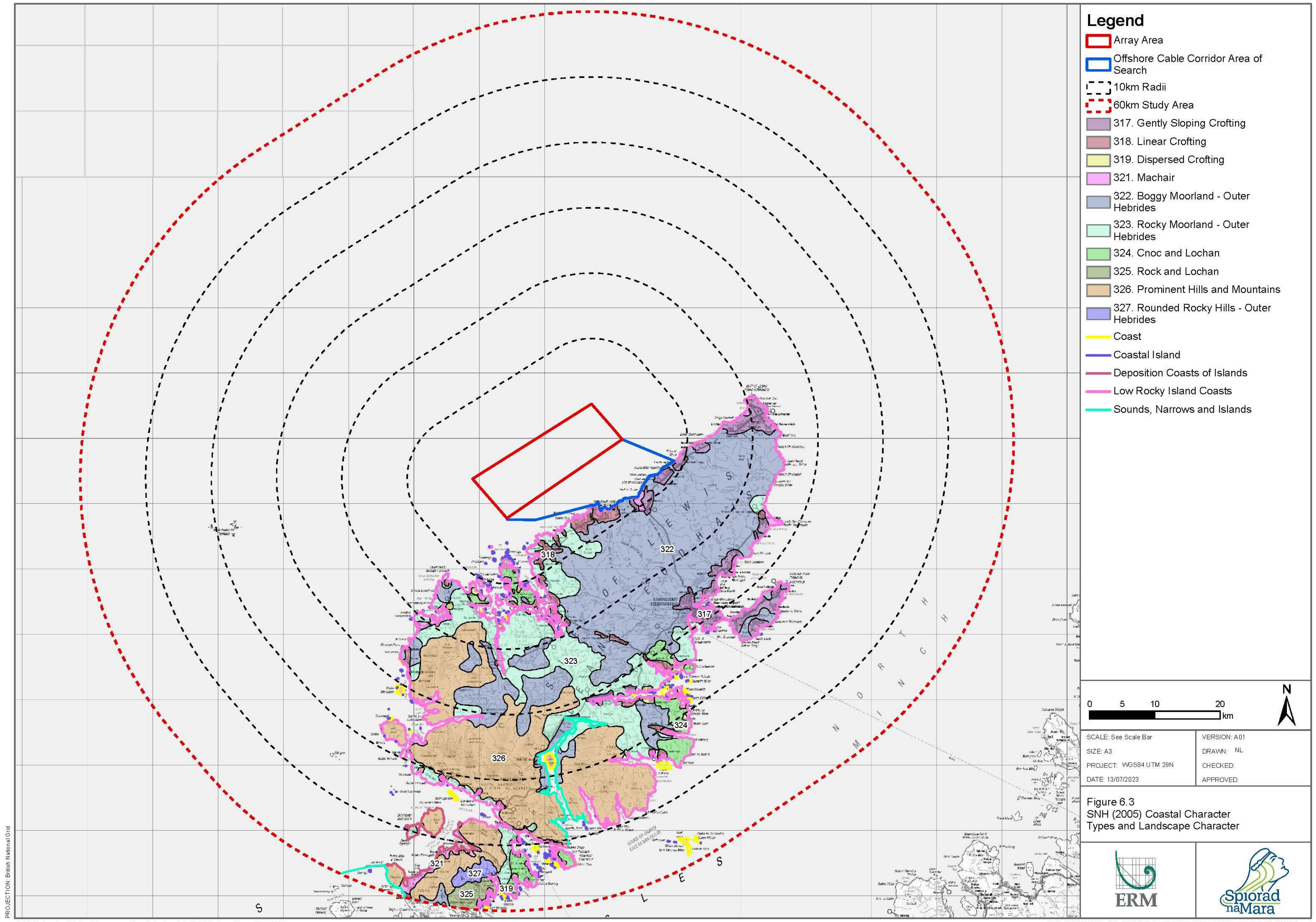


Figure 6.13-3 SNH (2005) Coastal Character Types and Landscape Character



SOURCE: Contains OS data © Crown copyright and database right (2023) Ordnance Survey 0100031673.
Contains NatureScot information licensed under the Open Government Licence v3.0.

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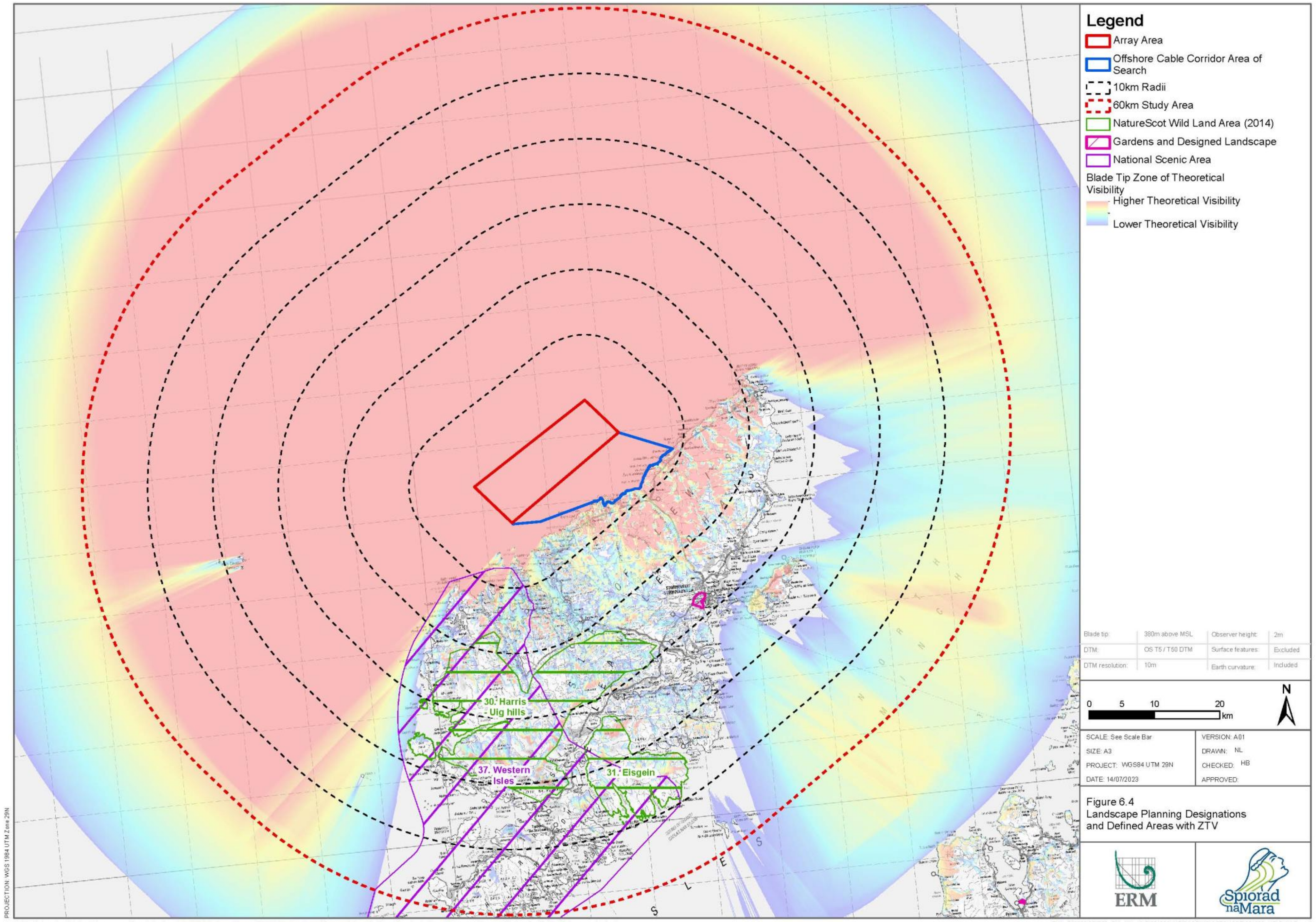
Figure 6.13-4 Landscape Planning Designations and Defined Areas with ZTV



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6.13.3 Baseline Environment

6.13.3.1 Data Sources

The data sources used to inform this SLVIA section of the Scoping Report are presented within **Table 6.13-1.** These data sources will be taken forward and used to inform the EIA, alongside any additional site-specific data that is collected for the Project.

Table 6.13-1 Summary of Key Publicly Available Datasets for Seascape, Landscape and Visual Resources

Source	Spatial Coverage	Year	Summary
Ordnance Survey 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	Digital Terrain Model.
Ordnance Survey Terrain 5 DTM	SLVIA Study Area	N/A	Digital Terrain Model.
Google Earth Pro	SLVIA Study Area	2022	Aerial Photography.
National Coastal Character Types. Available online at: https://www.nature.scot/professional-advice/landscape/coastal-character-assessment.	SLVIA Study Area	2010	Mapping of coastal characterisation in Scotland.
Scottish Landscape Character Types Map and Descriptions. Available online at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions	SLVIA Study Area	2019	Mapping and descriptions of areas of consistent and recognisable landscape character within Scotland.
SNH Review 92 - Western Isles landscape character assessment. Available online at: https://www.nature.scot/doc/naturescot-review-92-western-isles-landscape-character-assessment	The Western Isles	1998	Mapping and description of the Western Isles' landscape character.
National Scenic Areas - Scotland. Available online at: https://www.data.gov.uk/dataset/8d9d285a-985d-4524-90a0-3238bca9f8f8/national-scenic-areas-scotland	SLVIA Study Area	2023	Geographic Information System (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). Available online at: https://www.nature.scot/professional-advice/landscape/coastal-character-assessment	SLVIA Study Area	2010	Descriptions of the Special Qualities of the National Scenic Areas.
Wild Land Areas. Available online at: https://www.data.gov.uk/dataset/6bf02e7c-c3d6-4866-85ab-92471f73b2a3/wild-land-areas	SLVIA Study Area	2020	GIS dataset of Wild Land Areas.

Source	Spatial Coverage	Year	Summary
Gardens and Designed Landscapes. Available online at: https://www.historicenvironment.scot/advice-and-support/listing-scheduling-and-designations/gardens-and-designed-landscapes/	SLVIA Study Area	N/A	Mapping of Historic Environment Scotland's Inventory of Gardens and Designed Landscapes.
National Trust for Scotland. Available online at: https://www.nts.org.uk/visit/places	SLVIA Study Area	N/A	Mapping of specific visitor attractions/tourist destinations.
Outer Hebrides Core Paths Plan. Available online at: https://www.cne-siar.gov.uk/leisure-sport-and-culture/community-life-and-leisure/countryside-access/core-paths-planning-in-the-hebrides/	The Western Isles	N/A	Mapping of core paths within the Western Isles.
National Cycle Network. Available online at: https://data-sustrans-uk.opendata.arcgis.com/	SLVIA Study Area	N/A	GIS dataset of signed on-road and traffic-free cycling routes across the United Kingdom (UK).
Marine and Coastal Mapping Data, Ferry Routes. Available online at: https://www.oceanwise.eu/data/	SLVIA Study Area	N/A	GIS dataset of marine and coastal activity around the UK, including ferry routes.
UK Coastal Atlas of Recreational Boating. Available online at: https://www.rya.org.uk/knowledge/planning-licensing/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.

6.13.3.2 Overview of Baseline Environment

Coastal Character

Rather than classifying seascape, NatureScot promotes the coastal character approach, which focuses on the coastal edge, drawing on both 'seaward' and 'landward' elements as a means of characterising coastal landscapes. 13 National Coastal Character Types (NCCT) were initially identified in 'An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms' (Scott *et al.*, 2005), of which 3 occur within the SLVIA Study Area (see **Figure 6.13-3)**:

- Deposition Coasts of Islands (NCCT 12) including sub type 12a: Machair with Mountain Backdrop;
- Low Rocky Island Coasts (NCCT 13) 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;
- Sounds, Narrows and Islands (NCCT 9).

There is no more detailed coastal character assessment available for the western coastline of Harris and Lewis. It is proposed that a regional scale coastal character assessment will be undertaken and described as part of the assessment, as required, to inform the assessment of effects on the coastal landscapes. This is consistent with the approach taken for other offshore wind farm SLVIAs and is considered appropriate for this scale of development. It is proposed that this would be focussed on the coastline between Aird Mhor Mhangarstaid and Butt of Lewis where the Array Area visibility is likely to be concentrated.

Landscape Character

Published Landscape Character Assessments describe the baseline character of the landscape within the SLVIA Study Area at a national and regional level. NatureScot's landscape character map (NatureScot, 2019) and associated Landscape Character Type (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 character resulting from the Project.

The relevant NatureScot LCTs are shown in **Figure 6.13-3** and listed below:

- Boggy Moorland - Outer Hebrides (LCT 322);
- Cnoc and Lochan (LCT 324);
- Dispersed Crofting (LCT 319);
- Gently Sloping Crofting (LCT 317);
- Linear Crofting (LCT 318);
- Machair (LCT 321);
- Prominent Hills and Mountains (LCT 326);
- Rocky Moorland - Outer Hebrides (LCT 323).

Landscape Planning Designations and Defined Wild Land Areas

There are no designations specifically to protect the character of the seascape. There are, however, terrestrial areas within the SLVIA Study Area that have been attributed a landscape planning designation and some of these include areas of sea, close to the coast. These landscape planning designations include National Scenic Areas, designated by NatureScot and safeguarded by Scotland's planning system; and Gardens and Designed Landscapes (GDLs), which are selected for inclusion in the Inventory of Gardens and Designed Landscapes by Historic Environment Scotland (see **Figure 6.13-4**).

South Lewis, Harris and North Uist NSA lies within the SLVIA Study Area, approximately 7.2 km to the southwest of the Array Area, at its closest point. It is proposed that this NSA is included in the SLVIA, owing to its close association with the seascape context where the Project would be located. The SLVIA will assess the likely effects of the Project on this NSA, based on the citation presented by NatureScot (2010). There are several of the Special Qualities listed by NS that note the importance and diversity of the seascape as well as the sense of remoteness. The wildness characteristics of South Lewis are reinforced by the identified Special Quality of 'The wild, mountainous character'. Effects on these described special qualities will be a key consideration in relation to the Project.

Harris - Uig Hills Wild Land Area (WLA), defined by NatureScot is not a landscape planning designation but recognised in National Planning Framework 4 (NPF4) and regional planning policy as a nationally important mapped interest. While WLAs are afforded protection for their wildness qualities, they are not statutorily protected in the way that National Parks and National Scenic Areas are for their scenic qualities. In addition, NPF4 advises that where a development proposal is in an area identified as Wild Land it must be supported by a wild land impact assessment. The Project is not in an area identified as Wild Land and the Array Area is located 16.9 km from its boundary. NPF4 advises that *'Buffer zones around wild land will not be applied, and effects of development outwith wild land areas will not be a significant consideration.'* It is therefore proposed that a wild land impact is not required and the assessment of the effects on WLA is scoped out of the SLVIA.

The sole GDL within the SLVIA Study Area, Lews Castle and Lady Lever Park, has no potential to be significantly affected by the Offshore Infrastructure of the Project, due to lack of theoretical visibility of the Project, and will be omitted from further consideration within the SLVIA.

Those landscape designations which will be assessed in detail within the SLVIA are listed below:

- South Lewis, Harris and North Uist NSA.

Agreement to this is sought through this scoping exercise, in order to enable the SLVIA to be focussed on key considerations.

Visual Baseline

The visual baseline experienced from within the SLVIA Study Area ranges from simple and expansive views of open sea, from the northwest of the Isle of Lewis to more complex and enclosed views of the sea, to the southeast.

North of Carloway, the coastline of the Isle of Lewis and Harris is straighter with a northwesterly aspect. This rocky coastline is fairly large in scale and backed a coastal strip of crofting and a flat hinterland of moorland behind. Expansive views to the open sea are commonplace throughout. Settlement is relatively sparse and low in level and perceptions of relative wildness and exposure come from the strong influence of the sea. South of Carloway, the coastline is more complex and visibility of the sea varies. This section of coast is more indented and fragmented with more enclosure and a complex range of views of the sea, islands and hinterland. This more isolated stretch of coastline is sparse in settlement, with generally quiet roads and contains a large area devoid of settlement.

The coastline nearest to the Array Area within the SLVIA Study Area is generally rural in character, predominated by the linear patterns of crofting and is strongly associated with the sea. There are numerous settlements along the coastline, including Eoropie, Ness, Cross, North Galson, Borve, Shader, Barvas, Arnol, Bragar, Shawbost and Carloway. These are generally small, linear and clustered around the A858 and the contiguous A587, which are set back from the coast between Port of Ness and Carloway, only joining the coast around Breasclete.

Zone of Theoretical Visibility

The visual baseline described is largely defined by the ZTV shown in **Figure 6.13-2, Figure 6.13-4** and **Appendix A**. The ZTV shows the main area in which the Project would theoretically be visible, highlighting the different groups of people (visual receptors) who may experience views of the WTGs located within the Array Area and assisting in the identification of viewpoints where they may be affected. The ZTV is based on wind turbines of 385 m to blade tip (above MSL) and represents a likely worst-case scenario for the SLVIA considered in the scoping assessment, which has been derived from a turbines spaced across the Array Area at this early stage in the process.

The blade tip ZTV illustrates that the area affected by visibility of the Project is mostly sea. The terrestrial areas of the SLVIA Study Area with theoretical visibility of the Project lie mainly towards the Atlantic coastline, to the northwest of the Isle of Lewis and Harris; and extends over much of the Island north of Stornoway and the northwest of the Eye Peninsula. The ZTV indicates higher levels of theoretical visibility of the Project within these areas. The eastern coastline of the Isle of Lewis and Harris has no theoretical visibility of the Project. The ZTV is more extensive and continuous along the simpler, straighter coastline north of Carloway and extending north to Butt of Lewis. South of Carloway to Gallan Head, the more complex and indented coastline restricts higher theoretical visibility of the Project to the immediate coastline and higher ground facing the Array Area. The ZTV within the wider area of southern Isle of Lewis and Harris is much more fragmented, varying and limited to higher points within the island.

The coastline is closest to the Array Area between Aird Laimisiadair and Rubha Leathann north of Ballantrushall, approximately 5.6 km and 6.8 km from its boundary, respectively. The nearest point of the island to the Array Area is Gob a’Chuthail north of Garenin, approximately 4.8 km away. It is anticipated that the generally low incidence of tree cover and large built form within the Isle of Lewis and Harris will ensure that actual visibility is similar to theoretical visibility in terms of the geographical extent of the visual influence of the Project.

Between the Butt of Lewis and Garenin, the ZTV encompasses popular sandy beaches at Eoropie, Shawbost, Dalmore and Dalbeg; and behind, crofting settlements that are characteristic of the northwestern coastline including Europie, Ness, Cross Dell, North Galson, Borve, Shader, Barvas, Arnol, Bragar and Shawbost. Apart from Garenin and Carloway, where backing hills intervene, theoretical visibility of the Project from these settlements is generally higher due to their coastal location, local topography and limited screening which allows expansive views of open sea. This remains true for the sections of the A857 and A858 which are inset but run along the coastline from Port of Ness to Carloway; and the minor roads connecting these communities to these ‘A’ roads. The A857 connects Lower Barvas with Stornoway, generally running southeast through moorland within the interior of the Isle of Lewis and Harris. Much of this section of the road lies within the ZTV, which indicates lower theoretical visibility of the Project. Similar visibility is indicated from the minor road connecting Carloway with Stornoway, which also runs generally southwest, with ZTV coverage as far south as Cleichean Beag. Between Carloway and Achmore, the A858 has more intermittent and lower theoretical visibility of the Project, while Breasclete has none. Further west, the ZTV is increasingly intermittent. ZTV coverage of the B8059 running southeasterly from Great Bernera to the B8011, is varied but largely consistent. To the west and nearly parallel to the B8059, ZTV coverage of the B8011 is more intermittent with generally lower levels of theoretical visibility of the Project.

ZTV coverage of the Butt of Lewis West Coast Path (1), Na Gearrannan to Bragar Coastal Path (3) is consistent as shown on **Figure 6.13-2**. The distance from the Array Area and deeper relief of the landscape to the north and south, lowers the otherwise high theoretical visibility of the Project from the southern and northern ends of these routes, respectively. Much of the Great Bernera Circular Route (5) lies within the ZTV with higher theoretical visibility indicated to its northern and eastern section. Further west and south, the Uuige – Tamanabhaigh Path (7) runs south from Carnish Beach to Loch Tamnabhaigh and lies within the ZTV as far south as Loch a Chama. Lower theoretical visibility from this route is indicated.

Visual Receptors

The principle visual receptors in the SLVIA Study Area are likely to be found along the section of coastline closest to the Array Area, between Gallan Head and the Butt of Ness. These include people within the crofting communities and other settlements, visiting tourist facilities or historic environment assets; engaged in recreational activity, such as walking or cycling; and driving on roads.

An assessment will be undertaken in the SLVIA for those visual receptors that are most susceptible to visual changes arising from the Project and which may experience significant visual effects due to it; and will focus on visual receptors at locations where the sea is a strong influence in the baseline view, along the Isle of

Lewis coastlines between Gallan Head and the Butt of Ness, and within the immediate hinterland. This may include:

- Coastal settlements – such as Galson, Borve, Shader, Barvas, Arnol, Bragar, and Carloway;
- Visitor attractions/facilities – such as beaches (Dalbeg, Bosta), black houses (Garenin, Arnol), public open space, common land, coastal caravan and camping sites;
- Recreational routes – the Hebridean Way (cycling and walking routes), core path network including Butt of Lewis West Coast Path (1), Na Gearrannan to Bragar Coastal Path (3), Great Bernera Circular Route (5); and the wider path network;
- Vehicular routes – main transport routes including the A858, A857, B059, B8011 and several minor roads providing access to the communities listed above;
- High points – such as Mealaisbhal and Beinn Bhragair.

Representative Viewpoints

A proposed list of representative viewpoints is presented in **Table 6.13-2** based on the ZTV for the Project (**Figure 6.13-2**, **Figure 6.13-4** and **Appendix A**), the SLVIA receptors described above.

The viewpoints represent locations within the SLVIA Study Area at which sensitive visual receptors have potential to be significantly affected. The selection of the 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 to ensure suitable locations are used.

Comment on the proposed viewpoint locations is invited as part of this request for a Scoping Opinion. Visualisations and figures will be produced to NatureScot's standards as set out in 'Visual Representation of Wind farms: Version 2.2' (NatureScot, 2017).

Table 6.13-2 Proposed Representative Viewpoint Locations.

ID	Description	Approx. Grid Ref	Approximate Distance (to Array Area)	Reason for Selection
1 Butt of Lewis Lighthouse/Core Path 1	The viewpoint is located on the clifftops to the west of the Butt of Lewis lighthouse, which lies at the northern tip of the Isle of Lewis. The	151878 966467	21.1 km	The most easterly elements of the Project are potentially visible when looking along the coast. Representative of the area around the Butt of Lewis

ID	Description	Approx. Grid Ref	Approximate Distance (to Array Area)	Reason for Selection
	surrounding area is relatively wild and undeveloped. The view looks west along the coastline to the open sea from sloping crofting areas.			lighthouse, which is a popular signposted attraction with parking and interpretation boards.
2 A858 at turnoff to Melbost Borve	Nearer to the northern end of the Isle of Lewis, the viewpoint lies near the juncture of the A857 and the road to Melbost Borve. The view looks west from relatively level crofting areas to the open sea.	141836 957013	10.4 km	Potential visibility of the Project from the road and representative of the views of westbound road-users, people walking north to the coast on the recognised path route and residents.
3 Shader/Core Path 1	The viewpoint is located on the Lower Shader Road, where it meets the coast, just north of the settlement, adjoining Core Path 1. The view looks west from relatively level crofting areas to the open sea with the coastline of Lewis partially enclosing it.	138011 954939	7.8 km	Potential visibility of the Project from the coastline just north of Shader and Core Path 1. Representative of the view westwards seen by residents and people walking along the coast.
4 Arnol/Blackhouse	Located north of the main settlement and closer to the coast, the viewpoint lies near Arnol blackhouse with linear crofting to the west and moorland to the east. The view looks northwest over Port Mhor Bhraigair to the open sea.	131048 949299	8.2 km	Representative of views seen by visitors to the blackhouse, walkers on the core path and the similar views seen by residents of Arnol. Potential visibility of the Project beyond the bay and within the open sea. Sensitivity due to the number of visitors to the blackhouse, popularity with walkers along the coast and the open view across the inlet and sea.
5 A858 near junction with A857	Located within Barvas, the viewpoint lies on the A857 near the junction with the A858. From an area of crofting, the view looks north-northwest towards the sea,	135732 949127	11.0 km	The view is representative of those seen by westbound road-users on the A858 and residents, who have potential visibility of the Project beyond the coastline.

ID	Description	Approx. Grid Ref	Approximate Distance (to Array Area)	Reason for Selection
	over machair and Loch Mor Bharabhais.			
6 Shawbost/Core Path 3	Located at the northern end of the settlement and closer to the coast on Core Path 1, the viewpoint lies within an area of linear crofting. The view looks north over the coastline to the open sea.	126016 948175	6.3 km	Representative of views seen by residents and walkers along the coast. Potential visibility of the Project beyond the coastline and within the open sea. Sensitivity due to the number of residents, popularity with walkers and the natural quality of the open sea view.
7 A857 – inland	Within the boggy moorland of Lewis's interior, the viewpoint lies at a slightly elevated inland location on the A857 south of its junction with the A858. The view looks north-northwest towards Barvas and the open sea beyond.	137434 947122	13.7 km	The view is representative of those seen by northbound road-users who have potential visibility of the Project directly ahead. Higher sensitivity derives from the relatively large number of people that may be affected.
8 A858 near turn-off to Dalbeg	Located on the northern coast of Lewis, the viewpoint lies near the junction of the A858 and the road to Dalbeg. Rocky Moorland surrounds the viewpoint which overlooks linear crofting. The view looks northwest to open sea, with this westerly section of the Atlantic coast, appearing less complex than further west but more so than that further east.	123360 945315	7.2 km	Representative of the view seen by eastbound road-users, who have potential visibility of the Project directly ahead, framed by landform as eastbound receptors round a bend to face northwest. Sensitive due to the direct line of view, sudden appearance of the Project, and the complex landscape setting of the inlet, including the bay and headlands.
9 Dalmore Beach/Core Path 2	The viewpoint lies at the coastal edge of a small valley containing the settlement of Dalmore and surrounding linear crofting. Just north of the main settlement and on	121563 945073	6.4 km	Representative of the view seen by beach goers and users of Core Path 3 who have potential visibility of the Project from a less developed area within and looking away from the NSA.

ID	Description	Approx. Grid Ref	Approximate Distance (to Array Area)	Reason for Selection
	Core Path 1, the viewpoint overlooks open sea. The view is framed by the adjoining headlands.			Higher sensitivity derives from the complex landscape setting, including islands and headlands; and its small-scale.
10 Beinn Bhagair	The viewpoint is located at the summit of the 261 m hill, south of Shawbost and is surrounded by rocky moorland and overlooks linear crofting along the coastline. The view northwest to the open sea is panoramic.	126644 943301	10.7 km	Representative of walkers who have potential visibility of the offshore Project from this inland high point. Higher sensitivity derives from the relative wildness of surrounding landscape and coastline.
11 A857-south	The viewpoint lies on the A857, towards the southernmost stretch of road with potential visibility of the Project. The view looks north-northwest from within boggy moorland towards Barvas and the open sea beyond.	140152 939811	21.2 km	The view is representative of those seen by Northbound road-users who have potential visibility of the Project directly ahead. Higher sensitivity derives from the relatively large number of people that may be affected.
12 Bosta	On the northern coast of the small island of Great Bernera, this coastal viewpoint is located at the signposted beach near Bosta Cemetery and an iron age village, a Schedule Monument (SM73350, behind the beach. Within and overlooking a landscape of cnoc and lochan. Looking north-northeast, the coastline frames the view with Little Bernera ahead and the distinctive features of Bearasaigh and Stac an Tuil further west.	113750 940173	7.6 km	Representative of the view seen by beach goers, visitors to the iron age village, users of Core Path 3 and visitors to the cemetery, who have potential visibility of the Project from a less developed area within and looking away from the NSA. A bench indicates informal recognition of the view. Higher sensitivity derives from the complex landscape setting, including islands and headlands; and its small-scale.

ID	Description	Approx. Grid Ref	Approximate Distance (to Array Area)	Reason for Selection
13 Gallan Head	The coastal viewpoint is located towards the west of the Isle of Lewis's northern coast and lies on the Gallan Head headland near the World War 1 Royal Navy Observational Point. It is situated within and overlooks rocky moorland. The view looks northeast across open sea, the more inshore An Caolas and the northern coastline beyond.	105159 939151	12.5 km	Representative of views seen by visitors to the Observational Point who have potential visibility of the Project from a less developed area within the South Lewis, Harris and North Uist NSA. Higher sensitivity derives from the complex, small-scale mosaic of the landscape setting, including islands and headlands.
14 Reef Beach	Located on the west of the Isle of Lewis on the B8011 just south of Valtos, the viewpoint lies within campsite behind the larger of Valtos's beaches, Reef Beach. The view looks north-northwest across the beach and the several islands including Great Bernera to Lewis's Atlantic coastline.	110021 935958	12.5 km	Potential visibility of the Project from a popular beach with campsite within the South Lewis, Harris and North Uist NSA. Representative of beach goers and campers.
15 Shulishader	Located east of Stornoway, on the eye peninsula, the viewpoint lies at the southern end of Shulishader on the A866. The view from the slightly elevated viewpoint looks northwest. The landform of the Isle of Lewis screens the Atlantic Sea from view.	152999 934555	32.9 km	Potential visibility of the Project from a greater distance and at a slightly elevated location. Representative of residents and road users.
16 Cairisiadar	The viewpoint is located on the B8011 as it passes through Cairisiadar, on the shore of Loch Rog. The viewpoint looks north-northwest over Flodaigh, Loch and the surrounding headlands and island.	121299 932965	16.4 km	Representative of the view seen by residents and drivers on the B8011, who have potential visibility of the Project from within the South Lewis, Harris and North Uist NSA.

ID	Description	Approx. Grid Ref	Approximate Distance (to Array Area)	Reason for Selection
17 Callanish standing stones	The viewpoint is located at the southern end of Loch Rog An Ear and lies near an interpretation board at the southern end of the accessible path for the Callanish Standing Stones, a Scheduled Monument (SM90054). Linear crofting characterises the surrounding landscape. The view looks north, taking in the stones with Callanish and the hills of western Lewis enclosing them beyond.	109977 933095	15.3 km	Representative of visitors to the standing stone, who have potential visibility of the Project behind the standing stones and enclosing landform, with the NSA visible to the west. Highly sensitive due to the world-renowned historic monument and visitor attraction, with facilities including parking, café and shop; and the remote, quite complex, and undeveloped nature of the landscape setting.
18 Mealaisbhal	The viewpoint lies within the more hilly and mountainous area within the west of the Isle of Lewis, characterised as Prominent Hills and Mountains (LCT 326), and is located at the summit of the (575 m) hill. The viewpoint looks north-northwest, overlooking the surrounding hills and more complex coastline around Loch Rog and Loch Rog an Ear.	102531 926941	23.9 km	The view is representative of those seen by walkers on the hill, who have potential visibility of the Project from a relatively wild and undeveloped area. Higher sensitivity derived from the location within more sensitive, designated landscapes of South Lewis, Harris and North Uist NSA and Harris-Uig hills WLA (30).
19 Sgalabhal	The viewpoint lies at the summit of the (260 m) hill, to the south of the Isle of Lewis and Harris. A route to it runs from car parking on the A859. The view looks north across the hills and mountains of south Lewis to Lewis's Atlantic coastline.	114324 920257	27.5 km	Potential visibility of the Project from a high point within the Isle of Lewis and the South Lewis, Harris and North Uist NSA. Representative of walkers on the hill.

Note, selected viewpoints to inform the night-time visual assessment are to be determined and agreed through further stakeholder consultation and agreement.

Preparation of visualisations

The following visualisations are proposed for agreed viewpoints in accordance with NatureScot (2017a) visualisation standards:

- Daytime baseline photographs and cumulative wirelines – 90-degree field of view (cylindrical projection) with further 90 degree field of view increments where necessary to illustrate cumulative developments;
- Wireline view to include a 53.5-degree field of view (planar projection) for viewpoints to be agreed;
- Daytime photomontage to include a 53.5-degree field of view (planar projection) for viewpoints to be agreed;
- Night-time baseline photographs and wirelines – 90-degree field of view (cylindrical projection) for selected viewpoints to be agreed;
- Night-time photomontage to include a 53.5-degree field of view (planar projection) for agreed selected viewpoints to be agreed.
- Where appropriate the onshore works will be included in the SLVIA visualisations ie where the viewpoints are within the substation study area radius.

6.13.4 Embedded Mitigation

No embedded mitigation relevant to the SLVIA has been incorporated into the design of the Project at this stage. However, the Applicant is aware of the need for a design led approach to mitigation of the effects of the offshore wind farm in this location.

6.13.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

6.13.5.1 Likely Significant Effects

Potential likely significant effects on seascape, landscape and visual resources have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 6.13-3.**

Table 6.13-3 EIA Scoping Assessment for Seascape, Landscape and Visual Impact Assessment

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Impact (daytime) of the construction and decommissioning of the offshore elements of the Project, including activities associated with cable installation/removal, on coastal character		In	Potential for short -term, temporary impacts on perceived seascape/coastal character, arising from visibility of construction activities and structures related to the Project, which may alter the coastal character.	Assessed according to Methodology with reference to defined Coastal Character Areas and informed by the ZTV and visual assessment of representative viewpoints.
Impact (daytime) of the construction and decommissioning of the offshore elements of the Project on perceived landscape character		In	Potential for short-term, temporary impacts on perceived landscape character, arising because of the construction activities and structures located within the Project, which may be visible from the coast and may therefore affect the perceived character of the landscape.	Assessed according to Methodology with reference to LCTs and informed by the ZTV and visual assessment of representative viewpoints.
Impact (daytime) of the construction and decommissioning of the offshore elements of the 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 activities and structures within the Project, which may be visible from the coast and may therefore	Assessed according to SLVIA Methodology with reference to LCTs/special qualities of designated landscape and informed by the ZTV and visual assessment of representative viewpoints.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			affect the perceived character and qualities of the landscape.	
Impact (daytime) of the construction and decommissioning of the offshore elements of the Project on visual receptors/views		In	Potential for short-term, temporary impacts on views and visual amenity experienced by people from principle visual receptors and representative viewpoints, arising because of the construction 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 wirelines and photomontages for representative viewpoints.
Construction and decommissioning phase seascape, landscape, and visual impacts of the offshore elements of the Project outside the 60 km radius SLVIA Study Area (**Figure 6.13-1**)		**Out**	The 60 km radius SLVIA Study Area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 60 km due to the limited changes to views arising from the offshore elements of the Project over such distances.	None
Impacts of the construction and decommissioning of the offshore elements of the Project on physical aspects of landscape character.		**Out**	The offshore elements of the Project will only impact on the perception of character and qualities – which is considered as an indirect effect in LVIA. No physical attributes that define landscape character or special qualities of designated landscapes will be changed because of the Project.	None

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Impact of construction and decommissioning phase navigational and aviation warning lighting on visual receptors in the hours of darkness.		In	Navigational warning lights and aviation marking lights associated with construction and decommissioning will be on in the hours of darkness and visible from the coast.	Desk and field work review.
In-combination impacts of the offshore elements of the Project with the onshore elements of the Project on seascape, landscape and visual receptors.		In	Potential for in-combination impacts on the seascape, landscape and visual resource.	Desk and field work review.
Operation and Maintenance				
Impact (daytime) of the operation and maintenance of the offshore elements of the Project on coastal character.		In	Potential for long -term, reversible impacts on perceived seascape/coastal character, arising from visibility of the offshore elements of the Project, which may alter the coastal character.	Assessed according to SLVIA Methodology with reference to defined NCCTs and coastal character assessment and informed by the ZTV, and representative viewpoints.
Impact (daytime) of the operation and maintenance of the offshore elements of the Project on perceived landscape character		In	Potential for long -term, reversible impacts on perceived landscape character, arising from visibility of the offshore elements of the Project, which may alter the landscape character of areas within the Isle of Lewis and Harris.	Assessed according to SLVIA Methodology with reference to LCTs and informed by the visual assessment, ZTV and representative viewpoints.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Impacts (daytime) of the operation and maintenance of the offshore elements of the Project on perceived landscape character/special qualities of designated landscapes		In	Potential for significant, long term and reversible effects on perceived landscape character of LCTs and qualities of designated landscapes, arising from the operational wind turbines, and maintenance activities, which will be visible from the land and may therefore affect the perceived character and qualities of the landscape.	Assessed according to SLVIA Methodology with reference to defined LCTs/special qualities of designated landscapes and informed by the visual assessment, ZTV and representative viewpoints.
Impacts (daytime) of the operation and maintenance of the offshore elements of the Project on visual receptors/views within 60 km radius SLVIA Study Area (**Figure 6.13-1)**.		In	Potential for significant effects. Long term, reversible effects on views and visual amenity experienced by people at principle visual receptors and representative viewpoints, arising because of the visibility of operational wind turbines, and maintenance activities.	Assessed according to SLVIA Methodology with reference to defined LCTs and informed by the visual assessment, ZTV and representative viewpoints.
Effects (hours of darkness) of the operation and maintenance of the Project's visible aviation lighting on visual receptors/ views		In	Potential for significant, long term and reversible effects on views and visual amenity experienced by people from principle visual receptors and representative viewpoints arising because of the marine navigation and visible aviation lights.	Assessed according to SLVIA Methodology with reference to the visual assessment, baseline light assessment, lighting ZTVs and night time visualisations and representative viewpoints.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Operation and maintenance phase seascape, landscape, and visual impacts of the offshore elements of the Project outside the 60 km radius SLVIA Study Area (**Figure 6.13-1**)		**Out**	The 60 km radius SLVIA Study Area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 60 km due to the limited changes to views arising from the Project over this distance.	None
The seascape, landscape, and visual impacts of the operation of the offshore cables		**Out**	The offshore 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. Associated presence and activity of vessels will be relatively short-lived and intermittent with no potential for significant effects.	None
Impact of the operation and maintenance of the Project on the views experienced by offshore visual receptors		**Out**	Offshore receptors likely to be near the Array Area are not likely to be of high sensitivity and significant visual effects are unlikely to arise from the Project.	None
Cumulative impacts of the offshore elements of the Project on seascape, landscape and visual receptors when considered together		In	There are no cumulative offshore wind farms in the SLVIA Study Area. As similar existing, under construction and consented onshore	Assessed according to SLVIA Methodology with reference to defined Landscape Character Types/Special

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
with other existing, under construction or consented stage developments of a similar nature to the Project.			wind farms are present within the SLVIA Study Area, there is the potential for significant cumulative effects to arise.	Qualities of designated landscape and informed by the visual assessment and cumulative wirelines.
In-combination impacts of the offshore elements of the Project with the onshore elements of the Project when considered cumulatively together with other existing, under construction or consented stage developments of a similar nature to the Project. on seascape, landscape and visual receptors.		In	Potential for in-combination impacts on the seascape, landscape and visual resource.	Desk and field work review. The in-combination effects will be assessed in the LVIA chapter with cross reference to the SLVIA chapter. Visualisations included in the LVIA chapter will illustrate both onshore and offshore elements of the project where there may be a material in-combination effects.

6.13.6 Proposed Approach to EIA

6.13.6.1 Relevant Data Sources

The SLVIA will be informed by desk-based studies and field survey work undertaken within the SLVIA Study Area. The landscape, seascape and visual baseline will be informed by desk-based review of landscape and coastal character assessments, where available, and the ZTV, to identify receptors that may be affected by the offshore elements of the Project and produce written descriptions of their key characteristics and value.

A preliminary desk-based assessment will be undertaken of seascape, landscape and visual receptors using ZTV analysis, to identify which seascape, landscape and visual receptors are unlikely to be significantly affected, which will be subject to a simple assessment, and those that are more likely to be significantly affected by the Project, which require a detailed assessment.

Interactions will be identified between the offshore elements of the Project and seascape, landscape, and visual receptors, to predict potentially significant effects arising and measures may be proposed to mitigate effects.

For those receptors where a detailed assessment is required, primary data acquisition will be undertaken through a series of surveys. These surveys will include field survey verification of the ZTV from NCCTs/LCTs, micro-siting of viewpoint locations, panoramic baseline photography and visual assessment survey from all representative viewpoints (as listed in **Table 6.13-2**). Viewpoint photography and visual assessment surveys are planned to be started during Autumn 2023 subject to appropriate weather conditions.

If regional scale coastal character assessment is required to be undertaken this would be carried out in accordance with NatureScot, (2018) Guidance Note Coastal Character Assessment.

Further visual assessment surveys are then likely to be undertaken prior to the application submission, using the photomontage visualisations to undertake field survey assessment of visual effects from each representative viewpoint. Sea-based offshore surveys are not proposed to be undertaken as part of the SLVIA.

Assessment of the sensitivity of seascape, landscape and visual receptors will be undertaken, together with an assessment of the magnitude of change arising as a result of the offshore elements of the Project. Judgements on sensitivity and magnitude will be combined to arrive at an overall assessment as to whether the offshore elements of the Project will have an effect that is significant or not significant on each seascape, landscape, and visual receptor.

The SLVIA undertaken as part of the EIA will prepare baseline lighting analysis, aviation lighting ZTVs and selected night-time visualisations to inform the assessment of night-time visual effects of the proposed lighting of the offshore elements of the Project.

6.13.6.2 Consultation

Table 6.13-4 includes a preliminary list of consultees for SLVIA discussions, but is not considered comprehensive, and may be modified with additional consultees/stakeholders as they are identified.

Table 6.13-4 Preliminary List of Consultees

Consultee	Description
NatureScot	Statutory advisor to Scottish Ministers regarding environmental and natural heritage considerations; previously called Scottish Natural Heritage (SNH).
Comhairle nan Eilean Siar	Statutory consultee for application.

6.13.6.3 Policy, Legislation and Guidance

Table 6.13-5 summarises the policy and legislation which will be taken into consideration during the assessment of seascape, landscape and visual effects. The assessment will be undertaken in accordance with the methods outlined in the good practice guidance documents that are also included in **Table 6.13-5**

Table 6.13-5 Legislation, Policy and Guidance Relevant to the SLVIA

Relevant Legislation and Policy
European Landscape Convention (ELC)
NPF4
Outer Hebrides Local Development Plan (LDP) 2018, Policy NBH1: Landscape
Outer Hebrides Local Development Plan Supplementary Guidance for Wind Energy Development 2021
Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. Third edition
Landscape Institute (2021). Assessing landscape value outside national designations. Technical Guidance Note 02/21
NatureScot (2005). Commissioned Report No. 103 An assessment of the sensitivity and capacity of the Scottish seascape in relation to windfarms
NatureScot (2017a). Visual Representation of Windfarms: Version 2.2
NatureScot (2017b). Siting and Designing Windfarms in the Landscape, Guidance (Version 3a)
NatureScot (2021). Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments
NatureScot (2018). Guidance note Coastal Character Assessment

Relevant Legislation and Policy
NatureScot (2018). Guidance for Assessing the Effects on Special Landscape Qualities (Draft)
Scottish Government (2022). Guidance for applicants on using the design envelope for applications under section 36 of the Electricity Act 1989

6.13.6.4 Assessment Methodology

The objective of the assessment of the Project will be to predict the significant effects on the coastal, landscape, and visual resource. In accordance with the EIA Regulations, the SLVIA effects will be assessed to be either significant or not significant. The methodology to undertake the SLVIA will reflect the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (Landscape Institute, 2013).

The SLVIA will assess the effects of changes resulting from the 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 features of the Project that may result in coastal, landscape and visual effects will be described. The overall scope of the assessment will be defined, including the SLVIA Study Area and the range of possible seascape, landscape, and visual effects;
- The seascape/landscape baseline will be established using coastal/landscape character assessment and the ZTV of the Project, to identify seascape and landscape receptors that may be affected and their key characteristics and value;
- The visual baseline will be established by identifying the ZTV, identifying the people who may be affected and identifying visual receptors 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 can be scoped out of the assessment (in consultation with relevant stakeholders) and those that are more likely to be significantly affected by the Project, which require to be assessed in full;
- Interactions are identified between the Project and coastal, landscape, and visual receptors, to predict likely significant effects arising and measures that are proposed to mitigate effects.
- An assessment of the susceptibility of coastal, landscape and visual receptors to specific change and the value attached to landscape receptors and views will be undertaken, combining these judgements to assess the sensitivity of the landscape and visual receptors to the Project;
- An assessment of the size/scale of coastal/landscape impact, the degree to which seascape/landscape elements are altered and the extent to which the impacts change the key characteristics of the landscape will be undertaken, combining these judgements to assess the magnitude of change on each coastal/landscape receptor;

- An assessment of the size/scale of visual impact, the extent to which the change would affect views, whether this is unique or representative of a wider area, and the position of the Project in relation to the principle orientation of the view and activity of the receptor will be undertaken. These judgements are combined to assess the magnitude of change on the visual receptor;
- The assessments of sensitivity to change and magnitude of change will be combined to assess the significance of seascape, landscape, and visual effects.

The significance of effects will be assessed through a combination of two considerations – the sensitivity of the coastal, landscape or visual receptor/view and the magnitude of change that will result from the Project. 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.

Approach to assessment of effects

The SLVIA will focus on likely significant effects, rather than assessing all potential effects. This will allow determination of the key residual effects resulting from the Project and inform proposed mitigation.

A detailed methodology will be agreed with relevant stakeholders and set out in the EIA. The following section describes the broad principles and approach that will be applied. The key assessment stages will be:

- confirming the scope of the assessments, in terms of Study Areas extent, representative viewpoint locations, worst case scenarios for assessment, SLVIA content, and cumulative considerations;
- an iterative approach to the mitigation of potentially significant adverse impacts through the assessment process.

The SLVIA will include judgements in relation to the susceptibility, value and sensitivity of landscape and visual receptors, the predicted magnitude of change, and the predicted level of effect and whether these will be significant or not.

Consideration of the Project and landscape and visual impacts is based on a 'Design Envelope' approach following the Scottish Government (2022) Guidance for applicants on using the design envelope for applications under Section 36 of the Electricity Act 1989. A design envelope assessment approach is used in the SLVIA due to the uncertainty of the detail of the final project due to the nature of the Project and evolving technology.

In accordance with the guidance the SLVIA will:

- be undertaken on the basis of the relevant design parameters applicable to the characteristics of the Project included in the application documents;

- for each of the different receptors, establish those parameters likely to result in the maximum adverse effect (the worst-case scenario) and be undertaken accordingly to determine significance.

Cumulative assessment

Cumulative impacts will be considered as part of the EIA process. Developments of a similar type, nature, and scale will be identified and a list of cumulative developments to be considered in the SLVIA will be agreed with NatureScot and Comhairle nan Eilean Siar .

The assessment will consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the offshore Project, in the context of other developments that are either existing, consented/under construction, or at application stage.

The objective of the cumulative SLVIA is to describe, visually represent and assess the ways in which the offshore elements of the Project will have additional effects when considered together with other existing, consented or application stage developments of a similar nature and to identify related significant cumulative effects arising. The guiding principle in preparing the cumulative LVIA will be to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process. Existing and under construction energy development will form part of the baseline and the addition of the Project to this will be part of the main assessment.

The EIAR will include a section on the inter-relationship between the effects of the Offshore Project Infrastructure and the Onshore Project Infrastructure where the same receptors may be affected.

6.13.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to SLVIA include:

1. Do you agree with the data sources, including project specific surveys, to be used to characterise the SLVIA baseline within the EIA?
2. Do you agree that the assessment of the effects on coastal seascape character and landscape character should focus on a 60 km Study Area?
3. Do you agree with the proposal to scope out the landscape planning designations where no further assessment is proposed in the SLVIA?
4. Do you agree with the proposed list of representative viewpoints identified in **Table 6.13-2** and shown on **Figure 6.13-2** and **Appendix A**?
5. Do you agree with the approach to the assessment of visible aviation lighting?
6. Do you agree that all pathways, receptors, and potential likely significant effects have been identified for SLVIA?

7. Do you agree with the Project impacts which have been scoped out of the EIA for SLVIA?
8. Do you agree that transboundary impacts for SLVIA may be scoped out of the EIA?
9. Do you agree with the proposed approach to assessment?

6.13.8 References

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NatureScot, 2021. Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments.

Richards J., 1998. Western Isles landscape character assessment. *Scottish Natural Heritage Review* No. 92. Available online at: www.nature.scot/doc/naturescot-review-92-western-isles-landscape-character-assessment. [Accessed 13/06/2023].

Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R., 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. *Scottish Natural Heritage Commissioned Report* No.103 (ROAME No. F03AA06). Available online at: https://www.nature.scot/doc/naturescot-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation. [Accessed 15/06/2023]

Scottish Government, 2022. Guidance for applicants on using the design envelope for applications under Section 36 of the Electricity Act 1989. Available online at: https://www.gov.scot/publications/guidance-applicants-using-design-envelope-applications-under-section-36-electricity-act-1989/. [Accessed 13/05/2023]

Scottish Landscape Character Types Map and Descriptions. Available online at: www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions. [Accessed 05/06/2023]

7 Onshore Chapters

7.1 Landscape and Visual Impact Assessment

7.1.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Landscape and Visual Impact Assessment (LVIA) within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

This chapter focusses on the effects of the Onshore Infrastructure of the Project including onshore export cables, onshore substations and Landfall above mean-low water springs. The effects of the Offshore Infrastructure of the Project (located below mean high water springs) are covered in the SLVIA chapter.

This section is supported by the following figures:

- Figure 7.1-1 Maximum Extent of the LVIA Study Area;
- Figure 7.1-2 Visual Receptors;
- Figure 7.1-3 Landscape Character;
- Figure 7.1-4 Landscape Planning Designations and Defined Areas.

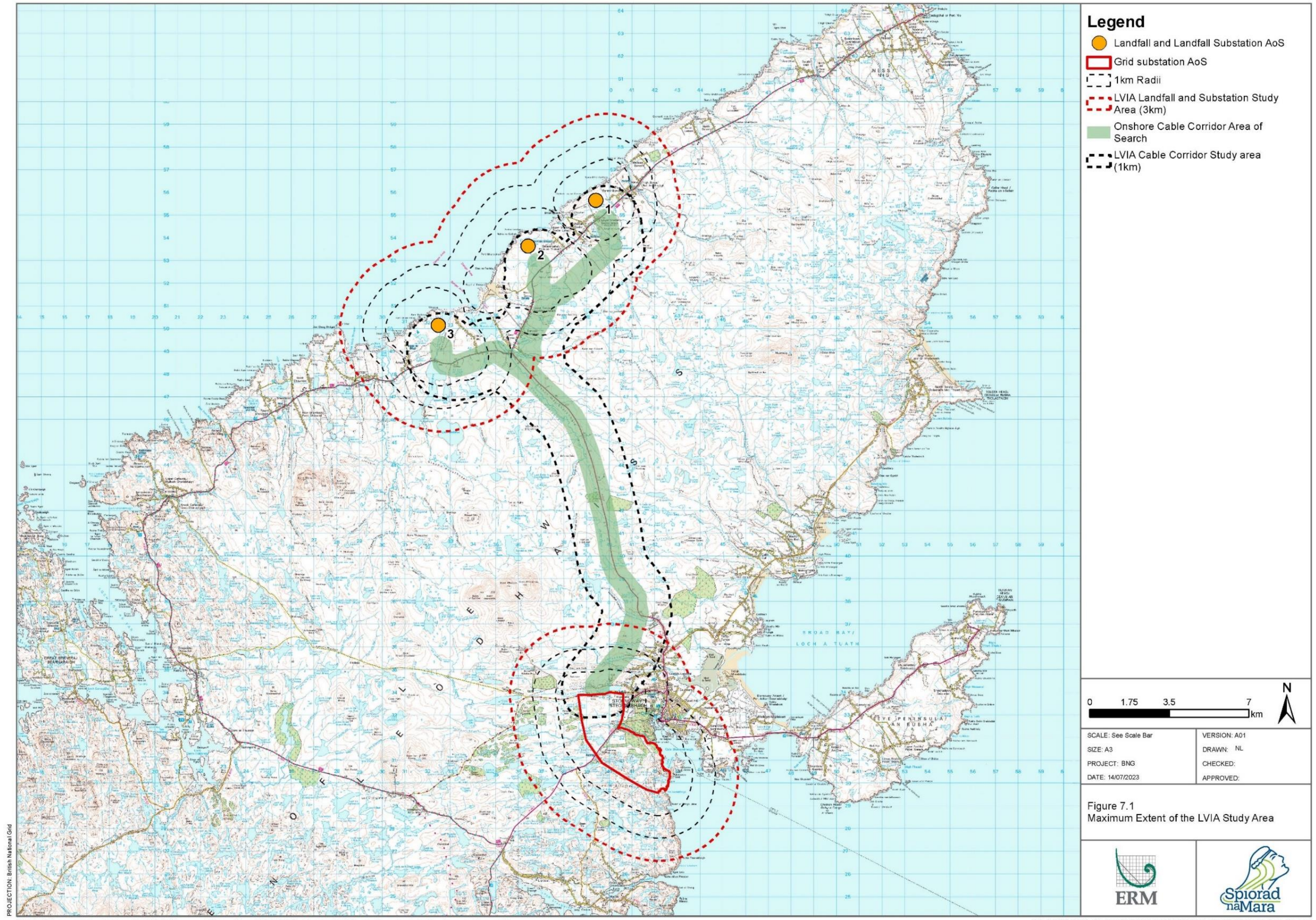
7.1.2 Study Area

The LVIA Study Area will be defined in relation to the Project footprint. For the purposes of this Scoping Report a maximum Study Area has been identified based on the current wider search areas. The Scoping LVIA Study Area comprises the Landfall and Landfall Substation Area of Search (AoS), Grid Substation AoS and Onshore Cable Corridor AoS as shown on **Figure 7.1-1**. At present, there are three AoS options for the location of Landfall and Landfall Substation AoS.

For LVIA purposes these will be narrowed down to encompass a more defined Study Area around the preferred locations for Onshore Substations locations; and a proposed Onshore Cable Corridor (working width of a maximum of approximately 100 m, with localised widening) through an iterative feasibility and assessment process, which includes consideration of landscape and visual matters. The LVIA Landfall and Substation Study Area is proposed to cover a 3 km radius from the selected Landfall and Landfall Substation and Grid Substation sites. The LVIA Cable Corridor Study Area will include a 1 km buffer from the Onshore Cable Corridor AoS that will be used in the assessment of the landscape and visual impact of the cable route, which will in the main be temporary, during construction only if it is entirely underground. In the event that a section of overhead line be required the study area and methodologies would be adjusted accordingly. The landscape and visual receptors would be identified and if required additional viewpoints would be considered within the assessment. These would be agreed with the appropriate authorities in the event that this scenario becomes necessary. The LVIA Study Area shown on **Figure 7.1-1** is considered to cover the maximum potential area within which significant effects may occur as a result of the Project and will be narrowed down for the purpose of the LVIA. The LVIA Study Area includes receptors lying above mean sea level.

The LVIA will be based on a Design Envelope approach following Scottish Government (2022) Guidance for applicants on using the design envelope for applications under Section 36 of the Electricity Act 1989. A reasonable worst-case scenario for the extent of the cable routeing works and the onshore substation(s) will be agreed with NatureScot and Comhairle nan Eilean Siar for the purpose of this assessment.

Figure 7.1-1 Maximum Extent of the LVIA Study Area



Path: P:\2022\221809_SpiorNMa\GIS\221809_NP\SCOPING\ONSHORE\221809_NP_7.1_Study_Area.mxd

Figure 7.1-2 Visual Receptors

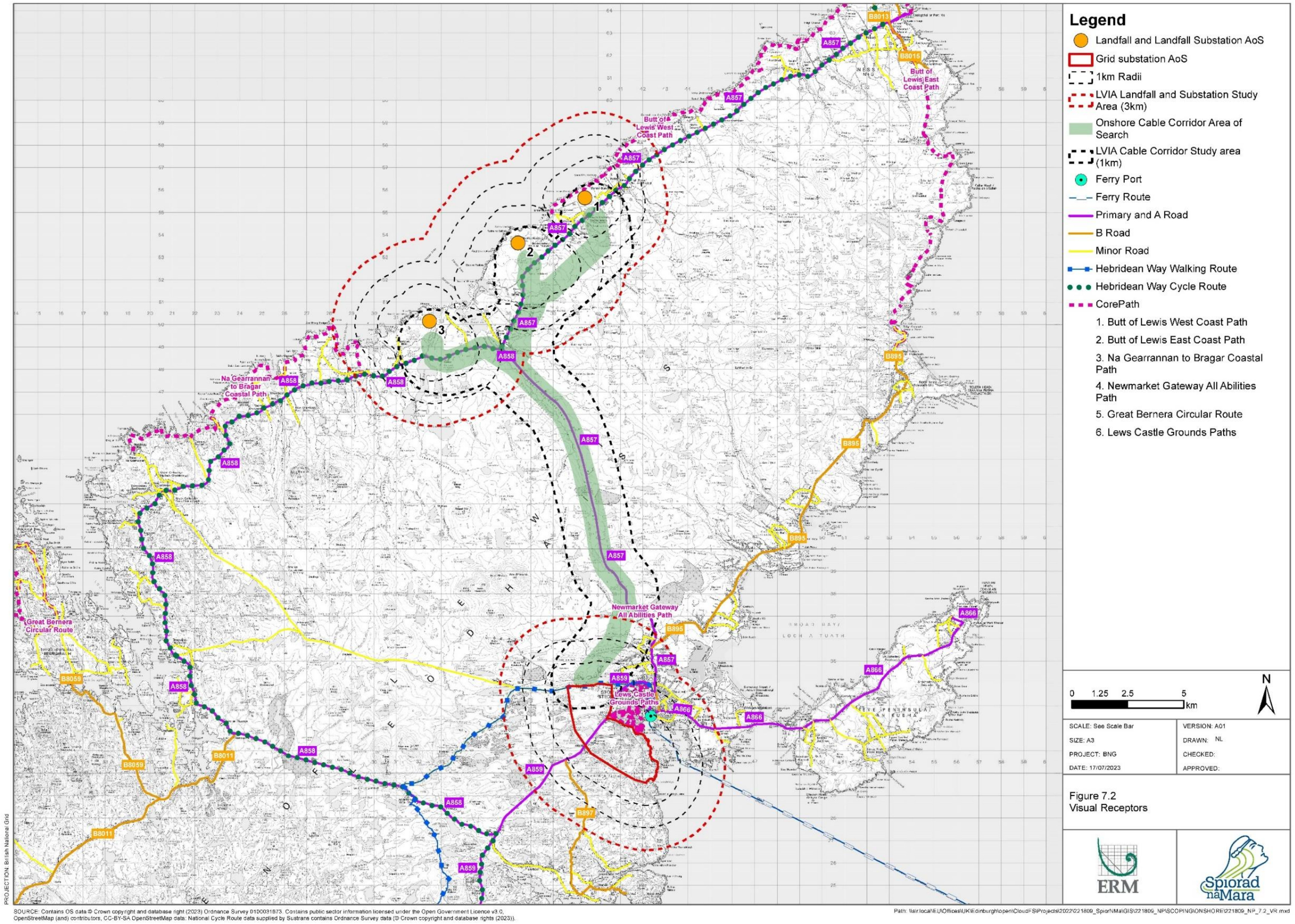
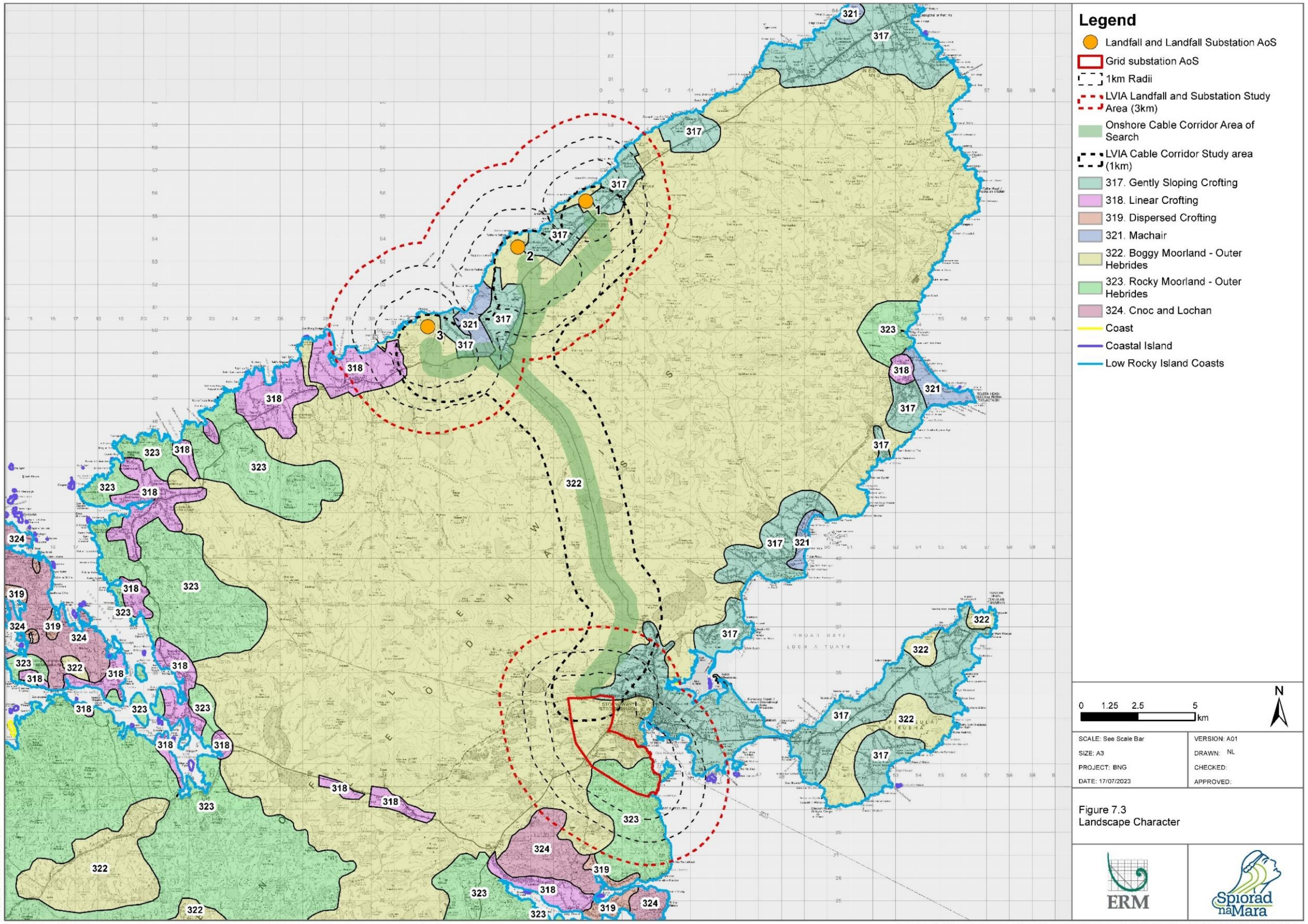


Figure 7.1-3 Landscape Character



SOURCE: Contains OS data © Crown copyright and database right (2023) Ordnance Survey 0100031673. Contains public sector information licensed under the Open Government Licence v3.0, Contains NatureScot information licensed under the Open Government Licence v3.0.

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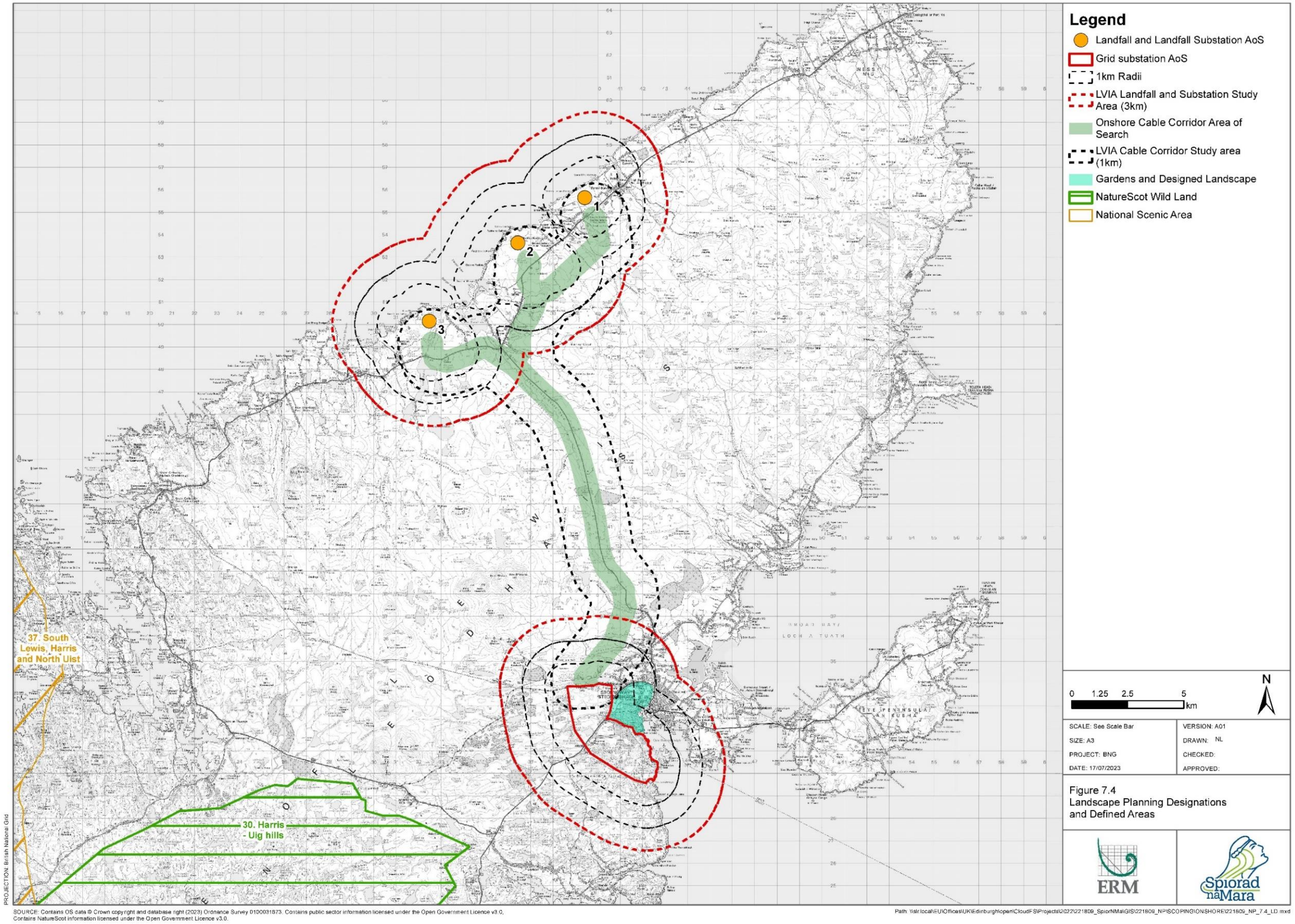
Figure 7.1-4 Landscape Planning Designations and Defined Areas



7.1.3 Baseline Environment

7.1.3.1 Data Sources

The data sources used to inform this LVIA section of the Scoping Report are presented within **Table 7.1-1** These data sources will be taken forward and used to inform the EIA, alongside any additional site-specific data that is collected for the Project.

Table 7.1-1 Summary of Key Publicly Available Datasets for LVIA

Source	Spatial Coverage	Year	Summary
Ordnance Survey 1:50,000 scale mapping	LVIA Study Area	N/A	Mapping
Ordnance Survey 1:25,000 scale mapping	LVIA Study Area	N/A	Mapping
Ordnance Survey County Region, Local Unitary Authority, Railways, Road and Settlements	LVIA Study Area	N/A	Mapping
Ordnance Survey Terrain 50 Digital Terrain Model (DTM)	LVIA Study Area	N/A	Digital Terrain Model
Ordnance Survey Terrain 5 Digital Terrain Model (DTM)	LVIA Study Area	N/A	Digital Terrain Model
Google Earth Pro	LVIA Study Area	2022	Aerial Photography
National Coastal Character Types. Available online at: https://www.nature.scot/professional-advice/landscape/coastal-character-assessment.	LVIA Study Area	2010	Mapping of coastal characterisation in Scotland.
Scottish Landscape Character Types Map and Descriptions. Available online at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions	LVIA Study Area	2019	Mapping and descriptions of areas of consistent and recognisable landscape character within Scotland.
SNH Review 92 – Western Isles landscape character assessment. Available online at: https://www.nature.scot/doc/naturescot-review-92-western-isles-landscape-character-assessment	Western Isles	1998	Mapping and description of the Western Isles' landscape character.
National Scenic Areas – Scotland. Available online at: https://www.data.gov.uk/dataset/8d9d285a-985d-4524-90a0-3238bca9f8f8/national-scenic-areas-scotland	LVIA 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). Available online at: https://www.nature.scot/professional-advice/landscape/coastal-character-assessment	LVIA Study Area	2010	Descriptions of the Special Qualities of the National Scenic Areas.

Source	Spatial Coverage	Year	Summary
Wild Land Areas. Available online at: https://www.data.gov.uk/dataset/6bf02e7c-c3d6-4866-85ab-92471f73b2a3/wild-land-areas	LVIA Study Area	2020	GIS dataset of Wild Land Areas.
Gardens and Designed Landscapes. Available online at: https://www.historicenvironment.scot/advice-and-support/listing-scheduling-and-designations/gardens-and-designed-landscapes/	LVIA Study Area	2023	Mapping of Historic Environment Scotland's Inventory of Gardens and Designed Landscapes.
National Trust for Scotland. Available online at: https://www.nts.org.uk/visit/places	LVIA Study Area	2023	Mapping of specific visitor attractions / tourist destinations.
Outer Hebrides Core Paths Plan. Available online at: https://www.cne-siar.gov.uk/leisure-sport-and-culture/community-life-and-leisure/countryside-access/core-paths-planning-in-the-hebrides/	Western Isles	2023	Mapping of core paths within the Western Isles.
National Cycle Network. Available online at: https://data-sustrans-uk.opendata.arcgis.com/	LVIA Study Area	2023	GIS dataset of signed on-road and traffic-free cycling routes across the UK.
Marine and Coastal Mapping Data, Ferry Routes. Available online at: https://www.oceanwise.eu/data/	LVIA Study Area	2023	GIS dataset of marine and coastal activity around the UK, including ferry routes.
UK Coastal Atlas of Recreational Boating. Available online at: https://www.rya.org.uk/knowledge/planning-licensing/uk-coastal-atlas-of-recreational-boating	LVIA Study Area	2019	GIS dataset of recreational boating activity around the UK, including indicators of intensity of use and general boating areas.

7.1.3.2 Overview of Baseline Environment

The baseline environment of the LVIA Study Area includes landscape elements, landscape character types, landscape planning designations and visual receptors (people) located onshore that may gain visibility of the Project.

Landscape Elements

The landscape elements that may be affected by the Project within the Isle of Lewis are likely to include rough grassland/peat moorland, crofting land, individual trees, plantation forestry and woodland.

Landscape Character

The landscape character types (LCTs) are derived from information prepared by NatureScot in 2019. This is a web-based dataset of mapped boundaries and descriptions (NatureScot, 2019). The following NatureScot LCTs are located within the LVIA Study Area, shown in **Figure 7.1-3** and will be included in the LVIA.

Gently Sloping Crofting (LCT 317) adjoins the Landfall and Landfall Substation AoS; the key characteristics of which are described as:

- "Long sweeping gentle slopes.
- Dividing buffers of common land between townships.
- Visually diverse due to land use management patterns.
- Rectangular field patterns.
- Graduation of landuse in the croft inbye from crops to grazing.
- Paucity of trees, limited to infrequent small areas of woodland.
- Crofting settlement set back from the shore.
- Repetitive pattern of croft houses backed by crofting strips.
- Strong simple relationship between the older croft buildings and the management of individual croft strips.
- Modern croft houses located behind original houses, of diverse design and constructed using diverse range of building materials.
- Occasional development of new small/medium housing schemes of contrasting layout to the original crofts.
- Remains of pre-crofting and prehistoric settlement, often including chapels and burial grounds, adjacent to the shore".

Linear Crofting (LCT 318) lies along much of the western coastline between the three Landfall options which make up the Landfall and Landfall Substation AoS options; the key characteristics of which are described as:

- "Strong linear rectangular field patterns on irregular landform of sweeping slightly concave slopes with rocky knolls, rising to rocky or boggy moor inland and sloping down to rocky shores or broad shallow glens.
- Medium scale landscape.
- Landcover dominated by improved and semi-improved grassland fields.
- Lack of tree cover, limited to a few small mixed and coniferous woodlands.
- Limited colour and textural diversity.
- Sharp contrast between inbye and outbye.
- House siting relates to topography, giving overall effect of being dispersed.
- Narrow buffer of common grazing between townships.
- Callanish stone circle complex".

An area of Machair (LCT 321) lies between the western (Option 3) and central (Option 2) landfall options; the key characteristics of which are described as:

- “Sweeping curves of coastal beaches.
- Dune systems.
- Expansive machair grasslands.
- Extensive multi-period settlement mounds.
- Frequent expansive views, often extending far out to sea.
- Sporadic and dispersed settlement pattern”.

The Landfall and Landfall Substation AoS and LVIA Cable Corridor Study Area largely lies within Boggy Moorland – Outer Hebrides (LCT 322); the key characteristics of which are described as:

- “Large scale, gently undulating peat moorlands.
- Relatively few landscape elements.
- Numerous large and small rounded lochs, interconnected by narrow, slow-moving rivers.
- Occasional small, shallow-sided hills.
- Sea cliffs with eroded gullies at the coast.
- Remote upland character.
- Predominantly uninhabited.
- Visible cultural elements dominated by shielings and township boundary dykes.
- Expansive horizontal scale and remoteness”.

An area of Rocky Moorland - Outer Hebrides (LCT 323) lies within the Landfall and Landfall Substation AoS; the key characteristics of which are described as:

- “Rocky, stepped landscape with irregular topography.
- Rocky knolls interlocked with peaty moorland vegetation and small lochans.
- Considerable diversity of form and texture.
- Occasional areas of forestry, small woodlands and shelter planting.
- Medium scale.
- Predominantly uninhabited and sense of remoteness”.

An area of Cnoc and Lochan (LCT 324) lies within the maximum extent of the LVIA Study Area, southwest of the Grid Substation AoS; the key characteristics of which are described as:

- “Sweeping curves of coastal beaches.
- Dune systems.
- Expansive machair grasslands.
- Extensive multi-period settlement mounds.
- Frequent expansive views, often extending far out to sea.

- Sporadic and dispersed settlement pattern”.

Landscape Planning Designations

Few areas within the LVIA Study Area have been attributed a landscape planning designation, as shown on **Figure 7.1-4**. These include Lews Castle and Lady Lever Park, an inventoried Garden and Designed Landscape (GDL), which has been selected for inclusion by Historic Environment Scotland (HES). While tree cover and local topography screens parts of the wider landscape from Lews Castle and Lady Lever Park, this GDL is open to the public and has potential visibility of the substation associated with the Grid Substation AoS and this will be considered in the LVIA.

The Harris - Uig hills Wild Land Area (WLA), defined by NatureScot, lies approximately 7 km west of the Grid Substation AoS, as shown on **Figure 7.1-4**. While the WLA is a nationally important mapped interest that is recognised in NPF4 and regional planning policy, it is considered that the effects of the Project would not be significant at this range and therefore will not be considered in the LVIA.

Visual Receptors

Visual receptors are people that may gain views of the Project. People are likely to be found using routes through the landscape, within settlements and homes, and at visitor attractions.

The A858 and A857 are the main routes within this part of the Isle of Lewis that link across between the west and east coasts. From these roads, several minor roads run broadly northwest, providing access to crofting communities along the Atlantic coastline. The A858 also extends southeast from Lower Barvas to Stornoway, providing the main link between these communities and the town. Within the LVIA Study Area west of Stornoway and within 3 km of the Grid Substation AoS, are sections of the A858, A859 and B897. The Ullapool to Stornoway ferry route enters the southeast corner of the LVIA Study Area, as it approaches Stornoway.

The Hebridean Way is the only long-distance route within the LVIA Study Area (see **Figure 7.1-2**). The Way’s cycle route follows the A858/A857 from Callanish to Port of Ness. The walking route, Section L: Balallan to Stornoway, approaches Stornoway from the east on the A858. There are also Local Adopted Core Paths which run along the west coast, comprising the Butt of Lewis West Coast Path (1) and Na Gearrannan to Bragar Coastal Path (3); and lie within the grounds of Lews Castle at Stornoway, comprising Lews Castle Grounds Paths (6). The wider path network includes shorter routes concentrated on the crofting settlements along the coastline at Borve and Shader. A larger network of path surrounds Barvas with another path along the A857 west of Bragar.

Concentrations of people are to be found in the town of Stornoway and the associated, outlying areas of Marybank, New Valley, Tong and Melbost; and smaller, less dense crofting settlements along the Atlantic coast, including Bragar, Arnol, Brue, Barvas, Shader and Borve.

Visitor attractions that may be affected by changes in their views include the standing stone at Truseil; Steinacleit Prehistoric Site, southeast of Shader; the blackhouse at Arnol; and the Whalebone Arch at Bragar. A further review of such locations will be undertaken once the LVIA Study Area is defined for the EIA.

Representative Viewpoints

As the locations for the Landfall Substations have not been defined at this stage, it is proposed that representative viewpoints are selected and agreed during further consultation with NatureScot and Comhairle nan Eilean Siar as part of the EIA process. This will be informed by a zone of theoretical visibility (ZTV) analysis.

These viewpoints will represent locations within the maximum extent of the LVIA Study Area where sensitive visual receptors would potentially be significantly affected by the Project. The viewpoint selection process will also consider the representation of different landscape character receptors, within which they are located. This enables the visual assessment to inform the wider assessment. While the aim of viewpoint selection is to achieve a distribution of viewpoints from different directions and distances across the LVIA 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.

Comment on this approach to representative viewpoint locations is invited as part of this request for a Scoping Opinion. Visualisations will be produced in accordance with Landscape Institute (2019) guidance.

Preparation of visualisations

The existing and predicted view of the Project substations will be described and illustrated using photography. A 35 mm equivalent camera (specifically a full frame digital single lens reflex camera) with a 50 mm lens is the chosen format for recording the viewpoint photography, which is endorsed as the most suitable camera combination/focal length for landscape and visual impact assessment work. The photography will be presented showing the existing view, together with visualisations (for example block model and photomontage as appropriate) to illustrate the predicted view of the Project.

The visualisations will be prepared in accordance with the Landscape Institute (2019) Visual Representation of Development Proposals (TGN 06/19). The visualisations will be Type 3 Accurate Visual Representative (AVR) Level 1 showing the maximum envelope of the Onshore Substations. If possible, illustrations may also be prepared to show how the substations may appear within the maximum three-dimensional design envelope. Visualisations will be presented without planting mitigation and (if relevant) with planting mitigation after a 15-year establishment period.

7.1.4 Embedded Mitigation

No embedded mitigation relevant to the LVIA has been incorporated into the design of the Project at this stage. However, the Applicant is aware of the need for a design led approach to development in this setting and will work with stakeholders to ensure appropriate siting, form and materials where possible.

7.1.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.1.5.1 Likely Significant Effects

Potential likely significant effects on LVIA have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 7.1-2**

Table 7.1-2 EIA Scoping Assessment for Landscape and Visual Impact Assessment

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Impact on landscape elements within the Onshore Cable Corridor AoS, Landfall and Landfall Substation AoS and Grid Substation AoS as a result of construction of the Onshore Infrastructure of the Project.		In	Potential for short-term and long-term permanent impacts on landscape elements.	Desk and field-based assessment.
Impact (daytime) of the construction and decommissioning of the Onshore Infrastructure of the Project on perceived landscape character		In	Potential for short-term, temporary impacts on perceived landscape character, arising because of the onshore Project construction activities and structures located within the onshore site boundary, which may therefore affect the perceived character of the landscape.	Desk and field-based assessment.
Impact (daytime) of the construction and decommissioning of the Onshore		In	Potential for short-term, temporary impacts on views and visual amenity experienced by people from principle visual receptors and representative	Desk and field-based assessment.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Infrastructure of the Project on visual receptors/ views			viewpoints, arising because of the construction activities and structures, which may be visible and may therefore affect views and visual amenity.	
Construction and decommissioning phase landscape, and visual impacts of the Onshore Infrastructure of the Project outside the LVIA Study Area (**Figure 7.1-1**)	-	**Out**	The LVIA Study Area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 3 km due to the limited changes to views arising from the onshore Project over such distances.	-
Construction phase cumulative impacts of the Onshore Infrastructure of the Project on landscape and visual receptors when considered together with other existing, under construction or consented stage developments of a similar nature to the Project.		In	Potential for cumulative short-term, temporary impacts on landscape and visual receptors, arising because of the construction activities and structures within the onshore site boundary in combination with similar activities and structures within other developments.	Desk and field-based assessment. To be informed by ZTV analysis and visualisations prepared from viewpoints.
Operation and Maintenance				

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Effects (daytime) of the operation and maintenance of the onshore substations on perceived landscape character.		In	Potential for significant, long term and reversible effects on perceived landscape character of LCTs arising from the operational Project substations which will be visible from parts of the LVIA Study Area and may therefore affect the perceived character of the landscape.	Desk and field-based assessment. To be informed by ZTV and visualisations prepared from viewpoints.
Effects of the operation and maintenance of the onshore cable route on LVIA, including above ground infrastructure		In	Potential for significant long term, reversible effects on views, visual amenity and landscape character arising from potential visibility, scale and extent of above ground project components, which may affect the perceived character of the landscape. Where the cable route will be underground with very limited round features visible along the route, such features are considered unlikely to give rise to a significant effect, however this will be kept under review.	Desk and field-based assessment. If limited above ground features associated with the underground cable route are required, the assessment will be informed by ZTV analysis and visualisations prepared from viewpoints.

Potential Likely Significant Effect	**Relevant Embedded Mitigation**	**Scoping Result**	**Justification**	**Assessment Method**
Effects (daytime) of the operation and maintenance of the Onshore Infrastructure of the Project on visual receptors/views		In	Potential for significant effect. Long term, reversible effects on views and visual amenity experienced by people as principle visual receptors and at representative viewpoints, arising because of the views of the operational Project substations.	Desk and field-based assessment. To be informed by ZTV analysis and visualisations prepared from viewpoints.
Effects (night-time) of the operation and maintenance of the lighting associated with Landfall substation.		**Out**	Substation will be unmanned and would only have task or minimal security lighting lit for very short periods in the event of infrequent maintenance or unplanned visits by operators. Such lighting is unlikely to give rise to significant effects. This assumption will be kept under review during the EIA process.	-
Effects (night-time) of the operation and maintenance of the lighting associated with Grid Substation (near grid connection).		In	Substation will be fully manned type and may have external lighting on more frequently, which may give rise to significant effects.	Desk and field-based assessment.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Operation and maintenance phase landscape and visual impacts of the Onshore Infrastructure of the Project outside the LVIA Study Area (**Figure 7-1**)		**Out**	The LVIA Study Area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 3 km due to the limited changes to views arising from the Project over such distances.	-
Operation and maintenance phase cumulative impacts of the Onshore Infrastructure of the Project on landscape and visual receptors when considered together with other existing, under construction or consented stage developments of a similar nature to the Project, should they become operational.		In	Potential for cumulative long-term, permanent impacts on landscape and visual receptors, arising because of the operation and maintenance of the Project in combination with similar operational structures within other developments.	Desk and field-based assessment. To be informed by ZTV analysis and review of materials prepared in relation to cumulative developments.
In combination impacts of the onshore elements of the Project with the offshore elements of the Project and when considered cumulatively together with other existing, under construction or consented stage developments of a similar nature to the Project. on landscape, and visual receptors.		In	Potential for in-combination impacts on the landscape and visual resource.	Desk and field-based assessment. To be informed by ZTV analysis and visualisations prepared from viewpoints. The in-combination effects will be assessed in the LVIA chapter with cross reference to the SLVIA chapter.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
				Visualisations included in the LVIA chapter will illustrate both onshore and offshore elements of the project where there may be a material in-combination effect.

7.1.6 Proposed Approach to EIA

7.1.6.1 Relevant Data Sources

The LVIA will be informed by desk-based studies and field survey work undertaken within the LVIA Study Area. The landscape and visual baseline will be informed by desk-based review of landscape character assessments, and ZTVs to identify receptors that may be affected by the onshore elements of the Project and produce written descriptions of their key characteristics and value.

A preliminary desk-based assessment will be undertaken of landscape and visual receptors using ZTV analysis, to identify which landscape and visual receptors are unlikely to be significantly affected, which will be subject to a simple assessment; and those that are more likely to be significantly affected by the Project, which require a detailed assessment.

Interactions will be identified between the onshore elements of the Project and landscape and visual receptors, to predict potentially significant effects arising and measures may be proposed to mitigate effects.

For those receptors where a detailed assessment is required, primary data acquisition will be undertaken through a series of field surveys, panoramic baseline photography and visual assessment surveys from representative viewpoints.

Further visual assessment surveys are then likely to be undertaken prior to the application submission, using the photomontage visualisations to undertake field survey assessment of visual effects from each representative viewpoint.

7.1.6.2 Consultation

The LVIA will also be informed by topic-specific consultations with key stakeholders, primarily NatureScot and Comhairle nan Eilean Siar. Information will be gathered on particular sensitivities or receptors to consider, and agreement will be sought on representative viewpoints.

7.1.6.3 Policy, Legislation and Guidance

The following policy, legislation and guidance will be taken into consideration during the assessment of landscape and visual effects.

Table 7.1-3 Legislation, Policy and Guidance relevant to the LVIA

Relevant Legislation, Policy and Guidance
European Landscape Convention (ELC)

Relevant Legislation, Policy and Guidance
National Planning Framework 4 (NPF4)
Outer Hebrides Local Development Plan (LDP) 2018, Policy NBH1: Landscape
Outer Hebrides Local Development Plan Supplementary Guidance for Wind Energy Development 2021
Carys Swanwick Department of Landscape University of Sheffield and Land Use Consultants for The Countryside Agency and NatureScot (2002). Landscape Character Assessment Guidance for England and Scotland
Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. Third edition
Landscape Institute (2019). Visual representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19
Landscape Institute (2021). Assessing landscape value outside national designations; Technical Guidance Note 02/21
Scottish Government (2022). Guidance for applicants on using the design envelope for applications under section 36 of the Electricity Act 1989

7.1.6.4 Assessment Methodology

The objective of the assessment will be to predict the significant effects on the landscape and visual resource. In accordance with the EIA Regulations, the LVIA effects will be assessed to be either significant or not significant and attribute a level of effect. The methodology to undertake the LVIA will reflect the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (Landscape Institute, 2013).

The LVIA will assess the effects of changes resulting from the Project on the landscape as a resource, the views available to people and their visual amenity.

The landscape and visual baseline will be established using landscape character assessment and ZTVs based on the onshore Project substations, to identify landscape receptors that may be affected and their key characteristics and value.

The visual baseline will be established by identifying the ZTV, identifying the people who may be affected and identifying key visual receptors (the key locations where people may be located) and selecting representative viewpoints.

The features of the Project that may result in landscape and visual effects will be described. The overall scope of the assessment will be defined, including redefinition of the LVIA Study Area based on the proposed onshore cable corridor and identified substation locations and the range of possible landscape and visual effects. The SLVIA will cover the baseline and effects of the Offshore Infrastructure of the Project which may also affect receptors onshore.

A preliminary or 'simple' assessment will be undertaken of the landscape and visual receptors using desk-based information and ZTV analysis to identify which landscape and visual receptors are unlikely to be significantly affected and can be scoped out of the assessment, and those that are more likely to be significantly affected by the Project and which require to be assessed in full.

Interactions are identified between the Project and landscape and visual receptors to predict likely significant effects arising and measures are proposed to mitigate effects.

An assessment of the susceptibility of landscape and visual receptors to specific change and the value attached to landscape receptors and views will be undertaken, combining these judgements to assess the sensitivity of the landscape and visual receptors to the Project.

An assessment of the size and scale of the landscape impact, the degree to which landscape elements are altered and the extent to which the impacts change the key characteristics of the landscape will be undertaken, combining these judgements to assess the magnitude of change on each landscape receptor.

An assessment of the size and scale of visual impact, the extent to which the change would affect views, whether this is unique or representative of a wider area, and the position of the Project in relation to the principle orientation of the view and activity of the receptor will be undertaken. These judgements are combined to assess the magnitude of change on the visual receptor.

The assessments of sensitivity to change and magnitude of change will be combined to assess the significance of landscape and visual effects.

Approach to assessment of effects

The LVIA will focus on likely significant effects, rather than assessing all potential effects. This will allow determination of the key residual effects resulting from the Project and inform proposed mitigation. In accordance with the EIA Regulations 2017, the LVIA effects will be assessed to be either significant or not significant.

A detailed methodology will be agreed with relevant stakeholders and set out in the EIA. The following section describes the broad principles and approach that will be applied. The key assessment stages will be:

- confirming the scope of the assessments, in terms of Study Areas extent, representative viewpoint locations, worst case scenarios for assessment, LVIA content, and cumulative considerations;
- an iterative approach to the mitigation of potentially significant adverse impacts through the assessment process.

The LVIA will include judgements in relation to the susceptibility, value and sensitivity of landscape and visual receptors, the predicted magnitude of change, and the predicted level of effect and whether these will be significant.

Consideration of the Project and landscape and visual impacts is based on a 'Design Envelope' approach following the Scottish Government (2022) Guidance for applicants on using the design envelope for applications under Section 36 of the Electricity Act 1989. A design envelope assessment approach is used in the LVIA due to the uncertainty of the detail of the final project due to the nature of the Project and evolving technology.

In accordance with the guidance the LVIA will:

- be undertaken on the basis of the relevant design parameters applicable to the characteristics of the Project included in the application documents;
- for each of the different receptors, establish those parameters likely to result in the maximum adverse effect (the worst-case scenario) and be undertaken accordingly to determine significance.

Cumulative assessment

Onshore cumulative impacts will be considered as part of the EIA process. Developments of a similar type, nature, and scale will be identified and a list of cumulative developments to be considered in the LVIA will be agreed with NatureScot and Comhairle nan Eilean Siar.

The assessment will consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the onshore Project, in the context of other developments that are either existing, consented/under construction, or at application stage.

The objective of the cumulative LVIA is to describe, visually represent and assess the ways in which the onshore elements of the Project will have additional effects when considered together with other existing, consented or application stage developments of a similar nature and to identify related significant cumulative effects arising. The guiding principle in preparing the cumulative LVIA will be to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process. Existing and under construction energy development will form part of the baseline and the addition of the Project to this will be part of the main assessment.

The EIAR will include a section on the inter-relationship between the effects of the Onshore Project Infrastructure and the Offshore Project Infrastructure where the same receptors may be affected.

7.1.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to LVIA include:

1. Do you agree with the data sources, including project specific surveys, to be used to characterise the LVIA baseline within the (Onshore) EIA?
2. Do you agree that the assessment of the effects on landscape character should focus on the LVIA Study Area as defined in **Figure 7.1-1**?
3. Do you agree with the approach to cumulative assessment?
4. Do you agree that all pathways, receptors, and potential likely significant effects have been identified for LVIA?
5. Do you agree with the Project impacts which have been scoped out of the LVIA?
6. Do you agree with the proposed approach to assessment?

7.1.8 References

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7.2 Onshore Ecology

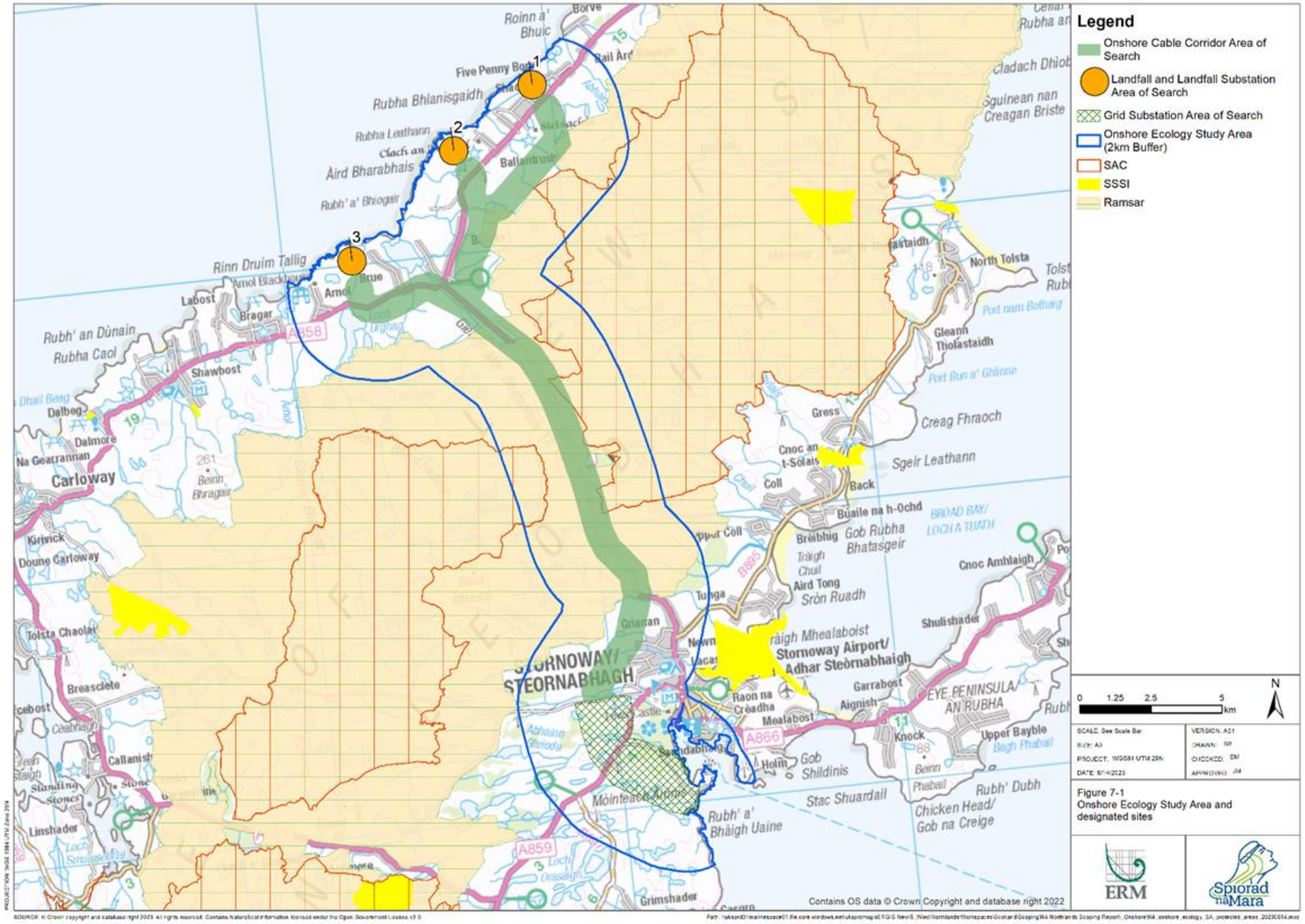
7.2.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Onshore Ecology within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project. Consideration of effects on ornithological features are described in Chapter 7.3: Onshore and Intertidal Ornithology.

7.2.2 Study Area

The Onshore Ecology Study Area is defined as the Onshore Development Area of Search (represented by the Landfall and Landfall Substation Area of Search, Onshore Cable Corridor Area of Search and Grid Substation Area of Search shown on **Figure 1.1-1**) and appropriate zones of influence in which ecological features may be affected by the biophysical changes caused by the Project; as described in section 7.2.3.1. This is considered to be suitable to allow sufficient baseline data to be collected to inform a robust assessment of potential likely significant effects of the Project on Important Ecological Features (IEFs). It should be noted the Onshore Development Area of Search will be refined, during design development phases and as the assessment progresses, to limit the extent of the Project and avoid/minimise loss of protected and priority habitats.

Figure 7.2-1 Onshore Ecology Study Area



7.2.3 Baseline Environment

7.2.3.1 Data Sources

The data sources used to inform the scoping of the Onshore Ecology Chapter are presented within **Table 7.2-1.** These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside any additional site-specific data that is collected for the Project.

Table 7.2-1 Summary of key publicly available datasets for Onshore Ecology

Source	Spatial Coverage	Year	Summary
Scotland's Environment Map	Within 2 kilometres (km) of the proposed Onshore Development Area of Search.	2023	Contains information on statutory designated sites.
	Within 1 km of the Onshore Development Area of Search.	2023	Habitat Map of Scotland (HabMoS) contains landcover data for Scotland, classified in accordance with EUNIS, NVC and Annex I Habitats that may help identify presence of protected and priority habitats.
NBN Gateway	Within 2 km of the proposed Onshore Development Area of Search.	2023	Contains information on protected and priority species. Note that some datasets are restricted to non-commercial use unless otherwise agreed with the data provider.
Ordnance Survey (OS) mapping	Within 500 m of the proposed Onshore Development Area of Search.	2023	Both 1:25,000 and 1:50,000 scales OS mapping may help identify the presence of watercourses and waterbodies within the Project's zone of influence.
Aerial Imagery	Within 1 km of the proposed Onshore Development Area of Search.	2023	Recent satellite imagery can help inform recent changes in habitat cover and land use within the Project's zone of influence.

7.2.3.2 Overview of Baseline Environment

The Lewis Peatlands Ramsar Site is located within the Onshore Development Area of Search and overlaps with a 10 km section of the Onshore Cable Corridor Area of Search between Allt Thuagro and Abhainn a Ghlinne Dhuibh. The wetland site comprises an extensive area of deep blanket bog, interspersed with wet heath, bog pool complexes, lochans and (oligotrophic and dystrophic) lochs. Blanket bog is rare in world terms and Britain has a significant proportion of the total world resource. Within Britain, the Lewis Peatlands are second in extent only to the peatlands of Caithness and Sutherland. With their north westerly and island location, the Lewis peatlands are probably the most extremely 'Atlantic' of all the blanket mires in Great

Britain. The Ramsar Site also support important populations of breeding birds (see Chapter 7.3: Onshore and Intertidal Ornithology).

The Lewis Peatlands Special Area of Conservation (SAC) is located within 2 km of the Onshore Development Area of Search and is partially within the Onshore Cable Corridor Area of Search, close to the confluence between the Cliastul and Abhainn Bharabhais. The SAC is designated for otter *Lutra lutra* and for its habitats, including acid peat-stained lakes and ponds, blanket bog, clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels, depressions on peat substrates and wet heathland with cross-leaved heath.

There are no National Nature Reserves (NNR) Sites, Special Scientific Interest (SSSI) or Local Nature Reserves (LNR) within 2 km of the Onshore Development Area of Search.

Protected and Priority Habitats

Habitats within and adjoining the Onshore Development Area of Search are dominated by extensive areas of open moorland characterised by raised and blanket bogs with localised areas of blanket bog complexes and wet heaths. Peatland habitats that occur within the Lewis Peatland SAC are classified as Annex I habitat including blanket bogs, wet heaths and transition mires.

Grassland habitats within the Onshore Development Area of Search are typically situated around the settlements of Brue, Barvas and Borve in the west; and Stornoway in the east. In addition, areas of agriculturally improved grasslands are present in lowland areas situated below the A857 road at Barvas. Grasslands that adjoin coastal sand dunes are classified as Annex I habitat including machair, fixed dunes and shifting dunes.

Woodland and tree cover within the Onshore Development Area of Search is extremely limited; although, small coniferous plantations have been identified near Barvas, Druim Roundagro and Cnoc Torravig; as well as shelter-belt planting at Arnish Point. An extensive area of broadleaved deciduous woodland is situated within the grounds of Lews Castle near Stornoway. No ancient woodland inventory (AWI) sites are present on the Isle of Lewis; and there is a presumption against woodland removal in Scottish Government Policy.

There are a large number of watercourses within the Onshore Development Area of Search, many of which are small in scale. The Abhainn Bharabhais is the largest watercourse within the west of the Onshore Development Area of Search that runs parallel to the A857 road between Barvas and Druim Roundagro; and drains into the Loch Mor Bharabhais at Barvas. There are numerous tributaries to the Abhainn Bharabhais that cross the Onshore Development Area of Search, through Glean Mor Bharabhais, which appear to drain small lochans and adjoining peatlands. Other notable watercourses crossed by the Onshore Development Area of Search include the Abhainn Bhuirgh (Borve), Abhainn Lacasdail (Grianan), and the Abhainn Ghrioda (access to Arnish Point).

There is a considerable amount of standing water adjoining the Onshore Development Area of Search, with lochs and lochans frequent across moorland areas. A number of larger lochs that are partially within the Onshore Development Area of Search include Loch Urghag, Loch Mor Bharabhais, Loch Atrabhat Iarach, Loch an Duin, Loch Marabhat, Loch Roisneabhat, Loch Dubh, Loch Grinneabhat and Loch Airigh na Lic. Natural and near-natural river systems that support protected and/or priority habitat or species are considered to be a Scottish Biodiversity List (SBL) priority habitat.

Figure 7.2-2 Onshore Ecology Annex 1 Habitats

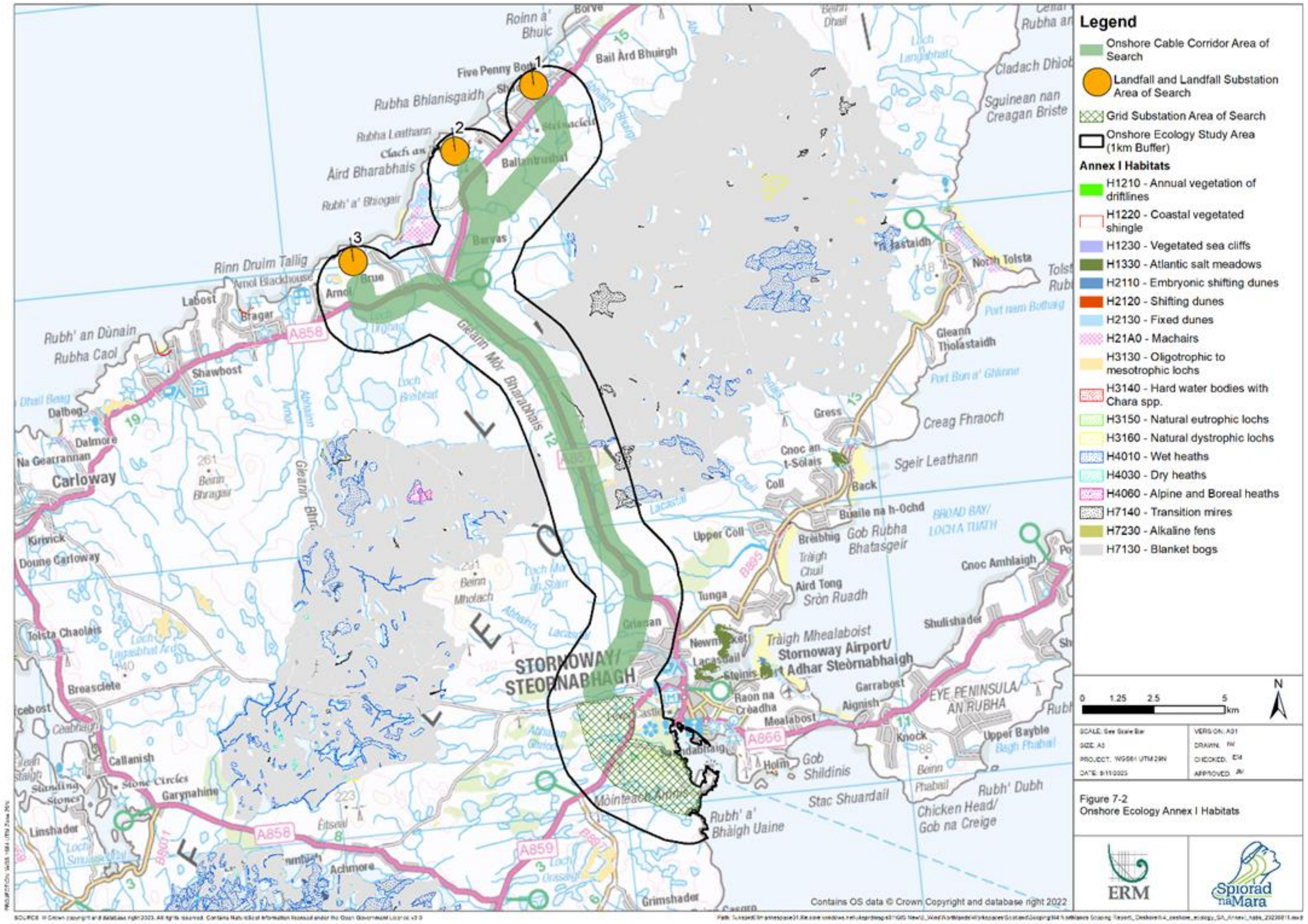
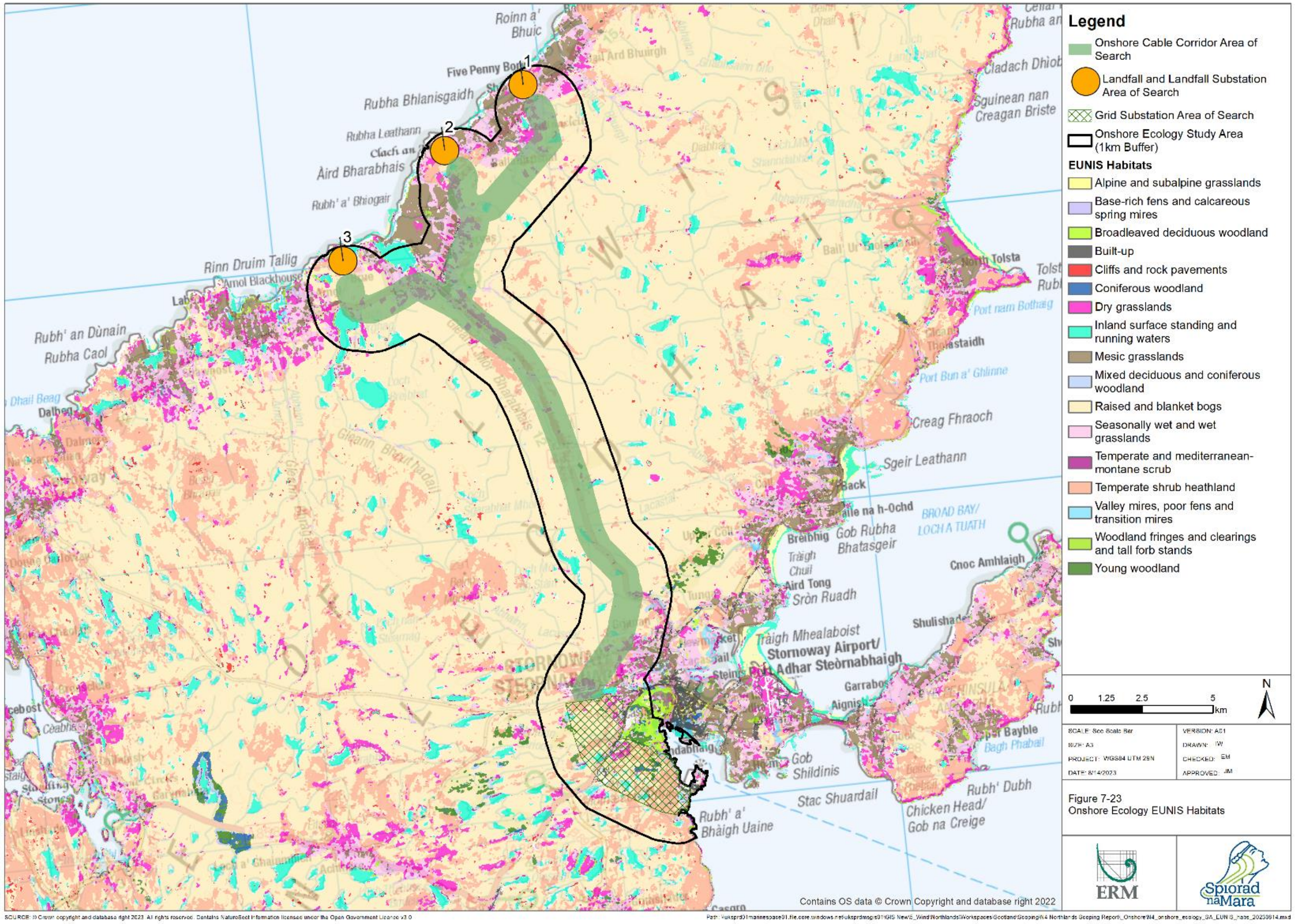


Figure 7.2-3 Onshore Ecology Annex 1 Habitats



Protected and Priority Species

Based on a review of the NBN Gateway, records of protected and priority species within 2 km of the Onshore Development Area of Search include otter, hedgehog *Erinaceus europaeus*, common frog *Rana temporaria*, slow worm *Anguis fragilis* and pipistrelle bat *Pipistrellus pipistrellus*.

7.2.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Onshore Ecology Chapter, which has been incorporated into the design of the Project (as detailed in **Table 7.2-2**).

Table 7.2-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
7.1	Project Design	The mitigation hierarchy will be applied throughout each stage of design development (i.e. outline and detailed design) to avoid and reduce potential likely significant effects on IEFs (e.g. designated sites, qualifying interest features, nationally important carbon-rich soils, protected and priority habitats (including Annex I habitats); as well as habitats supporting protected and priority species).
7.2	Good Practice	All construction, maintenance and decommissioning activities will be planned and undertaken in accordance with good practice (e.g. appointment of an Ecological Clerk of Works) and to ensure compliance with the Project's Code of Construction Practice (including any associated protection, management and/or restoration plans); as well as future legal/policy frameworks.
7.3	Outline Species Protection Plans (SPPs)	Outline Species Protection Plans (SPP) will be prepared to outline good practice and any specific measures identified through design development and EIA (or Habitats Regulations Appraisal (HRA)) to avoid, reduce and/or mitigate for potential likely significant effects on protected species that could arise during construction; as well as opportunities for biodiversity enhancements. SPPs will be finalised prior to the construction phase, and upon completion of any required pre-construction surveys/assessments.
7.4	Outline Habitat Management Plan	An outline HMP will be prepared to describe any measures proposed or required by the Project to compensate, restore and/or enhance habitats affected by the Project. The HMP will be finalised prior to the construction phase, and upon completion of any required pre-construction surveys/assessments.

7.2.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.2.5.1 Likely significant effects

Potential likely significant effects on Onshore Ecology have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These potential likely significant effects are outlined in **Table 7.2-3**.

Key ecological features are likely to include potential impacts on qualifying features of the Lewis Peatlands Ramsar Site and SAC; as well as resident and migratory fish utilising accessible watercourses that are within or hydrologically connected to the Onshore Development Area of Search. There is potential for the Landfall and Landfall Substation Area of Search and Grid Substation Area of Search to affect protected and priority habitats, including nationally important carbon-rich soils and deep peat. New underground electrical cabling and/or overhead lines within the Onshore Cable Corridor Area of Search would result in localised habitat loss with potential for habitats to be restored through appropriate reinstatement, management and monitoring. Furthermore, there is potential for the Project to result in disturbance and displacement to protected and priority species during construction and decommissioning works. Good practice during construction will minimise potential likely significant effects during construction and decommissioning, as well habitat restoration/creation to compensate for unavoidable and significant loss of IEFs.

Table 7.2-3 EIA Scoping Assessment for Onshore Ecology

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Potential loss of peatland habitats from within the Lewis Peatlands Ramsar Site.	7.1, 7.2, 7.3, 7.4	In	The Onshore Cable Corridor Area of Search is located partially within the Ramsar Site. Both the Landfall and Landfall Substation Area of Search and Grid Substation Area of Search currently avoid any direct encroachment into the Ramsar Site. Whilst there is potential for the Project to result in the loss of peatland habitats in overlapping areas, the Onshore Cable Corridor Area of Search will be significantly refined during design development phases to limit the extent of the Project and minimise the potential for any unavoidable reduction of habitats within the Ramsar Site. Where practicable, disturbed ground within the Ramsar Site will be reinstated to avoid any potential long-term reduction or loss in peatland habitats. The Project also presents an opportunity to restore and enhance peatland habitats within the Onshore Cable Corridor Area of Search through appropriate management and	Results of desktop study, habitat surveys will inform design development, HRA and the Onshore Ecology EIAR; as well as the mitigation strategy and opportunities for biodiversity enhancements.

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			monitoring, which could seek to avoid any lasting damage or disturbance to habitats within the Ramsar Site.	
Potential loss of peatland habitats from within the Lewis Peatlands SAC.	7.1, 7.2, 7.3, 7.4	In	The Onshore Cable Corridor Area of Search is located partially within the SAC. Both the Landfall and Landfall Substation Area of Search and Grid Substation Area of Search currently avoid any direct encroachment into the SAC. Whilst there is potential for the Project to result in the loss of peatland habitats in overlapping areas, the Onshore Cable Corridor Area of Search will be significantly refined during design development phases to limit the extent of the Project and avoid the SAC. Where practicable, disturbed ground within the SAC will be reinstated to avoid any potential long-term reduction or loss in peatland habitats in the locality. The Project also presents an opportunity to restore and enhance peatland habitats within the Onshore Cable Corridor Area of Search through appropriate management and monitoring, which could seek to avoid any	Results of desktop study, habitat surveys (as described in section 7.2.6) will inform ongoing design development; as well as HRA and Onshore Ecology EIAR including mitigation and opportunities for biodiversity enhancements.

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			lasting damage or disturbance to habitats within the SAC.	
Potential loss, damage and disturbance to protected and priority habitats including nationally important carbon-rich soils, Annex 1 habitats and SBL priority habitats; as well as other locally important habitat features.	7.1, 7.2, 7.3, 7.4	In	The Onshore Cable Corridor Area of Search is located in areas that could contain protected and priority habitats, as well as other locally important habitat features. This includes coastland grassland habitats within Landfall and Landfall Substation Area of Search (e.g. dunes, machair), peatland habitats within the Onshore Cable Corridor Area of Search, and woodland habitats within the Grid Substation Area of Search. Whilst there is potential for the Project to result in the loss of protected and priority habitats in overlapping areas, each Area of Search will be significantly refined during design development phases to limit the extent of the Project and avoid/minimise loss of protected and priority habitats, and other locally important habitat features. Where practicable, disturbed ground will be reinstated to avoid any potential long-term reduction or loss of protected and priority habitats. The Project also presents an opportunity to restore and enhance protected and priority	Results of desktop study, habitat surveys (as described in section 7.2.6) will inform ongoing design development; as well as the Onshore Ecology EIAR including mitigation and opportunities for biodiversity enhancements.

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			habitats within the Onshore Development Area of Search through appropriate management and monitoring.	
Potential for killing, injuring, disturbing and/or displacing protected and priority species, and loss of supporting habitats, for terrestrial and aquatic species.	7.1, 7.2, 7.3, 7.4	In	The Onshore Development Area of Search may affect structures or places that could be used by protected and priority species (e.g. otter holt). Whilst there is potential for the Project to affect protected and priority species in the locality, each Area of Search will be significantly refined during design development phases to limit the extent of the Project and avoid/minimise loss of habitats that do or could support protected and priority species. Where practicable, disturbed ground will be reinstated to avoid any potential long-term reduction or loss of habitats supporting protected and priority species. The Project also presents an opportunity to restore and habitats within the Onshore Development Area of Search through appropriate management and monitoring, which could seek to avoid any lasting damage	Results of desktop study, habitat surveys (as described in section 7.2.6) will inform ongoing design development; as well as the Onshore Ecology EIAR including mitigation and opportunities for biodiversity enhancements.

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			or disturbance to habitats supporting protected and priority species.	
Operation and Maintenance				
Potential loss of peatland habitats from within the Lewis Peatlands Ramsar Site.	7.2, 7.4	In	The Landfall and Landfall Substation Area of Search, Onshore Cable Corridor Area of Search and Grid Substation Area of Search has not been determined; therefore, the proximity of qualifying interest features within the Ramsar Site to the Project is not known.	
Potential loss of peatland habitats from within the Lewis Peatlands SAC.	7.2, 7.4	In	The Landfall and Landfall Substation Area of Search, Onshore Cable Corridor Area of Search and Grid Substation Area of Search has not been determined; therefore, the proximity of qualifying interest features within the SAC to the Project is not known.	
Potential loss, damage and disturbance to protected and priority habitats including Annex 1 habitat and SBL priority habitats, and other locally important habitat features.	7.2, 7.4	In	The Landfall and Landfall Substation Area of Search, Onshore Cable Corridor Area of Search and Grid Substation Area of Search has not been determined; therefore, the extent of protected and priority habitats, and other locally important habitat features, which could be affected by the Project are not known.	
Potential for loss of habitat; as well as killing, injuring, disturbing and/or	7.2, 7.4	In	The Landfall and Landfall Substation Area of Search, Onshore Cable Corridor Area of Search	

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
displacing protected and priority species, including terrestrial and aquatic species.			and Grid Substation Area of Search has not been determined; therefore, the extent of habitats supporting protected and priority species that could be affected by the Project is not known.	

7.2.6 Proposed Approach to EIA

7.2.6.1 Relevant Data Sources

Desktop Study

A desktop study will be undertaken to inform site-specific ecology surveys; as well as to support the HRA and the Onshore Ecology EIAR. As well as checking for updates to the data sources described in section 7.2.3, this will include requesting relevant data for third party organisations such as NatureScot (NS) and the Outer Hebrides Biological Recording to identify information on locally important sites, habitats and species within 2 km of the Onshore Development Area of Search, extending up to 5 km for records of bats.

Ecological Surveys

The scope of ecological surveys will be agreed with NS; as described in section 7.2.6.2. surveys will be undertaken by professional ecologists in accordance with relevant good practice; as well as the Chartered Institute for Ecology and Environmental Management (CIEEM) Code of Professional Conduct and Competency Framework.

National Vegetation Classification (NVC) Survey

A detailed botanical survey will be carried out during spring/summer and in accordance with standard methods. The survey will seek to classify and map homogenous stands of vegetation based on vascular plant, bryophyte and macro-lichen species using the NVC; and determine the extent and quality of important habitats and plant communities. The survey area includes accessible land within the Habitat Survey Area.

Groundwater Dependent Terrestrial Ecosystems (GWDTE)

In accordance with current guidance, a detailed survey will be undertaken for accessible wetlands within the Habitat Survey Area at the same time as the NVC Survey. The survey will seek to classify and map potential GWDTE, which will determine the extent of sensitive wetland habitats required to inform hydrogeological assessments required in relation to the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) and Water Framework Directive.

Otter Survey

In accordance with current NS standing advice, an otter survey will be undertaken for accessible watercourses within, and up to 200 m from Project infrastructure and temporary works areas ('the Otter Survey Area'). The survey will include a systematic search of watercourses and bankside areas to identify evidence of otter activity including feeding remains, spraints, prints and holts; as well as sightings of individual animals. Otter surveys can be carried out at any time of year and will be timed to avoid heavy frost or recent snow; as well as periods following prolonged heavy rainfall and/or high water when spraints and other signs of otter activity may have been washed away.

Bat Survey

NatureScot has advised[22] that bats are not widespread across the Isle of Lewis, and primarily found in suitable habitats near Stornoway. In accordance with Bat Conservation Trust (BCT) guidelines, a Preliminary Bat Roost Assessment (PBRA) may need to be undertaken for affected trees, buildings and structures in, and up to 50 m from, Project infrastructure and temporary works areas within the east of the Onshore Development Area of Search ('the PBRA Survey Area'). The survey will include identification and a systematic search of accessible Potential Roost Features (PRFs) for evidence of bat activity including droppings, scratch marks, staining and feeding remains; as well as sightings of individual animals. The suitability of PRFs to support roosting bats during summer and winter months would be classified in accordance with BCT guidelines, to inform the need for further surveys (e.g. emergence/re-entry surveys, roost characterisation surveys, hibernation survey and activity surveys).

7.2.6.2 Consultation

Initial consultation with NS will be undertaken to agree the proposed survey approach and programme; and request records of protected and priority habitats and species within the Project's zone of influence. As required, further consultations with NS, and other relevant consultees/stakeholders, will be undertaken to discuss responses to the initial consultation, emerging ecological sensitivities, proposed mitigation, and opportunities for biodiversity enhancements.

7.2.6.3 Policy, Legislation and Guidance

The following policies, legislation and guidance and information sources will be considered when undertaking the assessment. Where no specific planning and development guidance for biodiversity in relation to onshore cables, electrical infrastructure and sub-stations is available, then relevant guidance for onshore windfarm developments would be considered good practice.

Table 7.2-4 Legislation, Policy and Guidance relevant to the Onshore Ecology assessment

Relevant Legislation, Policy and Guidance
European Union (EU) Biodiversity Strategy (European Commission, 2011)

[22] During the Scoping Workshops held between May and June 2023 (see Chapter 5: Consultation).

Relevant Legislation, Policy and Guidance
2020 Challenge for Scotland's Biodiversity (Scottish Government, 2015)
Scottish Biodiversity List (SBL) (Scottish Government, 2020)
Outer Hebrides Local Development Plan (Comhairle nan Eilean Siar, 2018)
The Ramsar Convention on Wetlands of International Importance (the 'Ramsar Convention') (JNCC, 2019)
Council Directive 92/43/EEC (the 'Habitats Directive') (European Commission, 1992)
Council Directive 2000/60/EC ('Water Framework Directive') (European Commission, 2000)
Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) (Scottish Government, 1994)
Wildlife and Countryside Act 1981 (as amended) (UK Government, 1981)
Wildlife and Natural Environment (Scotland) Act 2011 (Scottish Government, 2011)
Nature Conservation (Scotland) Act 2004 (Scottish Government, 2014)
General Pre-application/ Scoping Advice to Developers from NS (NatureScot, 2023b)
Developing with Nature guidance (NatureScot, 2023a)
Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2019)
Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017)
Decommissioning and Restoration Plans for wind farms (NatureScot, 2016)
Good Practice During Construction (NatureScot, 2019)

7.2.6.4 Assessment Methodology

Following establishment of the Onshore Ecology baseline through completion of the desktop study and baseline surveys, potential likely significant effects of the Project on IEFs will be assessed in accordance with current CIEEM guidance on Ecological Impact Assessment (EcIA).

The following section outlines the proposed assessment methodology used within the EcIA to assess potential likely significant effects of the Project on IEFs. The Onshore Ecology EIA chapter will include the following sections:

- Description of baseline conditions;
- Identification of IEFs through consultation, desktop study and results of site-specific surveys;
- Identification and characterisation of potential likely significant effects;
- Assessment of potential effects (including cumulative effects) of the different phases of the Project on IEFs, taking into account any embedded mitigation; identification of measures to avoid and mitigate (reduce) any potential likely significant effects;
- Assessment of residual impacts.

In line with the latest CIEEM guidance, rather than using a matrix approach to determine significant effects, the approach used for the assessment will be to consider the importance and sensitivity of the IEF, and the characteristics and severity of the impact, and applying professional judgement as to whether the integrity of the feature would be affected. For the purposes of the assessment, an effect that threatens the integrity of an IEF will be considered significant. IEFs that are unlikely to be affected by the Project will be scoped out of the assessment.

7.2.6.5 Cumulative Effects

Historically, connection to the national grid has severely limited the development of renewables projects in the Western Isles. The planned Western Isles Link interconnector is scheduled for construction and energization by 2029 and completed by 2030. This is in line with the current programme for the Project thus there is the potential for cumulative construction effects to arise between the Project and the construction of the Western Isles Interconnector and converter station. In addition, the energization of the interconnector will inevitably lead to the consented onshore renewables projects undergoing construction and connection following a similar timeline. At the time of writing the location of the Western Isles Link converter station has not yet been confirmed, although the preferred location is known to be located at Marybank, west of Stornoway. Cumulative effects will be considered within the HRA and Onshore Ecology EIAR and will be refined as more information becomes available.

7.2.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Onshore Ecology include:

1. Do you agree that the data sources identified are sufficient to inform the ecological baseline for the EIA (and therefore that no further baseline data collection is merited)?
   The full extent of aquatic surveys cannot be determined at this stage. We have proposed a fish habitat survey as an optional item, which assumes some further surveys for a proportion of watercourses within or hydrologically connected to the Onshore Development Area of Search could contain suitable in-stream habitat that could support IEFs (e.g. migratory salmonids, lamprey, eels, etc.). Requirements for aquatic surveys would be agreed with NS.
2. Have all ecological receptors and potential likely significant effects that could result from the Project been identified?
   This Scoping Chapter has identified potential constraints in connection with Onshore Ecology based on a high-level review of freely available information. Potential likely significant effects on IEFs would be determined upon completion of ecological surveys, design development and EIA (including HRA).
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Onshore Ecology?

Potential likely significant effects on IEFs would be determined upon completion of ecological surveys, design development and EIA (including HRA).

4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential likely significant effects of the Project on onshore ecological receptors?
   Embedded mitigation currently identifies the application of good practice. Further measures that can be embedded into the Project may be identified through design development; as well as consultation with relevant consultees/stakeholders.

7.2.8 References

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7.3 Onshore and Intertidal Ornithology

7.3.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Onshore and Intertidal Ornithology within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project. Consideration of effects on ecological features are described in Chapter 7.2: Onshore Ecology.

7.3.2 Study Area

The Onshore and Intertidal Ornithology Study Area has been defined taking into account the ornithological features likely to be present within the Onshore Development Area of Search (defined as the Landfall and Landfall Substation Area of Search, Onshore Cable Corridor Area of Search and Grid Substation Area of Search) and appropriate zones of influence in which ornithological features may be affected by the biophysical changes caused by the Project; as described in sections 7.3.3.1 and 7.3.3.2. This is considered to be suitable to allow sufficient data to be collected to inform a robust assessment of likely significant effects of the Project on terrestrial Important Ornithological Features (IOFs).

The Onshore and Intertidal Ornithology Study Area is represented by the Onshore Development Area shown in **Figure 1.1-1.**

7.3.3 Baseline Environment

7.3.3.1 Project Specific Surveys

It is noted that the Onshore Development Area of Search overlaps the following statutory sites of international importance:

- Ness and Barvas Special Protection Area (SPA), which is designated for breeding corncrake (*Crex crex*);
- Lewis Peatlands SPA, which is designated for the following breeding species: golden plover (*Pluvialis apricaria*), dunlin (*Calidris alpina*), greenshank (*Tringa nebularia*), red-throated diver (*Gavia stellata*), black-throated diver (*G. arctica*), golden eagle (*Aquila chrysaetos*) and merlin (*Falco columbarius*);
- Lewis Peatlands Ramsar site, which is partly designated for breeding dunlin and because it supports internationally important breeding populations of the following species: golden plover, greenshank, red-throated diver and black-throated diver. Arctic skua (*Stercorarius parasiticus*) also breeds at the site in nationally important numbers;

- Whilst not a statutory designation, the Onshore Development Area of Search also lies adjacent to Loch na Muilne Royal Society for the Protection of Birds (RSPB) Nature Reserve, important for its breeding waders such as the red-necked phalarope (*Phalaropus lobatus)*.

This has been taken into consideration when designing the Onshore and Intertidal Ornithology survey programme.

Records of sensitive and protected species will be obtained from relevant organisations such as the Lewis & Harris RSG, RSPB and NS. Data requests will include any records of qualifying features of the above SPAs, any other breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and/or Annex I of the Birds Directive, and any records of white-fronted goose during the non-breeding season. This information will supplement the survey results, and where possible, will also be used to inform the Onshore and Intertidal Ornithology surveys, allowing any known breeding, roosting or foraging areas of relevant species to be targeted during surveys.

In order to provide Project specific and up to date information on which to base the impact assessment, the following Onshore and Intertidal Ornithology survey programme is proposed:

- Breeding Corncrake Surveys (late May to June 2023);
- Breeding Raptor Surveys (April to July 2023);
- Breeding Diver Surveys (April to July 2023);
- Moorland Breeding Bird Surveys (April to July 2023).

If necessary, the following winter surveys may also be undertaken:

- Foraging Goose Surveys (September 2023 to mid-May 2024);
- Winter Roosting Raptor Surveys (October 2023 to March 2024).

No Flight Activity Surveys are proposed to assess likely significant effects of new underground electrical cabling within the Onshore Cable Corridor Area of Search. However, should it be ascertained that any sections of overhead line are required, further consultation with NS will take place to determine any additional survey requirements; taking cognisance of current NS guidance relating to the assessment and mitigation of impacts of power lines and guyed meteorological masts on birds.

Survey methods are based on NS guidance, with deviations noted. Proposed survey methods are detailed below.

Breeding Corncrake Surveys

Breeding Corncrake Surveys will be completed between 20 May and 30 June 2023, based on the methods described in Gilbert *et al.* (1998). The Breeding Corncrake Survey Area will include all areas of suitable breeding habitat within the Onshore and Intertidal Ornithology Survey Area and a surrounding 500 m buffer. Two visits will be carried out during the hours of darkness, between 00:00 and 03:00 British Summer Time (BST), in suitable conditions (i.e. avoiding wet weather and wind speeds exceeding Beaufort Force 3 as far as possible). Surveys will involve following a pre-defined driven and/or walked transect route that takes the surveyor to within 500 m of all suitable breeding habitat, with regular stops to record singing males. The approximate location of each singing male heard will be mapped, with notes taken as appropriate.

Breeding Raptor Surveys

Breeding Raptor Surveys will be completed once per month between April and July 2023 with reference to the methods detailed in Hardey *et al.* (2013). NS guidance recommends that surveys for breeding/roosting raptors are completed within 2 km (6 km for breeding/roosting eagle species) of a proposed development. However, as the key impact of the Project is likely to be temporary disturbance during the construction phase, it is proposed that the Breeding Raptor Survey Area includes the Onshore Development Area of Search with a reduced survey buffer of 1 km (exceeding maximum species-specific disturbance distances of target raptor species other than golden eagle (NatureScot, 2022)) is sufficient to assess the impacts of the Project on IOFs present.

This will involve completing a combination of watches from Vantage Points (VPs) overlooking areas of suitable breeding habitat within the Breeding Raptor Survey Area to identify any evidence of breeding (such as birds performing breeding displays or carrying prey), and walkovers of suitable habitat to search for nests and other signs of raptor presence (such as prey remains, pellets or feathers).

Additionally, the habitat present within 2 km of the Onshore Development Area of Search (outside the maximum disturbance distance for eagle species (NatureScot, 2022)) is sub-optimal for breeding eagle species. As it is considered unlikely that eagle species would breed within 2 km of the Onshore Development Area of Search, the Project is outside of the maximum disturbance distance for breeding eagles. Therefore, targeted surveys for breeding eagle species have been scoped out.

Breeding Raptor Surveys will focus on recording ‘target’ raptor (including owl) species, i.e. those listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and/or Annex I of the Birds Directive. ‘Secondary’ raptor species will also be recorded. Additionally, observations of other notable species (such as divers and waders) will be recorded, and where relevant, used to inform the results of other breeding season surveys.

Breeding Diver Surveys

A Breeding Diver Survey will be completed between April and July 2023 based on the methods described in Gilbert *et al.* (1998). The Breeding Diver Survey Area will include all suitable waterbodies within the Onshore Development Area of Search and a surrounding 1 km buffer. A minimum of two survey visits will be completed, with waterbodies scanned from a distance (to avoid disturbance to any incubating birds) to check for diver activity and signs of breeding. Where divers are present, these will be mapped and relevant notes will be taken, e.g. on age (adult or juvenile) and behaviour. As far as possible, surveys will be completed in suitable conditions (i.e. avoiding poor visibility, persistent rain and wind speeds exceeding Beaufort Force 4).

Observations of other notable species (such as raptors and waders) will be recorded, and where relevant, used to inform the results of other breeding season surveys.

Moorland Breeding Bird Surveys

Moorland Breeding Bird Surveys will be completed between April and July 2023, following an adapted Brown and Shepherd (1993) method (designed to census upland breeding waders).

The Moorland Breeding Bird Survey Area will include all suitable breeding habitat within the Onshore Development Area of Search and a surrounding 500 m buffer. Surveys will involve walking across all accessible parts of the Breeding Wader Survey Area, stopping regularly to scan for birds, with all observations of waders, skuas and other notable species recorded on large-scale maps using standard symbology to record behaviour and allow breeding territories to be identified during subsequent territory analysis.

Surveys will focus on recording non-passerine species of conservation concern, such as waders and skuas. Observations of other notable species (such as raptors and divers) will be recorded, and where relevant, used to inform the results of other breeding season surveys.

A minimum of four survey visits will be completed across the season. Each survey visit will be completed between 08:30 and 18:00 BST, at least seven days apart and in suitable conditions. This will ensure species at their most detectable are less likely to be missed; and that baseline conditions are representative of local conditions.

Scoped Out Surveys

Foraging Goose Surveys

No SPAs designated for wintering geese or whooper swan (*Cygnus cygnus*) are present within 20 km of the Onshore Development Area of Search. However, during the scoping workshops NatureScot indicated the Greenland white-fronted goose (*Anser albifrons flavirostris*) population is unfavourable and the local population may be potentially vulnerable to disturbance.

Where suitable habitat features are identified, Foraging Goose Surveys targeting Greenland white-fronted goose will be completed twice per month during the non-breeding season between September 2023 and

Mid-May 2024[23], based on methods outlined in NS guidance, to identify foraging areas used by wintering Greenland white-fronted goose. It is proposed that the Foraging Goose Survey Area will comprise all areas of suitable habitat within the Onshore Development Area of Search and a surrounding 500 m buffer. The surveys will be undertaken from public roads and publicly accessible areas via a pre-defined transect, with surveyors stopping at appropriate VPs to map any Greenland white-fronted geese present, with notes taken on approximate flock size and behaviour.

Although the surveys will focus on foraging Greenland white-fronted geese, any other notable species (e.g. foraging whooper swans, large wader flocks or Schedule 1 raptor species) will be recorded incidentally, as well as any Greenland white-fronted geese in flight.

Winter Roosting Raptor Surveys

During the scoping workshops NatureScot indicated that the hen harrier population is increasing in size and range, having colonised the Isle of Lewis around 2015. Where suitable habitat features are identified, Winter Roosting Raptor Surveys would be completed once per month between October 2023 and March 2024 to map any roosts of hen harrier and other protected raptor species, with reference to methods detailed in Hardey *et al*. (2013) for surveys outside the breeding season. This will involve completing pre-dawn and pre-dusk watches from suitable VPs overlooking areas of suitable roosting habitat (including conifer plantations) within the Onshore Development Area of Search and a surrounding 1 km buffer.

Intertidal Surveys

As the extent of potential intertidal habitat within 500 m of the Landfall and Landfall Substation Area of Search and Grid Substation Area of Search is extremely limited, and will reduce further as search areas are refined, it is proposed that Intertidal Surveys are scoped out.

7.3.3.2 Data Sources

A detailed desktop study will be carried out to complement the Project-specific Onshore and Intertidal Ornithology surveys and provide supporting contextual information. This will include requesting relevant datasets for third party organisations, such as NS, the Lewis & Harris RSG and the RSPB. A summary of the data sources identified to inform the Onshore and Intertidal Ornithology chapter of the EIA Report are presented within **Table 7.3-1.**

[23] Note that the final survey visit may take place earlier, depending on when wintering birds depart to their breeding grounds.

Table 7.3-1 Summary of key publicly available datasets for Onshore and Intertidal Ornithology

Source	Spatial Coverage	Year	Summary
NatureScot SiteLink website	SPAs and Ramsar sites within 20 km of the Onshore Development Area of Search for geese and eagle species; and SPAs, Ramsar sites and Sites of Special Scientific Interest (SSSIs) designated for other bird species within 10 km of the Onshore Development Area of Search	2023	Provides information on statutory sites, including SPAs, Ramsar sites and SSSIs, designated for ornithological features within Scotland.
Lewis & Harris RSG	Within 2 km of the Onshore Development Area of Search (extended to 6 km for breeding/roosting eagle species)	Within the last 10 years	Hold records of raptor (including owl) species recorded by raptor workers on the Isle of Lewis, including details of any breeding pairs, nest sites and roost locations.
NS	Within 2 km of the Onshore Development Area of Search (extended to 6 km for breeding/roosting eagle species)	Within the last 10 years	May hold local records of sensitive and protected bird species (e.g. Schedule 1 and/or Annex I species), including nest sites, roost locations and regular foraging areas. In addition, NS may be able to supply Natural Heritage Zone (NHZ) 3 and NHZ 14 spreadsheets, which detail cumulative, primarily collision, risks across a range of species.
RSPB	Within 2 km of the Onshore Development Area of Search (extended to 6 km for breeding/roosting eagle species)	Within the last 10 years	Likely to hold records of sensitive and protected bird species, including nest sites, roost locations and regular foraging areas.
British Trust for Ornithology (BTO)	Within 2 km of the Onshore Development Area of Search	Within the last 10 years	May hold WeBS count data for waterbodies and/or coastal areas[24]. Bird Track data may also provide additional records.

[24] A preliminary check for available datasets via the WeBS website suggests that few records are available as most WeBS core count sites within 2 km of the Onshore Development Area of Search have not been regularly monitored in recent years. Available online at: https://app.bto.org/websonline/sites/data/sites-data.jsp#lon=-4.5263672&lat=54.8006849&zoom=5 [Accessed 10/07/2023].

Source	Spatial Coverage	Year	Summary
Outer Hebrides Bird Reports	Outer Hebrides (Western Isles) including North Rona, Sula Sgeir, Flannan Isles, St Kilda, Causamul and Monach Islands.	Volume 15 (2017)	Contains a summary of sightings throughout the Outer Hebrides and the outliers, including St. Kilda.
Francis *et al*. (2011)	Greenland White-fronted Goose Study: Scotland including the Outer Hebrides.	2011	Includes information relating to the Lewis (Loch Urrahag) Greenland white-fronted goose population.
Lewis Tidal Array Environmental Statement (ES) (Aquamarine Power and Royal Haskoning, 2012)	Site specific data of the Lewis Tidal Array plus a 10 km buffer	September 2010-2012	Survey data of seabirds (and marine mammals) collected through monthly DAS surveys of the proposed (but never constructed) Lewis Tidal Array
Birds of the Outer Hebrides / Western Isles – Their Status and Distribution on the Main Islands and Outliers	Within 2 km of the Onshore Development Area of Search (extended to 6 km for breeding/roosting eagle species)	Within the last 10 years	Guide to the status and distribution of bird species recorded on the Outer Hebrides / Western Isles, including Lewis.

7.3.3.3 Overview of Baseline Environment

Statutory Designated Sites

Three statutory sites (one of which is both an SPA and Ramsar site) designated for ornithological features were identified within 10 km of the Onshore Development Area of Search. Details of each site are summarised below. No additional SPAs or Ramsar sites designated for goose or eagle species were identified within 20 km of the Onshore Development Area of Search.

- Lewis Peatlands SPA and Ramsar site comprises an extensive area of deep blanket bog, interspersed with bog pool complexes and freshwater lochs. Breeding golden plover, dunlin, black-throated diver and golden eagle are qualifying features of both designations, while breeding greenshank, red-throated diver and merlin are additional qualifying features of the SPA. Much of the Onshore Development Area of Search overlaps with the SPA and Ramsar site.
- Ness and Barvas, Lewis SPA, which is designated for breeding corncrake, comprises two areas: Ness in the north of the Isle of Lewis and Barvas in the west. Both areas consist mainly of semi-improved grasslands and marshy areas within crofts. The Ness area of the SPA also includes an area of machair common grazing and a loch surrounded by marshy margins. The Onshore Development Area of Search overlaps the Barvas area of the SPA, while the Ness area is located approximately 8.6 km to the northeast of the Onshore Development Area of Search.

- Tong Saltings SSSI contains one of the largest areas of saltmarsh and tidal flats in the Outer Hebrides. The site is important for wintering, breeding and foraging birds, including terns, waders and wildfowl, and the breeding bird assemblage is a qualifying interest feature of the SSSI. The Onshore Development Area of Search is located approximately 1.9 km to the west of Tong Saltings SSSI.

Other Notable Sites of Ornithological Interest

Loch na Muilne RSPB Reserve, which is located adjacent to the Landfall and Landfall Substation Area of Search, comprises two shallow lochs with wet, marshy fringes, surrounded by an area of coastal heath at the edge of the Lewis Peatlands Ramsar Site and SPA. The reserve is most important for its breeding waders, particularly red-necked phalarope. It also supports the only wintering flock of Greenland white-fronted goose on the Isle of Lewis.

Habitat Appraisal

Much of the Onshore Cable Corridor Area of Search follows the A857 road and it is anticipated that new electrical cabling within the Onshore Cable Corridor Area of Search will be underground. Based on a preliminary inspection of OS maps and aerial imagery, the Onshore and Intertidal Ornithology Study Area is comprised predominantly of peatland habitat such as blanket bog, with some areas of grassland (including crofts), particularly in the north and south. The Abhainn Bharabhais watercourse flows parallel to the A857 on the western side and numerous tributaries and waterbodies of varying sizes are present within the Onshore and Intertidal Ornithology Study Area. Coastal habitats adjacent to the Landfall Area of Search in the north (see **Figure 1.1-1**) include cliffs, shingle bays and dunes. Other habitats present within the Onshore Development Area of Search include a small number of woodland blocks, the most notable of which is the mixed woodland that overlaps with the Grid Substation Area of Search in the south.

These habitats are likely to support several of the qualifying features of the statutory designated sites listed above, including corncrake, red-throated and black-throated divers, merlin, and wader species (golden plover, dunlin and greenshank). Other breeding species of conservation concern likely to be present include curlew (*Numenius arquata*). It is also possible that peregrine (*Falco peregrinus*) could breed along the coastal cliffs. It is noted that, due to the absence of voles from the island, kestrel (*Falco tinnunculus*) and hen harrier (*Circus cyaneus*) are scarce breeding species, while there is only a single confirmed short-eared owl (*Asio flammeus*) breeding record. However, it is possible that one or more of these species cold be present. During the non-breeding season, it is anticipated that goose species, potentially including Greenland white-fronted goose, may forage in the fields within the Onshore and Intertidal Ornithology Study Area. Winter roosting raptor species could also be present.

7.3.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Onshore and Intertidal Ornithology assessment, which has been incorporated into the design of the Project (as detailed in **Table 7.3-2**).

Embedded mitigation comprises best practice methods and works outlined in the publication 'Good Practice during Wind Farm Construction' (NatureScot, 2019). These are established and effective measures to which the applicant will be committed throughout the duration of the Project.

Table 7.3-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
7.1	Project Design	Where possible, ornithological constraints (such as breeding territories of Schedule 1 species) will be taken into account when finalising Project design.
7.4	Outline HMP	An outline HMP will be prepared to describe any measures proposed or required by the Project to compensate, restore and/or enhance habitats affected by the Project to benefit breeding birds. Exact measures will be determined through consultation with relevant stakeholders, including NS and the RSPB.
7.5	Breeding Bird Protection Plan (BBPP)	Works will be scheduled to avoid sensitive periods (breeding season) where possible. Where this is not feasible, pre-construction checks will be completed immediately prior to construction, with appropriate mitigation measures implemented during construction to protect any breeding birds identified (such as establishment of buffer zones around nests, within which works are excluded).

7.3.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.3.5.1 Likely Significant Effects

Likely significant effects on Onshore and Intertidal Ornithology have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 7.3-3**.

Important ornithological receptors (IOFs) are likely to include qualifying features of the Lewis Peatlands SPA and Ramsar site (described in section 7.3.3.3) and the Ness and Barvas, Lewis SPA (breeding corncrake). Additional IOFs may include other breeding species of conservation concern, such as curlew and peregrine, and potentially foraging Greenland white-fronted goose. Assuming that new electrical cabling within the Onshore Cable Corridor Area of Search will be underground, the key potential impact on IOFs is likely to be disturbance and displacement during construction and decommissioning works. Other likely significant effects, such as habitat loss, and disturbance and displacement during operation and maintenance, will also be assessed.

Table 7.3-3 EIA Scoping Assessment for Onshore and Intertidal Ornithology

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Likely significant effects on Lewis Peatlands SPA, and Ness and Barvas, Lewis SPA	7.1, 7.4, 7.5	In	The Onshore Development Area of Search overlaps with both SPAs and could have an adverse effect on the integrity of these European sites.	Relevant results of the Project-specific surveys and desktop study (detailed in sections 7.3.3.1 and 7.3.3.2) will be presented to support the HRA and Onshore and Intertidal Ornithology EIA Report.
Intentional or reckless killing or injuring wild birds; damage to, destruction of or interference with nests, destruction of eggs and/or obstructing or preventing wild birds from using their nests.	7.5	**Out**	The embedded mitigation will ensure compliance with the relevant legislation.	No assessment required (relevant embedded mitigation will be included in the HRA and Onshore and Intertidal Ornithology EIA Report).
Habitat loss	7.1, 7.4	In	Loss of breeding, foraging and/or roosting habitat could have a significant effect on IOFs.	Results of the Project-specific surveys and desktop study (detailed in sections 7.3.3.1 and 7.3.3.2) will inform the terrestrial OIA, which will include consideration of potential effects on relevant IOFs due to habitat loss. The results will be presented in the HRA and Onshore and Intertidal Ornithology EIA Report.
Disturbance and displacement	7.1, 7.4, 7.5	In	Visual and aural disturbance due to presence of Project personnel, plant and machinery could result in disturbance to breeding,	Results of the Project-specific surveys and desktop study (detailed in sections 7.3.3.1 and 7.3.3.2) will inform the terrestrial OIA,

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			foraging and/or roosting IOFs, potentially resulting in their temporary or long-term displacement from the area.	which will include consideration of potential effects on relevant IOFs due to disturbance and displacement. The results will be presented in the HRA and Onshore and Intertidal Ornithology EIA Report.
Operation and Maintenance				
Potential for intentional or reckless killing or injuring wild birds; damage to, destruction of or interference with nests, destruction of eggs and/or obstructing or preventing wild birds from using their nests.	7.5	**Out**	Maintenance works likely to be of low magnitude and the embedded mitigation will ensure compliance with the relevant legislation.	No assessment required (relevant embedded mitigation will be included in the HRA and Onshore and Intertidal Ornithology EIA Report).
Disturbance and displacement	7.1, 7.4, 7.5	In	Visual and aural disturbance due to presence of both onshore infrastructure (substations) and Project personnel, plant and machinery required for any operational maintenance could result in disturbance to breeding, foraging and/or roosting IOFs, potentially resulting in their temporary or long-term displacement from the area.	Results of the Project-specific surveys and desktop study (detailed in sections 7.3.3.1 and 7.3.3.2) will inform the terrestrial OIA, which will include consideration of potential effects on relevant IOFs due to disturbance and displacement. The results will be presented in the HRA and Onshore and Intertidal Ornithology EIA Report.
Collision risk		**Out**	At this stage, it is assumed that there will be no sections of cable overhead, therefore potential collision risk has been scoped out.	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			However, this will be scoped in if it is determined that any overhead cable sections are required.	

7.3.6 Proposed Approach to EIA

7.3.6.1 Relevant Data Sources

Data obtained from the Project-specific surveys detailed in section 7.3.3.1 and desktop study detailed in section 7.3.3.2 will be used to inform the terrestrial OIA.

7.3.6.2 Consultation

Consultation with relevant stakeholders such as NS and the RSPB will be undertaken as required, e.g. to address any concerns raised in the Scoping Opinion, discuss emerging key sensitivities, and discuss any species-specific mitigation proposed, including the Outline HMP.

7.3.6.3 Policy, Legislation and Guidance

The following key policy, legislation, guidance and information sources will be considered when carrying out the terrestrial OIA:

Table 7.3-4 Legislation, Policy and Guidance relevant to the Onshore and Intertidal Ornithology assessment

Relevant Legislation, Policy and Guidance
UK Post-2010 Biodiversity Framework
Scottish Biodiversity Strategy: It's in Your Hands
2020 Challenge for Scotland's Biodiversity
PAN 60: Planning for Natural Heritage
Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0
Comhairle nan Eilean Siar Local Development Plan
Wildlife and Countryside Act 1981 (as amended)
Directive 2009/147/EC on the Conservation of Wild Birds (the 'Birds Directive)
Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (the 'Habitats Directive')
The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) ('The Habitats Regulations')
The Wildlife and Natural Environment (Scotland) Act 2011
The Nature Conservation (Scotland) Act 2004 (as amended)
The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012
The Conservation of Habitats and Species (Amendment) Regulations 2017, relating to reserved matters in Scotland
Environmental Impact Assessment Directive 2014/52/EU
The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017

Relevant Legislation, Policy and Guidance
European Union (Withdrawal) Act 2018
Bibby et al. (2000) Bird Census Techniques. 2nd Edition
CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland
Gilbert *et al*. (1998) Bird Monitoring Methods
Hardey *et al*. (2013) Raptors: a field guide to survey and monitoring, 3rd edition
NatureScot (2016a) Assessing connectivity with SPAs
NatureScot (2016b) Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees
NatureScot (2016) Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds
NatureScot (2017) Recommended bird survey methods to inform impact assessment of onshore wind farms
NatureScot (2018) Guidance - Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas
NatureScot (2019) Good Practice during Wind Farm Construction (4th Edition)
NatureScot (2022) Disturbance Distances in selected Scottish Bird Species
Thompson & Stevenson (2023) Birds of the Outer Hebrides / Western Isles – Their Status and Distribution on the Main Islands and Outliers
Stanbury et al. (2021) Birds of Conservation Concern (BoCC)
Scottish Biodiversity List (SBL)

7.3.6.4 Assessment Methodology

Following establishment of the Onshore and Intertidal Ornithology baseline through completion of the desktop study and site-specific surveys, likely significant effects of the Project on terrestrial IOFs will be assessed in accordance with current CIEEM guidance on EIA in the UK and Ireland (CIEEM, 2018).

The following section outlines the proposed assessment methodology that will be used within the EIA to assess potential effects of the Project on terrestrial IOFs. The Onshore and Intertidal Ornithology baseline and results of the ecological impact assessment will be detailed in the Onshore and Intertidal Ornithology Chapter of the EIA Report, which will include the following sections:

- Description of baseline conditions;
- Identification of IOFs through consultation, desktop study and results of site-specific surveys;
- Identification and characterisation of likely significant effects;
- Assessment of potential effects (including cumulative effects): a comprehensive assessment of the potential effects of the different phases of the Project on IOFs, taking into account any embedded

mitigation; identification of measures to avoid and mitigate (reduce) any potential significant effects, and any monitoring requirements;

- Assessment of residual impacts.

In line with the latest CIEEM guidance, rather than using a matrix approach to determine significant effects, the approach used for the assessment will be to consider the importance and sensitivity of the IOF, and the characteristics and severity of the impact, and applying professional judgement as to whether the integrity of the feature would be affected. For the purposes of the assessment, an effect that threatens the integrity of an IOF will be considered significant. IOFs that are unlikely to be affected by the Project will be scoped out of the assessment.

7.3.6.5 Cumulative Effects

Historically, connection to the national grid has severely limited the development of renewables projects in the Western Isles. The planned Western Isles Link interconnector is scheduled for construction and energization by 2029 and completed by 2030. This is in line with the current programme for the Project thus there is the potential for cumulative construction effects to arise between the Project and the construction of the Western Isles Interconnector and converter station. In addition, the energization of the interconnector will lead inevitably to the consented onshore renewables projects undergoing construction and connection following a similar timeline. At the time of writing the location of the Western Isles Link converter station has not yet been confirmed, although the preferred location is known to be located at Marybank, west of Stornoway. Cumulative effects will be considered within the HRA and Onshore and Intertidal Ornithology EIA Report and will be refined as more information becomes available.

7.3.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Onshore and Intertidal Ornithology include:

1. Do you agree that the proposed survey scope and methods (including survey areas) are sufficient to inform a robust ornithological impact assessment (and therefore no further surveys are required)?
2. Do you agree that intertidal bird surveys can be scoped out and are not required to inform the assessment?
3. Are there any other key data sources (in addition to those identified in section 7.3.3.2) that should be consulted to inform the Onshore and Intertidal Ornithology baseline for the EIA?
4. Have all Onshore and Intertidal Ornithology receptors and likely significant effects that could result from the Project been identified?
5. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Onshore and Intertidal Ornithology?

6. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Project on Onshore and Intertidal Ornithology receptors?

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7.4 Onshore Archaeology and Cultural Heritage

7.4.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Onshore Archaeology and Cultural Heritage within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

7.4.2 Study Area

The Onshore Archaeology and Cultural Heritage Study Area has been defined on the basis of potential effects to onshore designated and non-designated assets, taking in onshore heritage assets out to the Mean Low Water Springs (MLWS); liaison with Marine Archaeology and Cultural Heritage (see Chapter 6.8: Marine Archaeology and Cultural Heritage) will ensure that no duplication of assessment is undertaken between the chapters. It is proposed the setting effects arising due to the presence of the offshore infrastructure, in relation to the onshore assets, is assessed alongside the onshore infrastructure within this chapter, including an assessment of cumulative and in-combination effects. The Onshore Archaeology and Cultural Heritage Study Areas proposed for assessment will consist of:

- A Core Study Area (CSA) in which direct effects upon archaeology are most likely to occur;
- 1 km Study Area around the onshore infrastructure;
- 3 km Study Area around the onshore infrastructure;
- 10 km Setting Study Area on the Isle of Lewis.[25,26]

The latter study area will ensure that potential effects to asset significance caused by changes to the setting on onshore assets which are attributable to offshore infrastructure are captured within the onshore cultural heritage Environmental Impact Assessment (EIA). Setting is defined as “Setting is more than the immediate surroundings of a site or building, and may be related to the function or use of a place, or how it was intended to fit into the landscape or townscape, the view from it or how it is seen from areas round about, or areas that are important to the protection of the place, site or building. ‘Setting’ is the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced”

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[25] An initial 45 km Setting Study Area for the offshore infrastructure was developed and assessed for the purpose of scoping by the EIA Scoping lead consultant ERM, as was presented in the scoping workshop. This has subsequently been replaced by a proposed 10 km Setting Study Area for offshore infrastructure, based on input and amendments provided by the EIA lead consultant WSP.

[26] Generated 10 km inland from the coastline between Galen head (West) and the Butt of Lewis (East).

(Scottish Government, 2023). Where assets include value derived from setting, the contribution will be considered and assessed within the appropriate context, whether there is the potential for impact to be introduced as a result of changes to their setting. While this will primarily focus on designated assets, selected non-designated assets will also be considered in relation to the onshore or offshore infrastructure. In addition, some assets beyond the 10 km Setting Study Area will need to be considered during the EIA process, where significant effects have the potential to be introduced. The final list of assets to be assessed will be agreed with Historic Environment Scotland (HES), the archaeological advisor to the Local Planning Authority (LPA) and other appropriate stakeholders. The CSA is defined by the Onshore Development Area of Search, which encompasses all onshore elements of the Project (Landfall and Landfall Substation, Onshore Cable Corridor and Grid Substation Areas of Search). This will be refined as the Project progresses.

The 1 km Study Area will consist of a 1 km buffer zone surrounding Landfall and Landfall Substation, the Onshore Cable Corridor Area, and the Grid Substation, and will inform the archaeological baseline and the potential for previously unrecorded archaeology within the CSA. This zone will also support the development of a baseline of designated assets that may incur indirect effects due to the construction and presence of the onshore infrastructure.

The 3 km Study Area will consist of an initial 3 km buffer zone around Landfall, Landfall Substation and Grid Substation Areas of Search, mirroring the Landscape and Visual Impact Assessment (LVIA). All designated assets and selected non-designated heritage assets within this area will be considered in the assessment. Non-designated assets will be selected following consultation with the archaeological advisor to the local planning authority. Assets will be included within the assessment where they lie within the Zone of Theoretical Visibility (ZTV), where the setting contributes to asset significance and where there is a potential change to the setting primarily caused by views of the above ground onshore infrastructure. This study area may be refined as the assessment progresses and as consultation is undertaken.

The 10 km Setting Study Area[25], extends inland along the coast from Galen Head to the Butt of Lewis. All designated heritage assets within will initially be considered by the scoping report. Subsequent refining, through a sifting exercise, utilising the ZTV for the Array Area, and expert input, will generate the baseline for assessment. Additionally, a process to identify significant non-designated assets, as well as designated assets deriving significance from long distance views and distant landscape or seascape context will be undertaken, with findings integrated into the final assessment baseline.

The proposed Study Areas are shown on **Figure 7.4-1** and **Figure 7.4-2**. The proposed Study Areas will be reviewed and refined as the EIA process develops via review of the receptors affected and the generation of a ZTV. The proposed Study Areas will also be informed by Project consultations with regulator and other key stakeholders (see section 7.4.6.2) to ensure there is a practicable balance of assets and receptors included for review and assessment. The assessment may also include visual representations such as photomontages and/or wirelines, as appropriate.

Figure 7.4-1 Onshore Archaeology and Cultural Heritage Study Areas

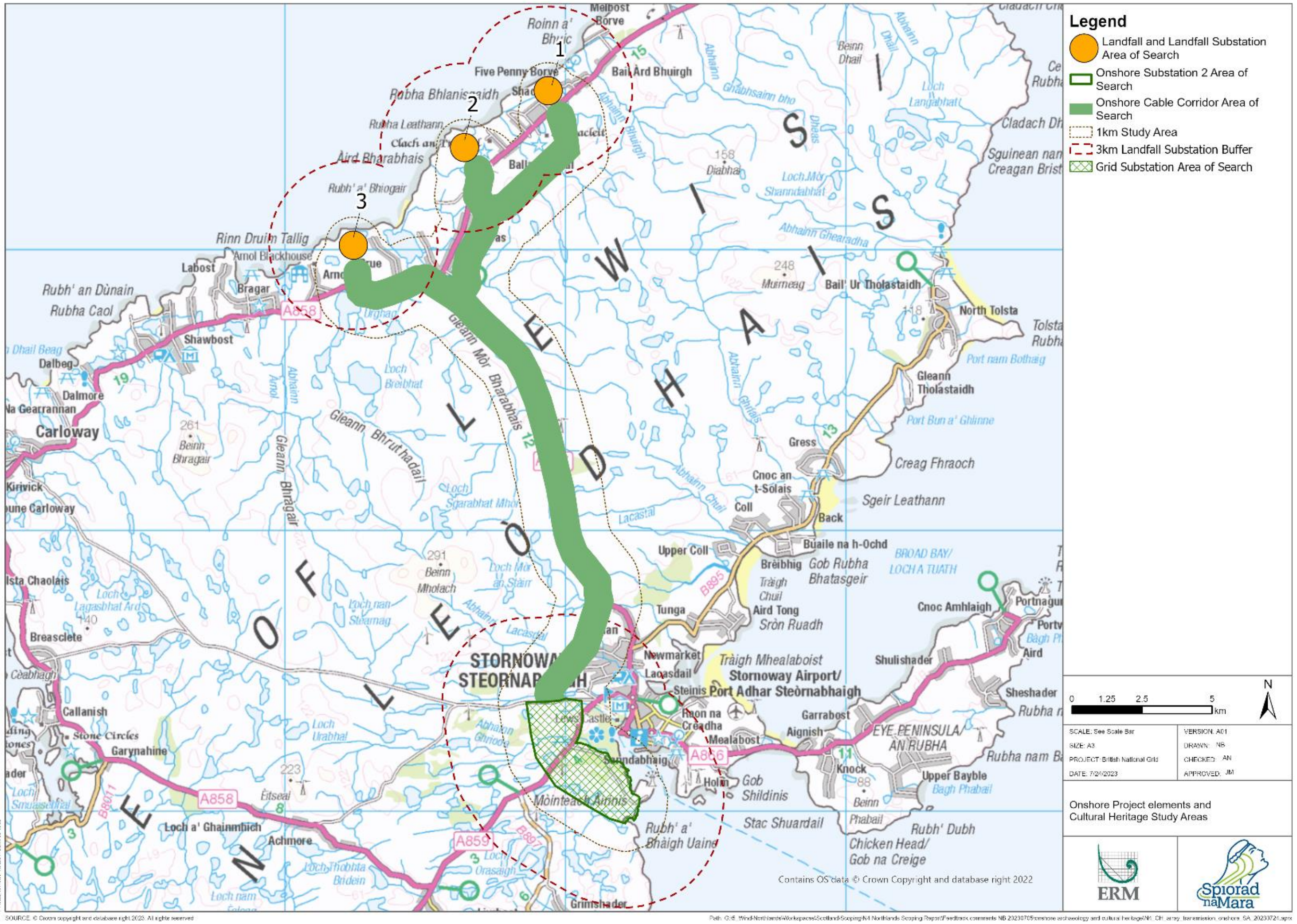
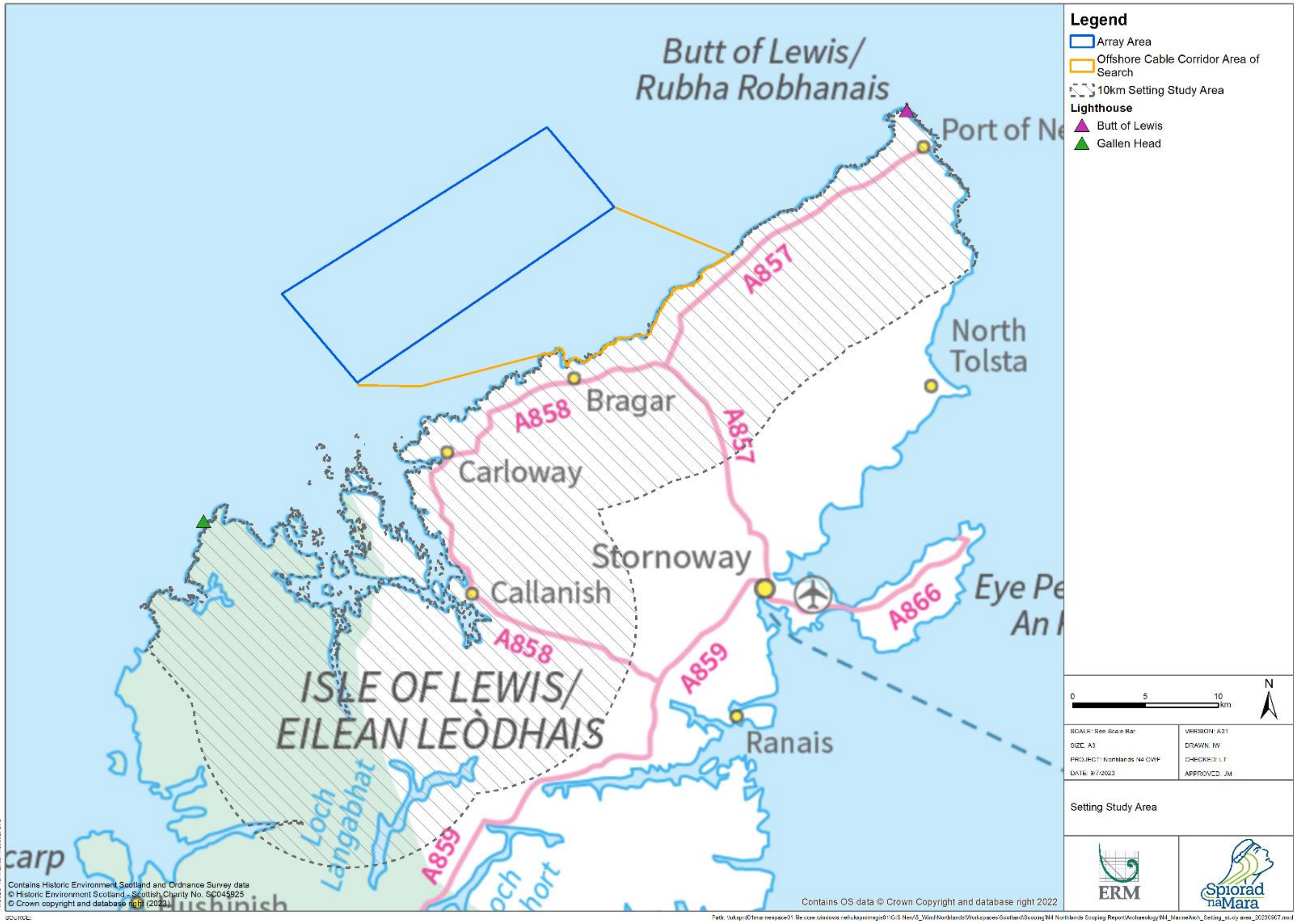


Figure 7.4-2 Settings Study Area for offshore infrastructure



7.4.3 Baseline Environment

7.4.3.1 Data Sources

The data sources used to inform this Onshore Archaeology and Cultural Heritage Chapter of the Scoping Report are presented within **Table 7.4-1.** These data sources will form only part of the final data set used to inform the EIA, and will be utilised alongside Historic Environment Record (HER) data, aerial photography and Lidar, cartographic evidence from the Ordnance Survey and historic maps, The Statistical Accounts for Scotland, The National Records of Scotland, Archaeological Data Service (ADS) for heritage data including grey literature reports, archaeological journals, and the Excavation Index for Scotland, regional and national research framework assessments and strategies, Published and grey literature archaeological journals and monographs, as well as any additional site-specific data that is collected for the Project.

Table 7.4-1 Summary of Key Publicly Available Datasets for Onshore Archaeology and Cultural Heritage

Source	Spatial Coverage	Year	Summary
NRHE: Canmore – HES	CSA, 1 km, 3 km Study Area and 10 km Study Area (Setting Study Area)	2023	Canmore is the online catalogue of Scotland's archaeology sites, buildings and industrial and maritime heritage.
Designated assets - HES	CSA, 1 km, 3 km and 10 km Study Area (Setting Study Area)	2023	Includes: Listed Buildings, Scheduled Monuments, Gardens and Designed Landscapes, Battlefields, Conservation Areas and World heritage Sites.

7.4.3.2 Overview of Baseline Environment

Initial information relating to Onshore Archaeology and Cultural Heritage has been gathered through a preliminary desktop search using the available online resources identified within **Table 7.4-1**, to indicate potential heritage features of interest. The Isle of Lewis has a rich archaeological record, for which, avoidance of impact to both designated and non-designated heritage is the primary mitigation.

"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, 2020b; SNH, 2017).

Landfall and Landfall Substation Area of Search

An initial 3 km buffer from the Landfall and Landfall Substation Area of Search has been used to develop a baseline of designated assets that may incur indirect impacts as a result of changes to their setting. Prior to the EIA, a ZTV will be reviewed and confirmed with stakeholders. The designated assets identified within 3 km of the Landfall and Landfall Substation Area of Search include:

- Seven Scheduled Monuments (SM5341, SM1669, SM5364, SM5901, SM90284, SM1661 and SM90022), inclusive of a standing stone, and indicative late prehistoric occupation sites;
- Two Listed Buildings (LB5763 and LB5764) both Category C. The Listing Buildings are made up of one church and one lodge.

Of these designated assets, none are located within the CSA of the Landfall and Landfall Substation Area of Search.

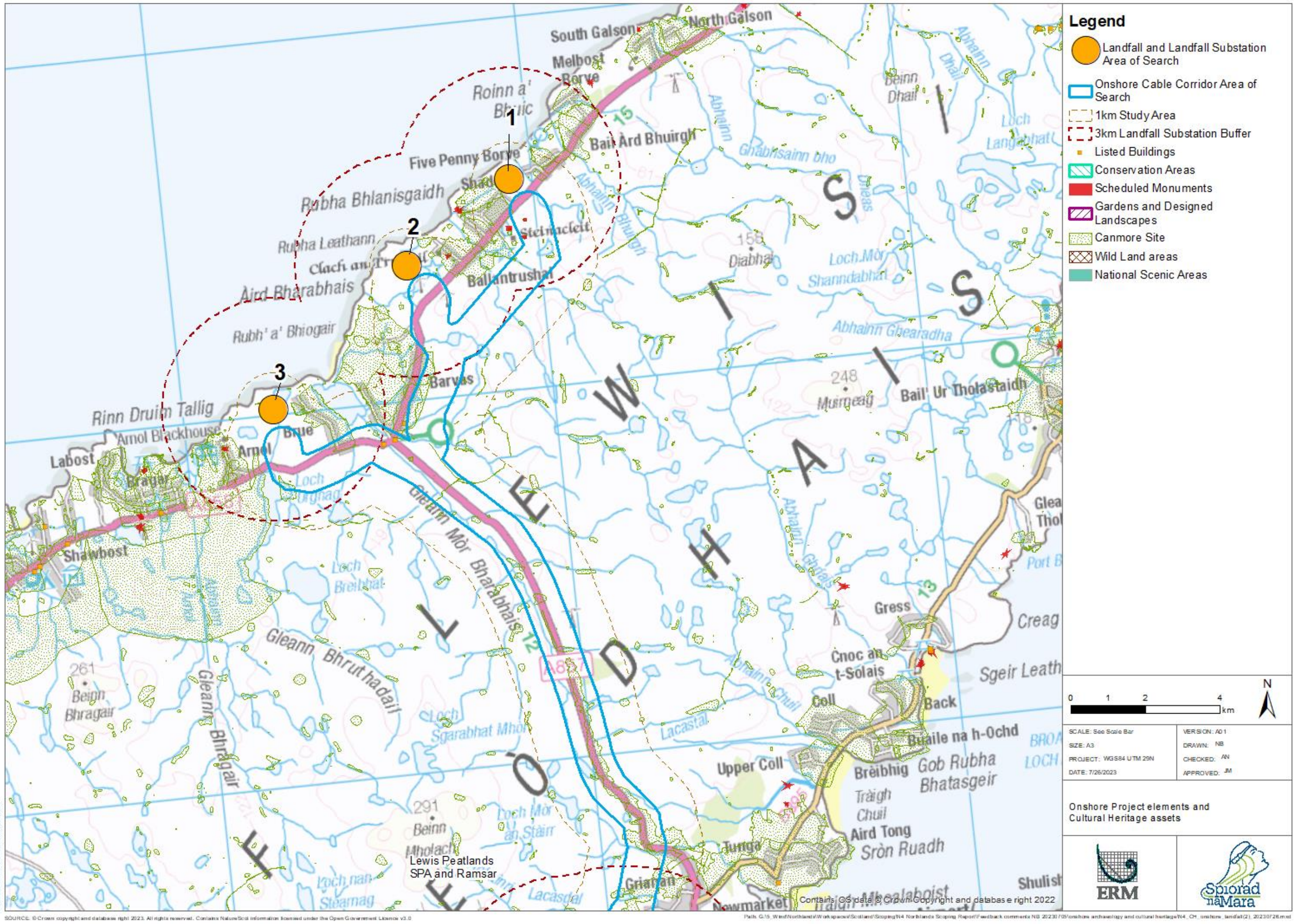
A 1 km diameter area has been used to develop the Landfall and Landfall Substation Area of Search, in which the baseline of heritage assets may incur direct impacts as a result of the Project. A review of Canmore data has identified ten non-designated Canmore assets within the CSA of the three landfall locations. Early prehistoric assets include standing stones, cairns, shell middens and flint tool findspots.

A further 113 Canmore assets are recorded within the 1 km Landfall and Landfall Substation Area of Search.

These assets include features relating to the Neolithic and Bronze Age ritual and funerary landscape as well as later prehistoric settlement sites. Later prehistoric assets include settlement sites (inclusive of a broch) and associated enclosures, as well as features relating to late prehistoric landscape management such as dykes. The bulk of the non-designated assets relate to medieval/post-medieval farmsteads and associated field systems, enclosures, shieling huts, dykes, small settlement sites and their associated infrastructure, religious buildings and burial grounds. Several assets relate to industrial sites in the form of quarries, mills, kelp kilns and lazy beds.

Figure 7.4-3 provides an overview of the baseline heritage assets in the vicinity of the Landfall and Landfall Substation Area of Search.

Figure 7.4-3 Landfall and Landfall Substation Area of Search baseline overview



Onshore Cable Corridor Area of Search

A 1 km buffer from the Onshore Cable Corridor Area of Search has been used to develop a baseline of assets that may incur direct impacts as a result of the Project. The designated assets identified within 1 km of the Onshore Cable Corridor Area of Search include:

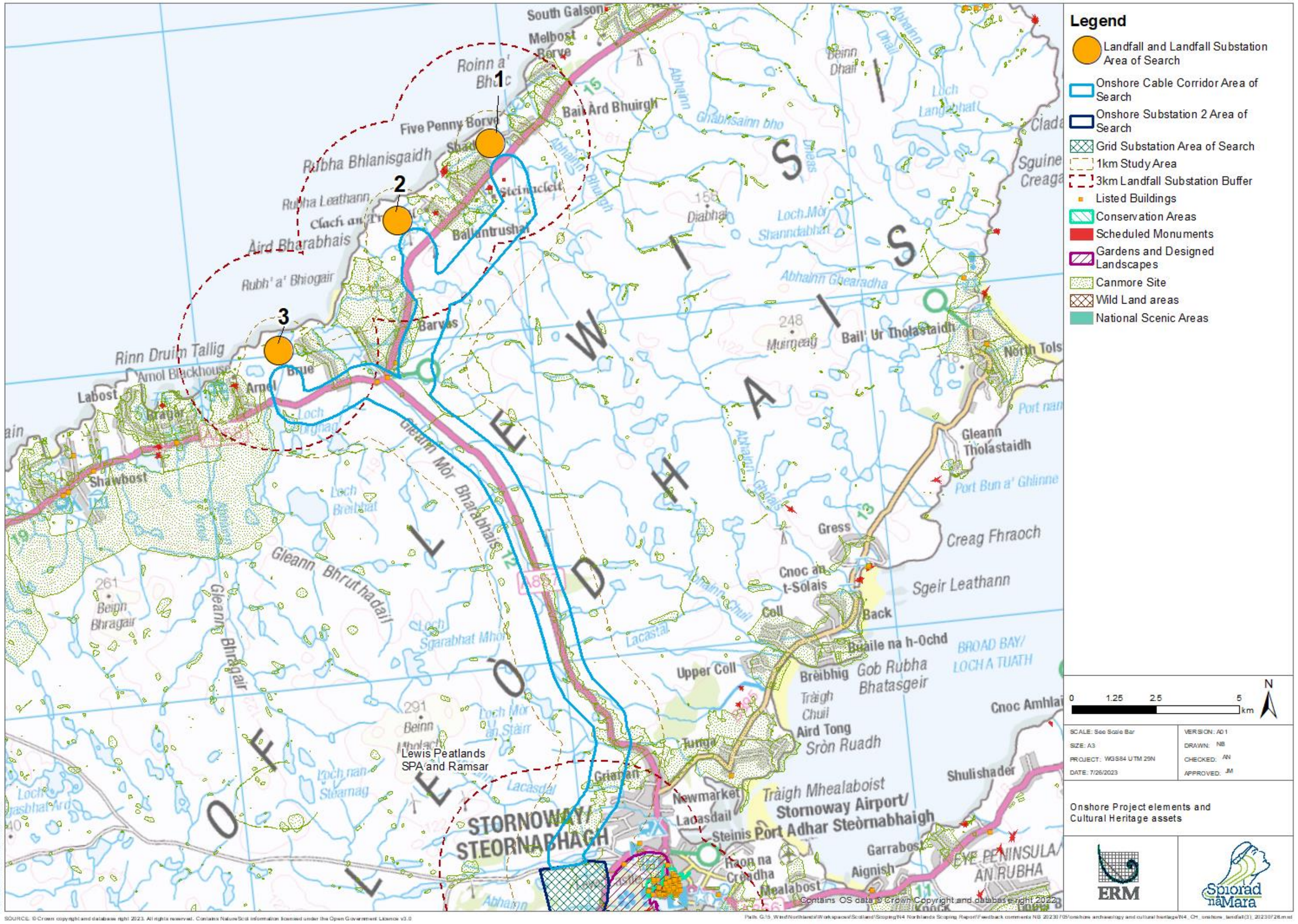
- Four Scheduled Monuments (SM5364, SM90284, SM5901 and SM1661) inclusive of a stone circle and settlement sites;
- Three Listed Buildings (LB5762, LB5763, and LB5764) inclusive of one Category B Listed Building and 2 Category C. The Listing Buildings are made up of two churches and a lodge;
- One Garden and Designed Landscape (GDL00263) associated with Lews Castle and Lady Lever Park.

Of these designated assets two Listed Buildings (LB5763 and LB5764), and two Scheduled Monuments (SM5901 and SM90284) fall within the CSA of the Onshore Cable Corridor Area of Search. All other designated assets fall out with the CSA.

A review of Canmore data has identified 72 non-designated Canmore assets within the CSA. Early Prehistoric assets take in a Mesolithic organic find, Standing stones and flint tool findspots. Later prehistoric assets include settlement sites and associated enclosures, as well as features relating to late prehistoric landscape management such as dykes. The bulk of the non-designated assets relate to Medieval/Post-Medieval farmsteads and associated field systems, enclosures, shieling huts and dykes. Industrial assets in the form of quarries, fisheries, paraffin works, peat works, mills and waterworks are recorded as well as transport infrastructure in the form of canals and tramways.

A further 169 Canmore assets are recorded within the 1 km Study Area. These assets take in features relating to the Neolithic and Bronze Age ritual and funerary landscape as well as later prehistoric settlement sites, both defended and undefended. Again, the bulk of assets date to the Medieval to Post-Medieval period, taking in farmsteads, field systems, shieling huts, settlement sites and their associated transport infrastructure, religious buildings, burial grounds and monuments. Industrial sites are further represented with a series of mills, tramways, lazy beds, industrial estates and gravel pits.

Figure 7.4-4 Onshore Cable Corridor Area of Search baseline overview



Grid Substation Area of Search

An initial 3 km buffer from the Grid Substation Area of Search has been used to develop a baseline of designated assets that may incur indirect impacts as a result of changes to their setting. Prior to the EIA, a ZTV will be reviewed and confirmed with stakeholders. The assets identified within 3 km of the Grid Substation Area of Search include:

- One Conservation Area (CA317) at Stornoway;
- One Garden and Designed Landscape (GDL00263) associated with Lewis Castle and Lady Lever Park;
- Five Scheduled Monuments (SM5504, SM5347, SM5397, SM5253 and SM6550), inclusive of 1 stone circle, one chambered cairn, two late prehistoric defended sites and one 20th century military monument;
- 106 Listed Buildings, comprising eight Category A Listed Buildings, 66 Category B and 32 Category C.

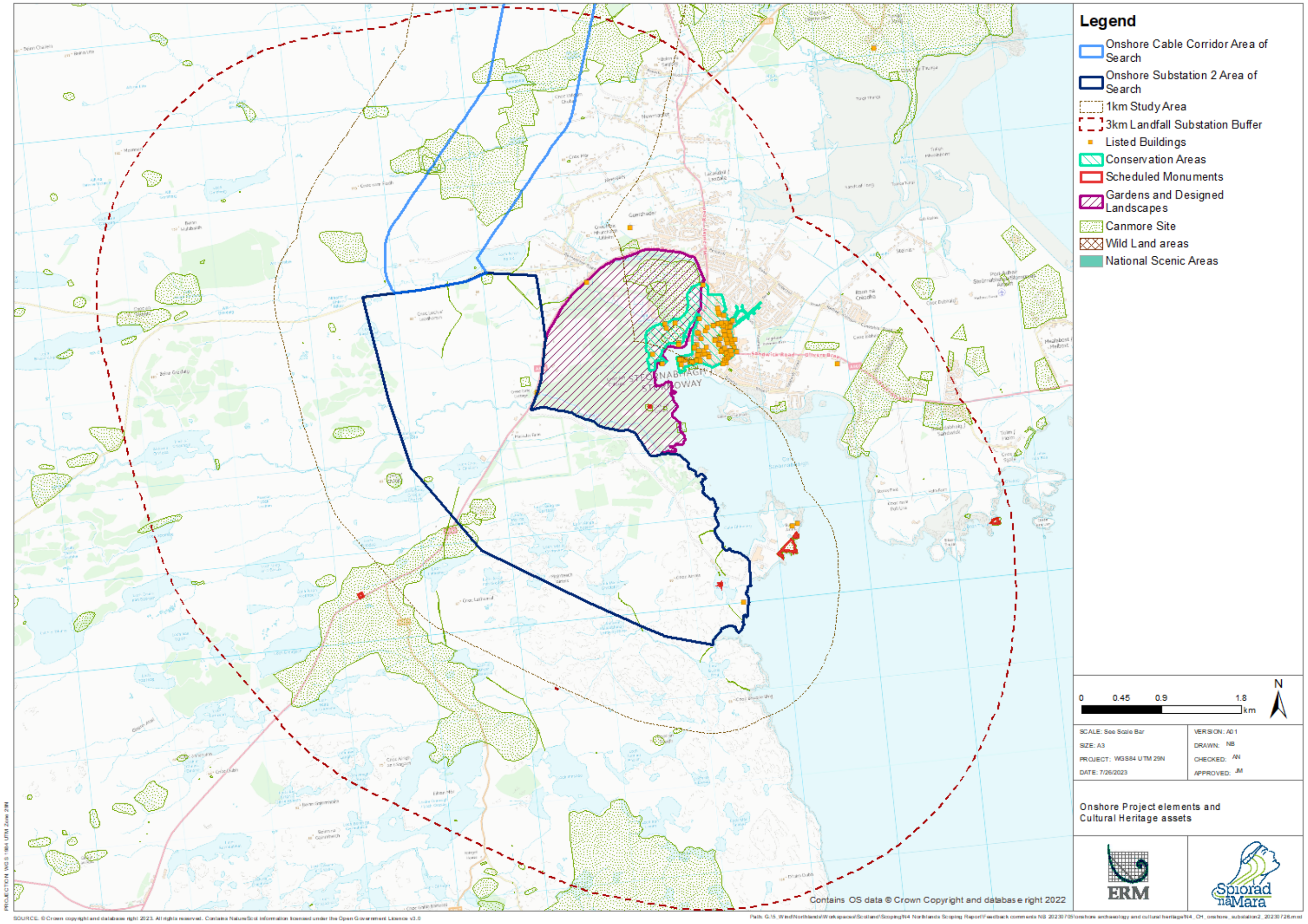
Of the designated assets only SM5397 (Dun), LB13329 and the Garden Designed landscape of Lews Castle, are located within the CSA of the Grid Substation Area of Search. All other designated assets fall out with the CSA.

A review of Canmore data has identified 35 non-designated Canmore assets within the CSA. Early prehistoric assets are limited to a single stone axe find spot. Later prehistoric assets include a crannog on Loch Arnish. The bulk of the non-designated assets relate to medieval/post-medieval farmsteads inclusive of shieling huts and dykes. Industrial assets in the form of paraffin works, peat works, industrial estate as well as transport infrastructure in the form of canals and tramways are recorded. A boat is also recorded on the coast south of Stornoway harbour.

A further 82 Canmore assets are recorded within the 1 km Study Area. These assets take in features relating to the Neolithic and Bronze Age ritual and funerary landscape, stone tool findspots as well as later prehistoric settlement sites, both defended and undefended. Again, the bulk of assets date to the medieval to post-medieval period, taking in farmsteads, field systems, shieling huts. The bulk of post-medieval assets relate to the development of Stornoway as a harbour town, inclusive of transport infrastructure (canal/tram), sea defences, beacons, lighthouses, warehouses associated with the working harbour as well as a series of military assets for its protection in wartime. A series of houses, shops and hotels are also recorded associated with Stornoway.

Spiorad na Mara

Figure 7.4-5 Grid substation Area of Search baseline overview



10 km Setting Study Area

The final selection of heritage assets for inclusion in the assessment of direct setting effects will be agreed through further consultation and informed using a ZTV and expert advise to consider assets beyond the Settings Study Area and long distance effects. The assessment may also include visual representations such as photomontages and/or wirelines, as appropriate to further inform selection.

Designated assets identified within the 10 km Settings Study Area include:

- One conservation area (Gearrannan (CA318));
- 48 listed buildings, of which 10 represent structures within the Gearrannan Conservation Area, comprising:
  - Two Category A;
  - 34 Category B;
  - 12 Category C.
- 61 scheduled monuments, including:
  - 10 ecclesiastical sites;
  - One burial ground (Little Bernera);
  - 22 prehistoric domestic and defensive sites;
  - 22 prehistoric ritual and funerary sites (cairns and standing stones, including Callanish Stones);
  - Two industrial water mills sites
  - Two shieling buildings;
  - One non-prehistoric fort;
  - The Blackhouse Arnol and associated domestic buildings.

Designated assets will be reviewed and assessed going forward to determine the contribution of setting to their value, and the impact from the Project upon that significance. This assessment will be presented in the Onshore Cultural Heritage Chapter of the EIAR and include a review of significant non-designated heritage assets also (such as Canmore and HER). It is noted that over 3800 Canmore assets lie within the 10 km Setting Study Area. Consultation with stakeholders will be undertaken to ensure a proportionate and robust assessment is undertaken of those assets where a likely significant effect may occur in line with the criteria detailed above.

7.4.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Onshore Archaeology and Cultural Heritage assessment, which has been incorporated into the design of the Project (**Table 7.4-2**).

Table 7.4-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
7.6	Avoidance of direct physical impacts to known Onshore Archaeology and Cultural Heritage	Through the iterative design process, onshore infrastructure will be located to avoid any known heritage assets as far as practicable.
7.7	Project cultural heritage management plan	Proactive management of archaeology and cultural heritage linked to the Onshore Archaeology and Cultural Heritage, the settings will be included in the project cultural heritage management plan, with implementation of soft design into the project infrastructure (e.g. planting screening, reduced height/burial of assets) secured under Planning Permission

7.4.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.4.5.1 Likely Significant Effects

Potential likely significant effects on Onshore Archaeology and Cultural Heritage have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 7.4-3**.

Table 7.4-3 EIA Scoping Assessment for Onshore Archaeology and Cultural Heritage

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Direct Impacts Direct physical disturbance, truncation or loss, of known Onshore Archaeology and Cultural Heritage assets, or to hitherto unidentified sub-surface archaeological features	7.6, 7.7	In	The construction and decommissioning of the proposed landfall, substation(s), cable route and their associated infrastructure, have the potential to result in the disturbance/loss of Onshore Archaeology and Cultural Heritage assets. Effects are considered to be permanent and irreversible.	Desk-Based Assessment (DBA) using datasets identified in **Table 7.4-1** and study areas identified in section 7.4.2. This DBA will incorporate a walkover survey of the CSA to ground truth heritage assets and identify new assets not recorded within the national and local records. Further primary survey may be required following discussions with the LPA and HES. See **Table 7.4-4**
Direct impacts Direct impacts that affect the significance of assets caused by changes to the setting of designated and significant non-designated Onshore Archaeology and Cultural Heritage assets during the construction and decommissioning of onshore and offshore development and infrastructure	7.6, 7.7	**Out**	Direct effects during construction and decommissioning will occur for a limited duration and as such are considered not significant. As such these have been scoped out.	
Operation and Maintenance				
Direct physical disturbance, truncation or loss, of known Onshore Archaeology and Cultural Heritage assets, or to hitherto	7.6, 7.7	**Out**	Scoped out based on the assumption all maintenance works are carried out within previously disturbed ground from the construction phase.	

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
unidentified sub-surface archaeological features				
Direct impacts that affect the significance of assets caused by changes to the setting of designated and significant non-designated Onshore Archaeology and Cultural Heritage assets as a result of onshore and offshore development and infrastructure	7.6, 7.7	In	Depending on the final Project Design there is the potential that the proposed offshore and onshore project infrastructure could have permanent effects on the setting of an onshore historic environment asset, resulting in changes to the understanding, appreciation and experience, and thus the significance of the Onshore Archaeology and Cultural Heritage assets.	A setting site visit and ZTV of the final design layout will be used to inform assets requiring setting assessment within the Onshore Archaeology and Cultural Heritage Study Areas, and 10 km Setting Study Area (affected onshore assets). Consultation with the LPA and HES will also inform assets to be included within any setting assessment. A sifting exercise will be produced to identify assets within the 10 km Setting Study Area to be taken forward for setting assessment. The assessment of direct effects for onshore heritage assets considers changes in setting which have the potential to affect the understanding, appreciation, and experience of heritage assets, from offshore and onshore project infrastructure. For the purposes of evaluating direct effects upon heritage assets, the contribution setting makes to asset significance, proximity to the Project, and location within the ZTV will determine whether further assessment is required. This assessment will also take account of the extent of the potential visual impact as determined through the LVIA. The assessment may also include

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
				visual representations such as photomontages and/or wirelines, as appropriate.
Cumulative effects	7.6, 7.7	In	The operation and maintenance of the offshore infrastructure, the proposed landfall, substation(s), cable route and their associated onshore infrastructure, have the potential to generate cumulative effects, which either temporarily or permanently, affect the setting of Onshore Archaeology and Cultural Heritage assets. Whilst some may be expected to be fully reversible, others such as the substation sites may have longer lasting effects; an assessment will be made during the EIA. Cumulative effects during construction and decommissioning will be over a short period and as such not significant. As such these have been scoped out.	Cumulative Effects arise as a result of impact interactions, either of different impacts of the proposal itself (intra cumulative effects) or between the impacts of other projects, or additive impacts resulting from incremental changes caused by the proposal together with other projects already in the planning system or allocated in a Local Development Plan (inter cumulative effects). Both intra and inter effects will be considered.

7.4.6 Proposed Approach to EIA

7.4.6.1 Relevant Data Sources

The requirements and approach to baseline data collection considered necessary to inform the EIA phase of the EIAR are detailed in **Table 7.4-4.** All data collected will be cross referenced with that collected in relation to the offshore works.

Table 7.4-4 Summary of Baseline Data Collection to Inform Onshore Archaeology and Cultural Heritage

Data Required	Survey Method	Approach Summary
Survey to enhance the heritage baseline	DBA	Conduct DBA and baseline studies to gather information on all known Archaeology and Cultural Heritage in the Onshore Archaeology and Cultural Heritage Study Area. In order to establish the historic environment baseline and aid in the assessment of the physical and ground--based archaeological potential of the CSA of the DBA will include a comprehensive desk-based review of data from the following sources: HES Datasets including: • Canmore Archaeological Records; • Database of World Heritage Sites; • Database of Scheduled Monuments; • Database of Listed Buildings; • Database of Inventoried Garden and Designed Landscapes; • Database of Inventoried Battlefields; Other data sets: • Historic Environment Record data; • The Statistical Accounts for Scotland; • The National Records of Scotland; • Aerial photography and LiDAR; • Cartographic evidence from the Ordnance Survey and other historic maps • Scape Trust; • ADS for heritage data including grey literature reports, archaeological journals, and the Excavation Index for Scotland; • Regional and national research framework assessments and strategies; • Published and grey literature archaeological journals and monographs;

Data Required	Survey Method	Approach Summary
		• Consultation with local heritage groups/specialists if available. These resources will be collated and examined alongside the results of any fieldwork to assess the potential for on-site archaeology.
Primary survey to enhance the baseline understanding for currently Unknown Archaeology	Walkover survey/geophysical survey/Palaeoenvironmental cores/geoarchaeological investigation/remote sensing	The DBA and baseline studies should be supplemented by primary walkover and potentially, following consultation with the LPA, geophysical survey and/or geoarchaeological investigation of the CSA to further identify any additional potential paleo landforms and terrestrial archaeology or cultural heritage features or receptors. Primary survey could include some or all of the following walkover: geophysical survey; additional LiDAR data collection, boreholes to identify layers, features or areas which might be archaeologically significant.
Viewpoint determination	ZTV analysis	Conduct DBA and baseline studies to understand if primary survey is needed to address any setting assessments as needed for intertidal and coastal marine archaeology and cultural heritage.
Setting visit and ZTV analysis	Setting visit to key designated assets identified as being at risk of indirect effects from the Project, in combination with a ZTV review.	Setting site visit for key assets at risk of direct effects within the 3 km and 10 km Study Areas. A review of the screened and bare earth ZTV for both Onshore and Offshore Infrastructure will be undertaken to identify assets that may be included for setting assessment. The ZTV will also be utilised, alongside consultation with HES and the archaeological advisor to the LPA, to identify receptors requiring wireline and photomontages to inform setting impacts of the Project.

7.4.6.2 Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. It is important that collaboration with the Project's engagement team is robust and ongoing. **Table 7.4-5** includes a preliminary list of consultees for Onshore Archaeology and Cultural Heritage discussions.

Table 7.4-5 Preliminary List of Consultees

Consultee	Description
HES	Lead public body established to investigate, care for and promote Scotland's historic environment.
Comhairle nan Eilean Siar	Local planning authority.

Consultee	Description
Local groups and/or representatives	Local groups and/or representatives may also be included as part of the consultation, such as the North of Scotland Archaeological Society; potential local groups will be discussed with the Comhairle nan Eilean Siar Archaeologist

7.4.6.3 Policy, Legislation and Guidance

Policy, legislation and best practice guidance related to the Onshore Archaeology and Cultural Heritage assessment is provided below. Relevant heritage legislation:

Table 7.4-6 Legislation, Policy and Guidance relevant to the Onshore Archaeology and Cultural Heritage Assessment

Relevant Legislation, Policy and Guidance
The Ancient Monuments and Archaeological Areas Act (as amended) (1979)
The Protection of Military Remains Act (1986)
The Planning (Listed Buildings and Conservation Areas) (Scotland) Act (as amended) (1997)
The Historic Environment Scotland Act (2014)
The Town and Country Planning (Historic Environment Scotland) Amendment Regulations (2015)
Treasure Trove Law (as revised Jan 2016)
Comhairle nan Eilean Siar Local Development Plan (2018) (Comhairle nan Eilean Siar, 2018b)
National Planning Framework 4 (NPF4) (The Scottish Government, 2023)
Scottish Planning Policy: Valuing the Historic Environment
Scottish Natural Heritage (SNH) (now known as NatureScot) and HES EIA Handbook (SNH and NatureScot, 2018)
Scottish Natural Heritage (SNH) (now known as NatureScot). (2017 (2.2)). Visual Representation of Wind Farms: Guidance
Historic Environment Policy for Scotland (HEPS) (HES, 2019)
Our Place in Time: The Historic Environment Strategy for Scotland (The Scottish Government, 2014a)
Comhairle nan Eilean Siar Outer Hebrides Local Development Plan Supplementary Guidance: Conservation Area Management Plans (Comhairle nan Eilean Siar, 2018a)
Planning Advice Note (PAN) PAN 2/2011: Planning and Archaeology (The Scottish Government, 2011)
Chartered Institute for Archaeologists (CIfA) Standards and Guidance for Desk-Based Assessments (CIfA, 2020)
HES (2016, updated 2020) Managing Change in the Historic Environment Series, specifically 'Managing Change in the Historic Environment: Setting (HES, 2016)

7.4.6.4 Assessment Methodology

The following section outlines the proposed assessment methodology that will be used within the EIAR to assess potential likely significant effects of the Project on Onshore Archaeology and Cultural Heritage receptors.

The proposed approach to assessment will take the following steps:

- Gathering of baseline data (primary survey, desk-based etc.) identifying specific receptors;
- Identification of potential effects and impact pathways;
- Generation of ZTV and setting assessment;
- Assessment of impacts.

The Impact Assessment for Onshore Archaeology and Cultural Heritage will follow that as set out in Chapter 4 (see Chapter 4: Proposed Approach to EIA), which states that receptors will receive a sensitivity and significance determination and the receptors will be assessed for the construction, operation, and decommissioning phases of the Project.

The cultural heritage assessment will proceed from an initial consideration of the ‘sensitivity’ of a cultural heritage feature against the ’magnitude’ of any potential change, to arrive at the ‘significance’ of the effect as detailed in the EIA Handbook (SNH and HES, 2018). The assessment of sensitivity of archaeological and historical assets reflects the relative weight which statute and policy attach to them. The final assessment of impact significance will be informed by professional judgement.

Direct Effects

Known archaeology, as identified during the DBA, will be avoided during site design, where possible. The assessment of physical effects will consider direct effects where sites or potential sites/buried archaeology are in danger of being disturbed or destroyed during the construction phase of the Project.

The assessment of direct effects also concerns changes to the baseline condition of a heritage asset resulting from development beyond the bounds of the asset. This may relate to noise, vibration or access, but primarily considers the potential changes to the settings of heritage assets as a consequence of new development, affecting the understanding, appreciation, and experience of the asset. Assessment of direct setting effects upon heritage assets includes an evaluation of the degree to which setting contributes to the significance of the asset, the sensitivity of the asset to changes in setting, proximity to the Project, and location within the visual setting (ZTV), to determine whether further assessment is required. For the purposes of the assessment, designated heritage assets include Listed Buildings, Scheduled Monuments, Gardens and Designed Landscapes, Inventoried Battlefields and World Heritage Sites as well as Conservation Areas. The range for detailed assessment of designated heritage assets within the EIAR will be based upon the results of initial survey work and consultation.

This assessment will also take account of the extent of the potential visual impact of the above ground onshore infrastructure as determined through the LVIA and Seascape, Landscape and Visual Impact Assessment (SLVIA). The assessment may also include visual representations such as photomontages and/or wirelines, as appropriate, with both the onshore and offshore effects considered in-combination.

Consultation will be undertaken with HES and the Council and local groups as part of the assessment process. The Onshore Archaeology and Cultural Heritage assessment will include proposals for mitigation of any identified impacts where necessary and appropriate. Direct effects arising from the Array Area will be considered in the Onshore Cultural Heritage Chapter of the EIA and should cumulative effects arise from both the onshore and offshore elements of the Project at specific receptors these will be considered within the cumulative effects section of the EIAR.

7.4.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Onshore Archaeological and Cultural Heritage assets include:

1. Do you agree that the data sources identified are sufficient to inform the Onshore Archaeological and Cultural Heritage assets baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all Onshore Archaeological and Cultural Heritage assets receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the potential likely significant effects table for Onshore Archaeological and Cultural Heritage assets?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Project on Onshore Archaeological and Cultural Heritage assets receptors?

7.4.8 References

CIfA (Chartered Institute for Archaeologists), 2014. Standards and Guidance for Historic Environment Desk-Based Assessments (2020 updates). Available online at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf [Accessed 05/07/2023].

Comhairle nan Eilean Siar, 2018a. Comhairle nan Eilean Siar Outer Hebrides Local Development Plan Supplementary Guidance: Conservation Area Management Plans. Available online at: https://www.cne-siar.gov.uk/media/12603/sg-camps-final-for-adoption-web-version.pdf [Accessed 05/07/2023].

Comhairle nan Eilean Siar, 2018b. Local Development Plan. Available online at: https://www.cne-siar.gov.uk/planning-and-building/planning-service/development-planning/development-plan/local-development-plan/ [Accessed 05/07/2023].

HES (Historic Environment Scotland), 2016. Managing Change in the Historic Environment Series - Managing Change in the Historic Environment: Setting, updated 2020. Available online at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=80b7c0a0-584b-4625-b1fd-a60b009c2549 [Accessed 05/07/2023].

HES (Historic Environment Scotland), 2019. Historic Environment Policy for Scotland (HEPS). Available online at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e [Accessed 15/07/2023].

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7.5 Traffic and Access

7.5.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Traffic and Access within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

7.5.2 Study Area

The exact locations of onshore infrastructure have not been confirmed; therefore, the Traffic and Access Study Area has been defined by the public road network within the Onshore Development Area of Search as outlined in **Figure 1.1-1** (see Chapter 2: Site Selection and Project Description). The Onshore Area of Search extends to include the deep water port at Arnish, and consideration will be given to the delivery of onshore infrastructure from the port to the point of construction.

7.5.3 Baseline Environment

7.5.3.1 Data Sources

The data sources used to inform this Traffic and Access Chapter of the Scoping Report are presented within **Table 7.5-1**. These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside any additional site-specific data that is collected for the Project.

Table 7.5-1 Summary of Key Publicly Available Datasets for Traffic and Transport

Source	Spatial Coverage	Year	Summary
Ordinance Survey and mapping data from Google Earth	Onshore Development Area of Search	Most recent data available	Mapping indicating the locations of potential key road links
Department for Transport	Onshore Development Area of Search	Most recent data available	Traffic flow data of key road links and cycleways
Comhairle nan Eilean Siar	Onshore Development Area of Search	Most recent data available	Traffic flow data of key road links
Comhairle nan Eilean Siar or Crashmap database	Onshore Development Area of Search	Most recent data (5 years) available	Personal Injury Accidents data of key road links
Comhairle nan Eilean Siar	Onshore Development Area of Search	Most recent data available	Public Rights of Way (PRoW)

7.5.3.2 Overview of Baseline Environment

The existing road and traffic environment focusses on the road networks surrounding the Onshore Cable Corridor Area of Search and at the Landfall and Landfall Substation Area of Search, and the Grid Substation Area of Search.

Baseline traffic flow conditions on routes within the Traffic and Access Study Area will be established and detailed in the Environmental Impact Assessment Report (EIAR) and the sensitivity of the traffic receptors will be determined. The geographic scope of the baseline assessment will be confirmed in consultation with Comhairle nan Eilean Siar and Transport Scotland; however, it is anticipated to include the Deep Water Terminal, the A858, A857, and A859. There are several minor roads that intersect with these 3 main roads which will also be included in the assessment. Where publicly available traffic flow information is available, this will be used as a basis for the baseline assessment. Where such information is not available, traffic surveys will be undertaken. This is likely to be in the form of Automatic Traffic Counters on key links/crossings and junction turn counts at key junctions of where new or temporary junction are formed. A number of Core Paths and cycleways are also present within the Onshore Development Area of Search. Personal Injury Accidents data will be obtained from Western Isles Police or publicly available data sources to inform the baseline assessment.

An initial desk study was undertaken to obtain a high-level understanding of the current traffic flows and road traffic collisions within or adjacent to the Traffic and Access Study Area.

Baseline Traffic Flows

Traffic flow data for the road sections that may be affected by the Project has been obtained from count point data available from the Department of Transport traffic count website. The Annual Average Daily Flow (AADF) data collected is summarised in **Table 7.5-2.**

Table 7.5-2 Traffic Flow Data on Key Links

Route	Count Point ID	Year	AADF	Heavy Goods Vehicles (HGV) AADF	% HGV
A857, near Barvas	30946	2021	1,415	29	2.1
A857, near Barabhas	88083	2021	2,010	27	1.34
A858, near Bragar	20947	2021	1,069	15	1.4
A858, near Tom Mhic Leoid	88003	2021	984	9	0.9

Route	Count Point ID	Year	AADF	Heavy Goods Vehicles (HGV) AADF	% HGV
A859, near Cleascro Road Houses	91285	2021	3,130	108	3.45

(Source: DfT, 2022)

Accidents and Safety

The history of traffic incidents which occurred along the most likely route to access the Onshore Development Area of Search was examined using the website CrashMaps.co.uk, between 2017-2021. This website provides details of the location and severity of traffic incidents occurring on United Kingdom (UK) roads, with severity divided into 3 categories of: slight, serious, and fatal.

A total of 13 accidents were recorded on the A857 over the 5-year period, 9 slight, 3 serious and 1 fatal. A total of 6 accidents (3 slight, 2 serious and 1 fatal) were recorded on the A858, while a total of 4 slight accidents have also been recorded on the A859 over the same period.

7.5.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Traffic and Access assessment, which has been incorporated into the design of the Project (**Table 7.5-3**).

Table 7.5-3 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
7.8	A Construction Worker Travel Plan.	A Construction Worker Travel Plan which will be developed to promote sustainable journeys during the construction phase of the Project and where possible reduce single occupant car journeys.
7.9	An Access Management Plan (AMP).	An AMP will be developed to be included in the wider Construction Environmental Management Plan (CEMP).
7.10	A Construction Traffic Management Plan (CTMP).	A CTMP will be developed outlining the mechanisms for managing the movement of construction related traffic.
7.11	An Operational Traffic Management Plan (OTMP).	An OTMP if required will be developed to mitigate the impact of the operational phase and associated traffic, otherwise an Operational Worker Travel Plan.
7.12	An Abnormal Load Route Assessment (ALRA).	An ALRA will be undertaken to confirm that the proposed designated haulage route can accommodate Abnormal Indivisible Loads (AILs)

ID	Parameter	Mitigation Measures Embedded into the Project Design
		and that their transportation will not have any detrimental effect on the proposed route and will identify any additional off-site improvement works which are required in order to make the route viable.

7.5.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.5.5.1 Likely significant effects

Potential likely significant effects on Traffic and Access have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These potential likely significant effects are outlined in **Table 7.5-4**.

Table 7.5-4 EIA Scoping Assessment for Traffic and Access

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Road Safety – Onshore Construction Activities including potential cable laying	7.8, 7.9, 7.10	In	Potential for likely significant effects	A detailed assessment will be undertaken including collision analysis of all parts of the road network significantly affected by construction traffic.
Driver Delay – Onshore Construction Activities including potential cable laying	7.8, 7.9, 7.10	In	Potential for likely significant effects	A detailed quantitative assessment will be undertaken using traffic count data collected for the Project to determine the level of effect.
Pedestrian/Cycling Amenity – Onshore Construction Activities including potential cable laying	7.9, 7.10	In	Potential for likely significant effects	An assessment will be undertaken to identify affected footways/footpaths, and cycle ways affected by the construction works.
Severance - Onshore Construction Activities including potential cable laying	7.9, 7.10	In	Potential for likely significant effects	A detailed quantitative assessment will be undertaken using traffic count data collected for the Project to determine the level of effect
Increase in Traffic Flows – Onshore Construction Activities	7.10	In	Potential for likely significant effects	A detailed quantitative assessment will be undertaken using traffic count data collected for the Project to determine the level of effect.
Abnormal Indivisible Loads – Onshore Construction	7.10, 7.12	In	Potential for likely significant effects	A detailed assessment will be undertaken including a full review of the abnormal load route from the Port of Entry (PoE) for critical structure dimensions/capability.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
				Swept path analysis of key junctions, bends and other constraints on the route will be completed.
Decommissioning		**Out**	It is not possible to forecast accurately baseline traffic flow levels 30 years into the future. For this reason, further work would be undertaken at the time of decommissioning to determine if significant transport effects might be experienced.	
Operations and Maintenance				
Impact from Traffic Generation – Operational Phase (Onshore Infrastructure)	7.11	**Out**	HGV movements will only be required in event of equipment failure where a large component need replaced. As such there is no potential for a significant impact to occur. Vehicle movements associated with operations will mainly be associated with personnel carrying out operations and maintenance activities. Number of people involved will be limited and as such will not give rise to significant vehicle movements. No potential significant impacts are predicted.	

7.5.6 Proposed Approach to EIA

7.5.6.1 Relevant Data Sources

The requirements and approach to the baseline data collection from relevant data sources for the EIA phase of the EIAR are detailed in **Table 7.5-5**.

Table 7.5-5 Summary of Baseline Data Collection to Inform the Traffic and Access Assessment

Data Required	Survey Method	Approach Summary
Existing Traffic (Count Data)	Desktop Study	This information will be collected from the Transport Scotland/Department for Transport traffic count database or Comhairle nan Eilean Siar database if available.
New Traffic Count Data (if required)	Link Counts; Junction Turning Counts	New Traffic Surveys would be undertaken if publicly available traffic flow information is unavailable, or it is considered unsuitable to be used in the assessment.
Personal Injury Accidents Data	Desktop Study	This data will be obtained from Western Isle Police or from publicly available sources such as the Crashmap database.
Online Mapping Resources	Ordinance Survey/mapping data from Google Earth	This information will be used to identify the locations of sensitive receptors and to characterise roads.

7.5.6.2 Consultation

Table 7.5-6 provides a summary of consultees to be consulted with to inform the Traffic and Access assessment.

Table 7.5-6 Summary of Proposed Key Consultees for Traffic and Access Assessment

Proposed Consultee	Objective of Consultation
Transport Scotland	It is acknowledged that there are no trunk roads on the Isle of Lewis, consultation would be carried out to discuss approach to Traffic and Access assessment and to inform the scope of the Traffic and Access assessment of the EIAR, particularly with regard to any components requiring transport by road within mainland Scotland as well as staff travel and logistics. Consultation activities would also look to discuss potential mitigation measures to be incorporated into the design or traffic management plan.
Comhairle nan Eilean Siar	To discuss approach to Traffic and Access assessment and to inform the scope of the Traffic and Access assessment of the EIAR. To consult on approaches to potential infrastructure crossing methods or cable laying within the local roads.

Proposed Consultee	Objective of Consultation
	To consult on building standards and utilities located within the local roads. To discuss potential mitigation measures to be incorporated into the design or Traffic Management Plan.
Relevant Port Authorities	To discuss approach to Traffic and Access assessment and to inform the scope of the Traffic and Access assessment of the EIAR.

7.5.6.3 Policy, Legislation and Guidance

The assessment will follow guidance contained in the following planning policy documents in **Table 7.5-7.**

Table 7.5-7 Legislation, Policy and Guidance Relevant to the Traffic and Access assessment

Relevant Legislation and Policy
Guidelines for Environmental Impact Assessment, Institute of Environmental Management & Assessment (IEMA), (1993)
National Planning Framework 4, The Scottish Government, (2023)
National Transport Strategy, The Scottish Government, (2020)
Planning Advice Note 75 (PAN 75) – Planning for Transport, The Scottish Executive, (2005)

7.5.6.4 Assessment Methodology

The assessment methodology presented is based on the IEMA (1993) guidelines. The recently published revised guidance, IEMA (2023) guidelines, will be reviewed and implemented at the EIA phase. A screening process, using 2 broad rules from these guidelines, will be employed to identify roads on which potential likely significant effects may occur:

- Roads where traffic is predicted to increase by more than 30% as a result of the Project, or where the number of HGVs is predicted to increase by more than 30% must be assessed;
- Roads in specifically sensitive areas where overall traffic flow or HGVs are predicted to increase by more than 10% must be assessed.

Where the predicted increase in traffic flow is lower than these thresholds, the significance of the effects can be considered to be low or not significant with no further detailed assessments warranted. Consequently, where the predicted increase in traffic flow is greater than these thresholds, the potential effects are considered to be potentially significant and are assessed in greater detail.

Any change in traffic flow which is greater than the thresholds set out in the IEMA (1993) guidelines will be subject to further analysis. The magnitude of potential impacts will be identified through consideration of receptor sensitivity against the degree of predicted change to baseline conditions, the duration and reversibility of this change and professional judgement.

It is not proposed to submit a formal Transport Assessment (TA) to accompany the planning application for the Project, as TAs principally relate to developments that generate a significant permanent increase in traffic as a direct consequence of function (e.g. retail parks). Traffic associated with the operational phase of the Project is anticipated to be below the required threshold for a formal TA. It is anticipated that further assessment in addition to consultation with Comhairle nan Eilean Siar and Transport Scotland as appropriate,will demonstrate that a formal TA is unlikely to be required.

7.5.6.5 Assessment Criteria

The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Project or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance (IEMA 1993), legislation, statutory designations and/or professional judgement **Table 7.5-8** details the framework for determining the sensitivity of receptors.

Table 7.5-8 Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	The receptor has no ability to absorb change without profoundly altering its present character, is of high strategic value, or of national importance. For example: • Routes with existing high traffic levels which are at or very close to exceeding capacity; • Receptors such as populated urban areas where existing traffic levels are high and there is no capacity to absorb additional traffic flow on adjacent routes; • Strategic nationally important routes with no capacity to absorb additional traffic flow; • At severe/fatal accident hotspots where an increase in traffic flow is likely to increase the likelihood or severity of accidents; • A route with very poor pedestrian facilities and a high traffic flow level where an increase in traffic is likely to decrease pedestrian amenity severely; • At a settlement which is bisected by a major route where a significant change in traffic flow or composition is likely to severely increase severance; • A receptor where due to the presence of noise and vibration inducing road surfaces (e.g. cattle grids or cobbles) close to a residential property or similarly sensitive receptor, a change in traffic flow or traffic composition is likely to severely affect the perception of noise and vibration due to traffic; • A significant change in traffic flow level might induce severe pedestrian crossing delay also where children/elderly people might frequently cross an informal crossing.
High	The receptor has little ability to absorb change without fundamentally altering its present character, is of high strategic value, or of national importance. For example: • Routes with existing high traffic levels which have little additional traffic flow capacity;

Sensitivity of Receptor	Definition
	• Receptors such as populated urban areas where existing traffic levels are high and there is little capacity to absorb additional traffic flow on adjacent routes; • Strategic nationally important routes with little capacity to absorb additional traffic flow; • At severe accident hotspots where an increase in traffic flow may increase the likelihood or severity of accidents; • A route with poor pedestrian facilities and a high traffic flow level where an increase in traffic is likely to decrease pedestrian amenity significantly; • At a settlement which is bisected by a major route where a significant change in traffic flow or composition is likely to significantly increase severance; • A receptor where due to the presence of noise and vibration inducing road surfaces (e.g. cattle grids or cobbles) close to a residential property or similarly sensitive receptor, a change in traffic flow or traffic composition may significantly affect the perception of noise and vibration due to traffic; • At a location where pedestrian crossing facilities are informal and where a significant change in traffic flow level might induce significant pedestrian crossing delay also where children/elderly people might regularly cross an informal or priority crossing.
Medium	Areas where the transport network has moderate capacity to change, without significantly altering its state. For example: • Routes with existing moderate traffic levels which have some additional traffic flow capacity; • Receptors such as populated urban areas where existing traffic levels are moderate and there is some capacity to absorb additional traffic flow on adjacent routes; • Receptors such as rural roads where existing traffic levels are moderate and there is some capacity to absorb additional traffic flow on adjacent routes; • Strategic nationally important routes with some capacity to absorb additional traffic flow; • At slight accident hotspots where an increase in traffic flow may increase the likelihood or severity of accidents; • A route with moderate pedestrian facilities where an increase in traffic is may decrease pedestrian amenity; • At a settlement which is bisected by a major route where a significant change in traffic flow or composition is likely to moderately increase severance; • A receptor where due to the presence a road close to a residential property or similarly sensitive receptor, a change in traffic flow or traffic composition may moderately affect the perception of noise and vibration due to traffic; • At a location where pedestrian crossing facilities are informal or substandard and where a significant change in traffic flow level might induce a moderate pedestrian crossing delay.
Low	Areas where the transport network is tolerant to change without detriment to its state. For example: • Routes with existing low traffic levels which have additional traffic flow capacity; • Receptors such as populated urban areas where existing traffic levels are low and there is capacity to absorb additional traffic flow on adjacent routes; • Receptors such as rural roads where existing traffic levels are low and there is capacity to absorb additional traffic flow on adjacent routes;

Sensitivity of Receptor	Definition
	• Strategic nationally important routes with capacity to absorb additional traffic flow; • On routes with a low level of historical accident data where a change in traffic flow or composition would have a low effect on the likelihood or severity of accidents; • A route with formal pedestrian facilities where an increase in traffic would have a low effect on pedestrian amenity; • A settlement which is bisected by a road, but where the effect of increased traffic or change in composition would have a low effect on severance; • A receptor which is not highly sensitive to changes in noise level (e.g. a school) or where receptors are set back from the road and therefore their sensitivity to changes in noise as a result of changes in traffic flow or composition are low; • A location where pedestrian crossing facilities are formal but priority, or pedestrian flows are sufficiently low that changes to traffic flow or composition are unlikely to cause a significant pedestrian delay.
Negligible	Areas where the transport network is highly tolerant to change without detriment to its state. For example: • Routes with existing very low traffic levels which have a lot of additional traffic flow capacity; • Receptors such as populated urban areas where existing traffic levels are very low and there is a lot of capacity to absorb additional traffic flow on adjacent routes; • Receptors such as rural roads where existing traffic levels are very low and there is a lot of capacity to absorb additional traffic flow on adjacent routes; • Strategic nationally important routes with a lot of capacity to absorb additional traffic flow; • On routes with a very low level of historical accident data where a change in traffic flow or composition would have a negligible effect on the likelihood or severity of accidents; • A route with formal pedestrian facilities where an increase in traffic would have a negligible effect on pedestrian amenity; • A settlement which is not bisected by a road or where the effect of increased traffic or change in composition would have a negligible effect on severance; • A receptor which is negligibly sensitive to changes in noise level (e.g. a sports stadium) or where receptors are set very far back from the road and therefore their sensitivity to changes in noise as a result of changes in traffic flow or composition are negligible; • A location where pedestrian crossing facilities are formal and controlled, or pedestrian flows are negligible (i.e. where there are no footways) such that changes to traffic flow would not result to pedestrian delay.

7.5.6.6 Magnitude of Change

The magnitude of potential change is a function of the existing volumes of traffic and will be identified through consideration of the Project, the percentage increase and degree of change to baseline conditions predicted as a result of the Project, the duration and reversibility of an effect and professional judgement, best practice, guidance and legislation (IEMA 1993).

The criteria for assessing the magnitude of change on those receptors described above are presented in **Table 7.5-9**.

Table 7.5-9 Framework for Determining the Magnitude of Change

Magnitude of Change	Change in Total Traffic	Definition
High	> 90%	A fundamental change to the baseline condition of the asset, leading to a major alteration of character. For example, a substantial permanent shift in traffic flow levels and near to capacity.
Medium	60-90%	A material, partial loss or alteration of character. For example, a moderate short term- change, or slight long-term change in traffic flow levels and/or near to capacity.
Low	30-60%	A slight, detectable, alteration of the baseline condition of the asset. For example, a minor, short-term change to traffic flow levels unlikely to present capacity issues.
Negligible	<30%	An imperceptible change from baseline conditions and little effect on capacity.

7.5.6.7 Significance of Effect

Table 7.5-10 summarises guideline criteria for assessing the significance of effects. The sensitivity of the receptor and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects by considering both the sensitivity of the receptors and magnitude of change. Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations and are shaded in orange in the below table.

Table 7.5-10 Significance of Effect Evaluation Matrix

	Magnitude of Impact				
Sensitivity of Receptor		**Negligible**	**Low**	**Medium**	**High**
	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor

	Magnitude of Impact				
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

7.5.6.8 Abnormal Load Study

An ALRA will be undertaken to confirm that the proposed designated haulage route can accommodate AILs and that their transportation will not have any detrimental effect on the proposed route and will identify any additional off-site improvement works which are required in order to make the route viable.

7.5.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Traffic and Access include:

1. Do you agree that the data sources identified are sufficient to inform the Traffic and Access baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all Traffic and Access receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Traffic and Access?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential likely significant effects of the Project on Traffic and Access receptors?

7.5.8 References

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7.6 Peat, Geology, Soils and Contaminated Land

7.6.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Peat, Geology, Soil and Contaminated Land within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

7.6.2 Study Area

The Peat, Geology, Soils and Contaminated Land Study Area has been defined on the basis of the proposed infrastructure. The Peat, Geology, Soils and Contaminated Land Study Area will cover the Onshore Development Area of Search displayed in **Figure 1.1-1**.

7.6.3 Baseline Environment

7.6.3.1 Site Specific Surveys

In order to provide site specific and up to date information on which to base the impact assessment, a desktop assessment was completed of the geology and potential soil contamination of the Onshore Development Area of Search.

In addition to the desktop assessments of the geology and superficial soils in the Onshore Development Area of Search, Peat Probing along the Onshore Cable Corridor Area of Search will be required in order to determine the presence and extent of peat.

Peat Probing will consist of points being taken at 50 metres (m) centres along the Onshore Development Area of Search, with 25 m offsets on either side to allow for micro-siting.

This approach is in accordance with Energy Consents Unit (ECU) Scottish Government guidance Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition). The information gathered will be utilised in preparation of Peat Landslide Hazard and Risk Assessment and outline Peat Management Plan.

7.6.3.2 Data Sources

The data sources used to inform this Peat, Geology, Soils and Contaminated Land Chapter of the Scoping Report are presented within **Table 7.6-1**. These data sources will be taken forward and used to inform the Environmental Impact Assessment (EIA), alongside any additional site-specific data that is collected for the Project.

Table 7.6-1 Summary of key publicly available datasets for Peat, Geology, Soils and Contaminated Land

Source	Spatial Coverage	Year	Summary
British Geological Survey (BGS) "GeoIndex Onshore"	Covers the entire onshore Peat, Geology, Soils and Contaminated Land Study Area.	2020	Information on superficial soils and bedrock geology of the site and surrounding areas.
NatureScot Carbon and Peatland map	Covers the entire onshore Peat, Geology, Soils and Contaminated Land Study Area.	2016	Map showing the distribution of carbon and peatland classes across the whole of Scotland.
Scotland's Soils, National Soils of Scotland, Scotland's Environment website	Covers the entire onshore Peat, Geology, Soils and Contaminated Land Study Area.	2016	Information on Peat coverage and class.
The Coal Authority	Covers the entire onshore Peat, Geology, Soils and Contaminated Land Study Area.	2020	Information on the history of Coal Mining and the risks associated with mining.
Local Authority	Isle of Lewis	2023	Records on contaminated land.

7.6.3.3 Overview of Baseline Environment

Bedrock Geology

The data presented in this Chapter of the Scoping Report is based on large scale mapping (1:50,000 scale), which may not be fully representative of the localised geology.

Bedrock is defined by the BGS as the main mass of rocks forming the Earth. It can be concealed beneath superficial soils and water, or visible at the surface as an outcrop. Typically, bedrocks are solid rocks that have formed over a vast amount of time (British Geological Survey, 2020).

Published mapping by the BGS provides information on the soils and geology present at the Onshore Development Area of Search. The bedrock geology is identified as being mostly Gneiss from the Lewisham Complex, with areas to the southern portion of the Onshore Development Area of Search consisting of Protocatclasite from the Outer Hebrides Thrust Zone Mylonites Complex, and Conglomerate from the Stornoway Formation.

Further geological information is detailed by BGS GeoIndex, including 3 faults running east to west that intersect the Onshore Cable Corridor Area of Search on the Isle of Lewis, close to Stornoway. These 3 faults include a thrust fault with the hanging wall side to the south, and 2 faults at rockhead. All of these faults intersect the A857.

Superficial Soils

Superficial soils are described by the BGS as the youngest geological deposits that rest upon the much older bedrock; however, a layer of surface soil is generally present overlying superficial soils, typically a thickness of 0.1-0.2 m and with a higher organic content than the underlying superficial soils.

Information of the superficial soils present at the Onshore Development Area of Search is also provided by BGS; Peat is identified as the soil type covering the majority of the area. No superficial deposits are recorded in the southern portion of the Onshore Development Area of Search or within much of the northern section of the Onshore Development Area of Search.

National Soils of Scotland

According to the National Soil Map of Scotland (James Hutton Institute, 1982), the majority of the Onshore Development Area of Search falls under the soil classification "peat" with the northern and southern extents of the Onshore Development Area of Search classified as "peaty gleys" with small areas of "mineral gleys". These terms are defined as:

- Peat: "An accumulation of partially decomposed organic material, usually formed in waterlogged conditions. Peat soils have an organic layer more than 50 centimetres (cm) deep from the soil surface which has an organic matter content of more than 60 %".
- Peaty Gleys: "Peaty gleys have no free calcium carbonate in the upper horizons of the profile. There is often a gleyed pale grey (Eg) horizon below an organic (O) horizon (which is less than 50 cm thick). Below the Eg there are gleyed subsoil horizons (Bg and Cg). Where the gleying is more intense in the Bg horizon than the Cg, then the soils are generally more affected by poor drainage of surface water but in those soils where the Cg is more intensely gleyed (grey and bluish grey colours can be present), then the soils are more likely to be affected by fluctuating groundwater)".
- Mineral Gleys: "Soils that are periodically or permanently waterlogged. They are typically greyish with greenish or blueish tinges and often have a blotchy appearance".

Carbon Rich Soils, Deep Peat, and Priority Peatland Habitats

The assessment of soils needs to consider the potential likely significant effects of the Project on the soils as a receptor, worst case scenario being that the receptor has little or no ability to absorb change without fundamentally altering its present character. Where Class 1 or 2 priority peatland is present, or carbon -rich and peaty soils cover >20% of the Study Area the receptor is regarded as having little or no ability to absorb change without fundamentally altering its present character.

In terms of the magnitude of change, the worst-case -scenario is long term/permanent change to baseline resource where the value of the Onshore Development Area of Search would be severely affected and/or major or total loss or alteration to peatland resource such that post-development characteristics or quality will be fundamentally or irreversibly changed.

The Carbon and Peatland Map (2016) details an area of underlying peat in the entire Onshore Development Area of Search, the soil present in this area is predominantly Class 1 peat with isolated pockets of class 2, 3, and 5 peat. The different classifications of carbon-rich soils and peatland importance categories are defined as:

- Class 1 - Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value.
- Class 2 - Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential.
- Class 3 - Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat.
- Class 5 - Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat.

Priority Peatland Habitat is considered as land that is covered by peat-forming vegetation or any vegetation associated with peat formation. Class 1 and Class 2 are categorised as areas with priority peatland habitat.

Peat

Peat is a sedimentary material, dark brown or black in colour, comprising of partial remains of plants and organic materials preserved in anaerobic conditions, essentially within a waterlogged environment. There are principal types of peat:

- Acrotelm: The upper layer which is quite fibrous and contains plant roots. Acrotelmic peat is relatively dry, generally lying above the groundwater table and has some tensile strength.
- Catotelm: The lower layer of peat which is highly amorphous and has a very high-water content. Catotelmic peat generally lies below the groundwater table and has a very low tensile strength.

Deep peat is defined as being a surface layer of peat soil greater than 1.0 m deep by the Scottish Government (Scottish Government, 2017).

Peat depth surveys will be carried out to determine the extent and depth of the peat present across the Onshore Development Area of Search as discussed in section 7.6.3.1.

Contaminated Land

Contaminated land is land where substances are causing or could cause significant harm to people, property or protected species, cause significant pollution of surface waters or groundwater, or cause harm to people as a result of radioactivity. Further detail provided by the Scottish Government is included below:

> "*Land can be contaminated by a variety of substances that pose immediate or long-term risks to human health and the environment. Such contaminants may escape from the site to cause air, land, surface water or groundwater pollution, and in some cases may even damage buildings and underground services, or contaminate the food chain*" (Scottish Government, 2017).

There is potential for contaminated land to be present within the Onshore Development Area of Search as a result of historic development and land use. Assessment will be required to assess the risk posed by contaminated land, if any, and to advise on further action, as appropriate.

7.6.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Peat, Geology, Soils and Contaminated Land assessment, which has been incorporated into the design of the Project (**Table 7.6-2**).

Embedded mitigation comprises best practice methods and works outlined in the publication 'Good Practice During Wind Farm Construction'. These are established and effective measures to which the applicant will be committed through the duration of the Project.

At this stage of the project, embedded mitigation has been demonstrated through site design, with the Landfall and Landfall Substation Area of Search and the Grid Substation Area of Search all sited out with the Lewis Peatlands Special Area of Conservation (SAC) and the Lewis Peatlands Ramsar Site. They also avoid nationally important carbon-rich Class 1 and Class 2 peatland.

The Onshore Cable Corridor Area of Search also largely avoids the Lewis Peatland SAC. Due to the extensive coverage of the Lewis Peatland Ramsar Site and nationally important carbon-rich peatland across central section of the island, their avoidance by the Onshore Cable Corridor Area of Search was not possible, although it is proposed to cross through the narrowest section of the Ramsar site and nationally important peatland.

Table 7.6-2 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
7.13	Peat Landslide Hazard Risk Assessment (PLHRA)	The PLHRA will be completed to evaluate areas that are of higher risk of landslide. Mitigation measures will

ID	Parameter	Mitigation Measures Embedded into the Project Design
		be introduced if there are risks in areas that will be used for infrastructure.
7.14	Peat Management Plan (PMP)	The PMP will evaluate the disturbance, reuse, and rehabilitation of peat associated with the Project across the Onshore Development Area of Search.
7.15	An assessment of effects on underlying geology	This assessment will determine the potential likely significant effects of the Project on the underlying geology of the Onshore Development Area of Search.

7.6.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.6.5.1 Likely Significant Effects

Potential likely significant effects on Peat, Geology and Soils have been identified, which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 7.6-3.**

Table 7.6-3 EIA Scoping Assessment for Peat, Geology, Soils and Contaminated Land

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Peat Stability	7.13	In	Peat instability is generally the result of a combination of causative factors. Ground breaking construction activities have the potential to increase the likelihood of peat slides in areas where peat is present at a sufficient depth and where gradients are sufficiently steep to result in a peat slide event.	Peat stability will be assessed within the PLHRA. The PLHRA will be supplemented by peat probing data and desktop assessments in order to evaluate the stability of the substrate of the Onshore Development Area of Search.
Disturbance of Deep Peat	7.14	In	If construction activities take place in areas with peat, then peat will be disturbed with potential for Likely Significant Effects.	The PMP will evaluate areas that have deep peat and this will inform the design in order to minimise the disturbance of deep peat.
Loss and Compaction of Peat and Soils	7.14	In	Construction activities involve the use of heavy machinery and compaction of soils (and peat) in order to increase the bearing capacity of the soils in order to support infrastructure. There is therefore a potential Likely Significant Effect to the soil and peat environment through loss and compaction of the resource.	The loss and compaction of peat and soils will occur should Project take place over areas with peat. Even with the avoidance of peat the construction activities could lead to the compaction of soils. This can reduce soil permeability and increase run-off and erosion. This will be assessed within the PMP.
Peat as waste material	7.14	In	Excavation required as a part of construction could result in the removal of peat from its natural habitat. If the peat is not reused or reinstated within the Project area itself, it may be classified as a waste material. Construction activities therefore result in a potential for likely significant effects.	If peat is disturbed it will need to be reused and there may be areas in the Onshore Development Area of Search where there is opportunity for peatland restoration. The reuse potential of peat within the Onshore Development Area of Search will be addressed in the PMP.

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Impact to the Geology of the Site	7.15	In	Construction activities that require excavations can impact the geology of the Project area. If the bedrock geology is not covered by significant depths of superficial soils, the bedrock geology may be impacted by excavations. Construction activities therefore result in a potential for Likely Significant Effects.	The assessment of geology will be considered based on the impacts from the Project on geology as a receptor. Receptor sensitivity will be based on the type of rock present and the magnitude of change based on the level of loss predicted.
Contaminated Land	7.15	In	Construction activities requiring excavations can lead to exposure of contaminated soils to construction workers and the wider environment. Construction activities may also result in the release of contamination into the air and hydrological environment.	The effects of contaminated land will be assessed in a Phase 1 Contaminated Land Risk Assessment. This assessment consists of a desktop assessment to determine whether there is the potential for the soils within the Project boundary to be contaminated. Depending on the findings of this study, further assessments may have to be completed.
Operation and Maintenance				
Peat Slide Risk	7.13	In	Risk of peat slide could remain during operation and maintenance where peat is present at a sufficient depth and where gradients are sufficiently steep to result in a peat slide event.	Peat Slide Risk is to be assessed within the PLHRA. The PLHRA will be supplemented by peat probing data and desktop assessments in order to evaluate the stability of the substrate of the Onshore Development Area of Search.

7.6.6 Proposed Approach to EIA

7.6.6.1 Relevant Data Sources

The relevant data sources include desktop information as described in section 7.6.3.2, as well as the Peat Probing surveys to be conducted to determine the peat within the Onshore Development Area of Search.

7.6.6.2 Consultation

This section provides a summary of the engagement and consultation activities to be undertaken by the Applicant to inform the EIA. A detailed stakeholder mapping exercise was undertaken to identify key statutory and non-statutory stakeholders of the Project. The following are the proposed consultees for this topic:

- Scottish Environment Protection Agency (SEPA);
- NatureScot (NS);
- Comhairle nan Eilean Siar.

7.6.6.3 Policy, Legislation and Guidance

This Chapter is written with consideration given to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('The EIA Regulations') which establishes in broad terms what is to be considered when determining the potential likely significant effects of development proposals on Peat, Geology and Soils.

Consideration was also given to the National Planning Framework 4 (NPF4), which sets out the Scottish Government's policy on how nationally important land use planning matters should be addressed. Policy 5 within NPF4 details the approach to Soils, and includes some of the following key points relating to developments on peatlands:

"*Development proposals on peatland, carbon rich soils and priority peatland habitat will only be supported for:*

- Essential infrastructure and there is a specific locational need and no other suitable site;
- The generation of energy from renewable sources that optimises the contribution of the area to greenhouse gas emissions reductions targets;
- Small-scale development directly linked to a rural business, farm or croft;
- Supporting a fragile community in a rural or island area; or
- Restoration of peatland habitats.

Where development on peatland, carbon-rich soils or priority peatland habitat is proposed, a detailed site specific assessment will be required to identify:

- the baseline depth, habitat condition, quality and stability of carbon rich soils;
- the likely effects of the development on peatland, including on soil disturbance;
- the likely net effects of the development on climate emissions and loss of carbon.

This assessment should inform careful project design and ensure, in accordance with relevant guidance and the mitigation hierarchy, that adverse impacts are first avoided and then minimised through best practice. A peat management plan will be required to demonstrate that this approach has been followed, alongside other appropriate plans required for restoring and/ or enhancing the site into a functioning peatland system capable of achieving carbon sequestration."

In addition to the EIA Regulations and NPF4, the following guidance, legislation and information sources have been considered in carrying out this assessment.

Table 7.6-4 Legislation, Policy and Guidance relevant to the Peat, Geology, Soils and Contaminated Land assessment

Relevant Legislation and Policy
NS (formerly Scottish Natural Heritage (SNH)) (2019) 4th Edition, Good Practice During Wind Farm Construction
The Scottish Government (2017) Peat Landslide Hazard and Risk Assessments – Best Practice Guide for Proposed Electricity Generation Developments
Scottish Government, SNH, SEPA (2017) Peatland Guidance on Development on Peatland, on-line-version-only
SEPA (2012) Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste
SEPA (2017) Developments on Peat and Off Site Uses of Waste Peat
The Scottish Government (2009) The Scottish Soil Framework
The Scottish Office (1996) Planning Advice Note PAN 50 - Controlling the Environmental Effects of Surface Mineral Workings
The Construction Industry Research and Information Association (CIRIA) (2015) Environmental Good Practice on Site (C741)

7.6.6.4 Assessment Methodology

Sensitivity of Receptors

The sensitivity of a receiving environment is defined as its ability to absorb an effect without noticeable change and can be classified as either very high, high, medium, low or negligible. The receptor classification is determined by a series of factors, including: the nature and extent of peat, associated habitats, soil characteristics and geology. Peat soils of high moisture content, such as those found in blanket bog, are considered to be highly sensitive receptors.

Table 7.6-5 details the different classifications of receptor sensitivity that are used to inform the assessment of the soils, geology and peat present within the Onshore Development Area of Search, assessing whether the effects would be significant under the EIA regulations.

Table 7.6-5 Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance; Very deep peat, where peat depths are >3.0 m.
High	Soil type and associated land use are highly sensitive (e.g. peat/blanket bog); Class 1 or 2 priority peatland, carbon-rich and peaty soils cover >20% of the Project area. Deep peat (>1.0 m) is present in area of blanket bog. Nationally important carbon rich soils are present. Areas containing geological or geomorphological features considered to be of national importance (e.g. geological Sites of Special Scientific Interests (SSSIs)). Receptor contains areas of regionally important economic mineral deposits.
Medium	Soil type and associated land use are moderately sensitive (e.g. commercial forestry); Class 1 or 2 priority peatland, carbon-rich and peaty soils cover <20% of the Development Area. Class 3 and 5 peatland areas, carbon rich and peaty soils. Deep peat (>1.0 m) is present out with blanket bog. Receptor contains areas of locally important economic mineral deposits; Areas containing geological features of designated regional importance including Regionally Important Geological/geomorphological Sites (RIGS), considered worthy of protection for their historic or aesthetic importance.
Low	Geological features or geology not protected and not considered worthy of specific protection. Soil type and associated land use not sensitive to change in hydrological regime (e.g. intensive grazing); Receptor contains Class -2, -1, 0, and 4 non-peatland areas, with no carbon-rich and/or peaty soils.
Negligible	The receptor is resistant to change and is of little environmental value.

Magnitude of Effect

The magnitude of potential effects on soils, geology and peat will be identified through the degree of change to baseline conditions predicted as a result of the Project, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

The criteria for assessing the magnitude of an effect are presented in **Table 7.6-6.**

Table 7.6-6 Framework for Determining Magnitude of Effects

Magnitude of Effects	Definition
High	Major or total loss of or alteration to peatland resource such that post development characteristics or quality will be fundamentally or irreversibly changed. Long term/permanent change to human or environmental health. Catastrophic failure of site infrastructure due to ground instability. Long term/permanent change to baseline resource. Major or total loss of a geological site or mineral deposit, where the value of the site would be severely affected.
Medium	Loss of, or alteration to the baseline resource such that post development characteristics or quality will be partially changed. Mid-term/permanent change to human or environmental health. Ground failure that requires remediation but does not cause catastrophic failure of site infrastructure. Mid-term/permanent change to baseline resource. Partial loss of a geological site or mineral deposit, with major effects to the settings, or where the value of the site would be affected.
Low	Small loss of soils or peatland, or where soils will be disturbed but the value not impacted. Short-term change to human or environmental health. Ground settlement/subsidence that does not adversely affect site infrastructure or require remedial action. Short-term change to baseline resource. Small effect on a geological site or mineral deposit, such that the value of the site would not be affected.
Negligible	Minimal or no change to soils or peatland deposits. Minimal or no change to human or environmental health. Minimal or no change to ground stability. A very slight change from the baseline conditions. The change is barely distinguishable and approximates to the 'no-change' situation. Minimal or no change to a geological site or mineral deposit.

Significance of Effect

The sensitivity of the receptor and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects on the soils geology and peat resource as a result of the Project. **Table 7.6-7** summarises guideline criteria for assessing the significance of effects.

Table 7.6-7 Framework for Assessment of the Significance of Effects

		Magnitude of Impact			
Sensitivity of Receptor		**Negligible**	**Low**	**Medium**	**High**
	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations and are shaded in orange in the above table.

7.6.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Peat, Geology, Soils and Contaminated Land include:

1. Do you agree that the data sources identified are sufficient to inform the Peat, Geology, Soils and Contaminated Land baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all Peat, Geology and Soils receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Peat, Geology, Soils and Contaminated Land?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential likely significant effects of the Project on Peat, Geology, Soils and Contaminated Land receptors?
5. Do you agree with the proposed methodology and scope of the Peat, Geology, Soils and Contaminated Land assessment?
6. Do you have any information that would be useful in the preparation of the Peat, Geology, Soils and Contaminated Land assessment, such as information on local quarrying, or infilled land?

7.6.8 References

British Geological Survey, 2020. GeoIndex Onshore. Available online at: GeoIndex - British Geological Survey (bgs.ac.uk) [Accessed 24/06/2023].

James Hutton Institute, 1982. National Soil Map of Scotland. Available online at: Scotland's Soils - soil maps (environment.gov.scot) [Accessed 24/03/2023].

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7.7 Hydrology and Hydrogeology

7.7.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Hydrology and Hydrogeology within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

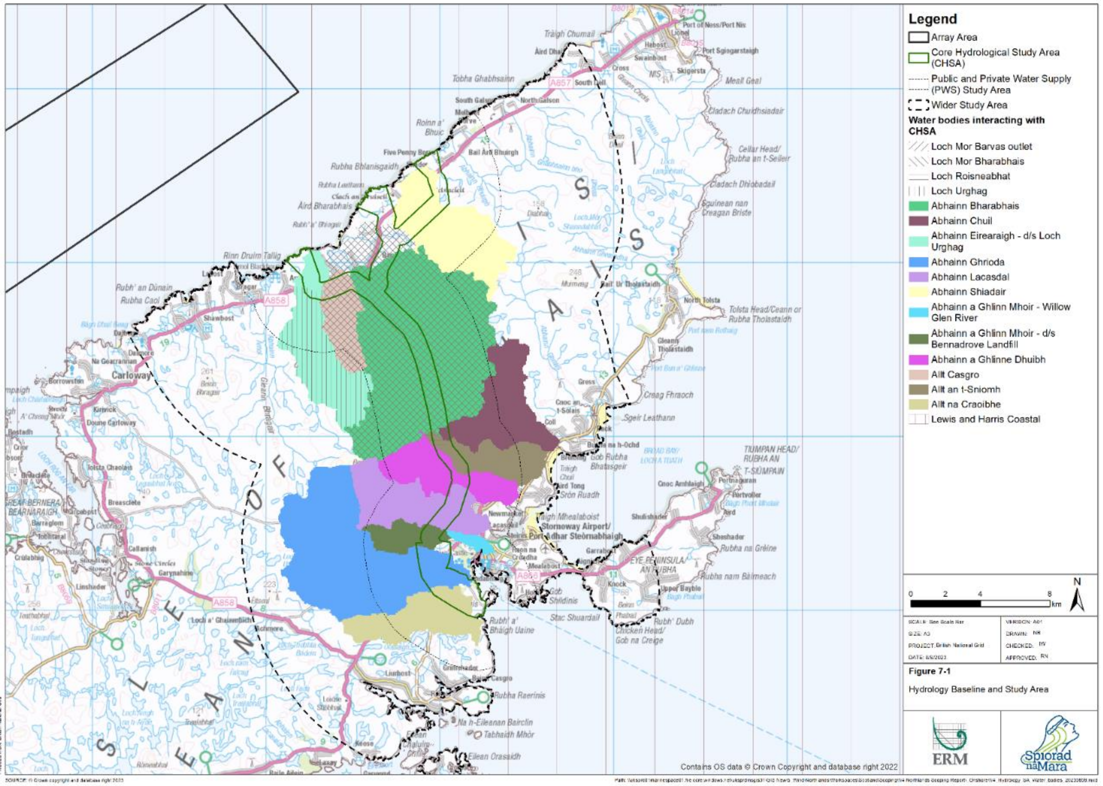
7.7.2 Study Area

The Hydrology and Hydrogeology Study Areas have been defined based on potential likely significant effects to onshore hydrological receptors. The following Study Areas will be considered as part of the hydrological assessment:

- **Core Hydrological Study Area (CHSA)**: This area is defined by the Onshore Development Area of Search and reflects where potential likely significant effects to hydrological receptors are most likely to occur. The CHSA does not extend offshore as coastal processes are covered under Chapter 6.1: Physical and Coastal Processes.
- **Public and Private Water Supply (PWS) Study Area**: Public and PWS Study Area is identified within 2 kilometres (km) of the Onshore Development Area of Search. Beyond 2 km, it is considered that potential for hydrological connectivity is limited. The PWS Study area does not extend offshore as coastal processes are covered under Chapter 6.1: Physical and Coastal Processes.
- **Wider Study Area**: a 10 km buffer zone around the Onshore Development Area of Search. The Project is not expected to impact the hydrological environment outside of the Wider Study Area due to dilution and attenuation of potential pollutants. The Wider Study Area does not extend offshore as coastal process are covered under Chapter 6.1: Physical and Coastal Processes.

Figure 7.7-1 presents the Hydrology Baseline and Study Area.

Figure 7.7-1 Hydrology and Hydrogeology Study Area[27]



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[27] The Lewis and Harris Coastal Area encompasses the entire coastline of the Isle of Lewis and Harris. This includes the coastal areas of the CHSA.

7.7.3 Baseline Environment

To provide site-specific and up to date information on which to base the impact assessment, a high-level desk-based survey was conducted, using data sources detailed below.

7.7.3.1 Site Specific Surveys

A hydrological site walkover will be conducted to ground-truth the presence of water features, watercourses and drainage features shown on Ordnance Survey mapping.

7.7.3.2 Data Sources

The data sources used to inform this Hydrology and Hydrogeology Chapter of the Scoping Report are presented within **Table 7.7-1**. These data sources will be taken forward and used to inform the EIAR, alongside any additional site-specific data that is collected for the Project.

Table 7.7-1 Summary of Key Publicly Available Datasets for Hydrology and Hydrogeology

Source	Spatial Coverage	Year	Summary
Scottish Environmental Protection Agency (SEPA) Classification Hub	Project wide / CHSA, Public and PWS Study Area and Wider Study Area	2020	Information providing the SEPA classification of watercourses, derived from Water Framework Directive (WFD) classifications.
SEPA Classification Hub	Project wide / CHSA, Public and PWS Study Area and Wider Study Area	2020	Provides information on main river and coastal catchments, groundwater body classification.
Scottish Government	Project wide / CHSA, Public and PWS Study Area and Wider Study Area	2014	Drinking water protected areas – Scotland's River Basin District: Map 4.
SEPA Flood Hazard and Flood Risk Information	CHSA	2022	Provides information on flooding from pluvial flooding, fluvial flooding, and coastal flooding.
British Geological Survey (BGS) "GeoIndex Onshore"	CHSA and Public and PWS Study Area	2020	Provides information on superficial soils, bedrock geology and underlying groundwater aquifer properties.
NatureScot SiteLink	Project wide / CHSA, Public and PWS Study Area and Wider Study Area	2023	A database providing information on Statutory Designated Sites.

Source	Spatial Coverage	Year	Summary
Met Office Climate Data	Project wide / CHSA, Public and PWS Study Area and Wider Study Area	2023	Information on long term climate data including rainfall.
National River Flow Archive Gauging Station Data	Project wide / CHSA, Public and PWS Study Area and Wider Study Area	2023	Catchment information such as rainfall, elevation, superficial and bedrock geology permeability.
Scotland's Soils, National Soils of Scotland, Scotland's Environment website	CHSA and Public and PWS Study Area	2016	Information on Peat coverage and soil classification (a full assessment on Peat coverage is included in Chapter 7.6: Peat, Geology, Soils and Contaminated Land).

7.7.3.3 Overview of Baseline Environment

Surface Hydrology

The Outer Hebrides contains approximately 15% of the United Kingdom's (UK) total freshwater surface area but only constitutes 1.2% of the UK' total land (Comhairle nan Eilean Siar, 2010).

Surface water bodies in the vicinity of the Project will be identified and described along with their importance. Based on an initial, high-level review of SEPA (2020) and Ordnance Survey Data (2022), the main water bodies are:

- The Lewis and Harris Coastal Waterbody is located immediately north and south of the Project. This WFD coastal waterbody has an overall SEPA classification of 'Good' in the Gallan Head to Butt of Lewis area (ID: 200476) which is situated to the north of the Project. To the south of the Project, 2 areas of the Lewis and Harris coastal body area hydrologically connected to the Project. These areas are Loch a Tuath (ID: 200481) and Stornoway Harbour (ID: 200191), both of which have a SEPA classification of 'Good'.
- Loch Mòr Bharabhais (ID: 100030) is a WFD waterbody located to the north of the Project, approximately 365 metres (m) north of the Onshore Cable Corridor Area of Search. This waterbody has an overall SEPA classification of 'High' and drains north into the Lewis and Harris Coastal Waterbody.
- Abhainn Bharabhais (ID: 20801) is a watercourse that flows northeast and drains into Loch Mòr Bharabhais. This watercourse closely follows the A857 and the Onshore Cable Corridor Area of Search. The watercourse has an overall SEPA classification of 'Good'. Also flowing north, discharging into Loch Mòr Bharabhais is Allt Casgro (ID:20802) which flows directly through the Onshore Development Area of Search between the Onshore Cable Corridor Area of Search and Landfall option 3. This watercourse has an overall SEPA classification of 'Good'.

- Located within the Onshore Cable Corridor Area of Search and immediately upstream of the westernmost landfall option (Landfall option 3) is Loch Urghag (ID: 100033) which has an overall SEPA classification of ‘Good’. This waterbody discharges north into Abhainn Eirearaigh (ID; 20798), a watercourse of ‘Moderate’ SEPA classification, which continues to flow north before discharging into the Harris and Lewis Coastal Waterbody. This watercourse flows through Landfall option 3.
- There are 3 SEPA classified watercourses which are situated between the central (Landfall option 2) and eastern landfall (Landfall option 1) options; Abhainn Shiadair (ID: 20803), Abhainn Bhuigh (ID: 20804) and Abhainn Ghabhsainn bho Dheas (ID: 20805). All 3 watercourses flow northwest and discharge into the Lewis and Harris Coastal Waterbody and are likely to flow through any Onshore Cable Corridor Area of Search to the eastern landfall option (Landfall option 1). All 3 watercourses have an overall SEPA classification of ‘Good’.
- Abhainn Gabhsann bho Thuath (ID: 20806) is classified by SEPA as having an overall ‘Good’ Condition. This watercourse originates southeast of the Onshore Cable Corridor Area of Search before flowing northwest through the eastern landfall option (Landfall option 1) before discharging into the Lewis and Harris Coastal Waterbody.
- To the south of the Onshore Cable Corridor Area of Search, 4 SEPA classified watercourses flow east/southeast through the area of search. Abhainn Chuil (ID: 20747) originates within the Onshore Development Area, east of the A857 but does not flow under the proposed Onshore Cable Corridor Area of Search. Whereas Allt an t-Sniomh (ID: 20748), Abhainn a Ghlinne Dhuibh (ID: 20749) and Abhainn Lacasdal (ID: 20750) originate to the west of the Onshore Development Area and flows east through the Onshore Cable Corridor Area of Search. All 4 watercourses have a SEPA classification of ‘Good’ and discharge into Loch a Tuath of the Lewis and Harris Coastal Waterbody.
- Abhainn Ghrioda (ID: 20753) is situated towards the south aspect of the Project and originates to the west of Stornoway before flowing east, through the Onshore Development Area of Search before discharging into Stornoway Harbour. This watercourse has a SEPA classification of ‘High’.
- There are several smaller named and unnamed watercourses, lochs and lochans which are present within or downslope of Onshore Development Area of Search. These waterbodies all lie within the catchments of the larger, SEPA classified watercourses noted above.

Hydrogeology

The groundwater units underlying the Onshore Development Area of Search are identified by Scotland’s Environment mapping service as the Lewis and Harris groundwater body ID: 150695 (SEPA 2020). This groundwater unit has an overall SEPA classification of 'Good'.

The BGS 1:50,000 digital map (2020) shows the bedrock aquifer underlying much of the northern area of the Onshore Development Area of Search, including the Landfall and Landfall Substation Area of Search, to consist of gneisses (metamorphosed sedimentary rocks) of the Lewisian Complex. Within the southern areas of the Onshore Cable Corridor Area of Search, the Project is underlain by Gneiss (Lewisian Complex) as well as a large area of Protocataclasite of the Outer Hebrides Thrust Zone Mylonites Complex. These rocks are classified by the BGS as "low productivity aquifer" where ‘groundwater is only present in near-surface weathered zone and secondary fractures.

The BGS digital mapping shows that the southern aspect of the Onshore Cable Corridor Area of Search passes through 2 parallel fault lines, running east to west. Additionally, BGS mapping shows most of the superficial deposits underlying the Project consist of peat, however large areas underlying the Onshore Cable Corridor Area of Search are unmapped. The central and western cable landfall option areas (Landfall options 2 and 3) are partially underlain by wind-blown sand and alluvium deposits.

Flood Risk

The Indicative River and Coastal Flood Map (Scotland) produced by SEPA (2022) shows areas of Scotland with a 0.5% (1:200) chance of flooding in any given year. These areas are classified into areas of river, surface water and coastal flooding with a risk rating of low to high applied.

An initial review of SEPA flood maps show that there is a ‘medium’ to ‘high’ risk of annual flooding from river flooding within the Onshore Cable Corridor Area of Search. However, this is confined to watercourses and existing lochs and lochans such as Abhainn Bharabhais and Loch Mòr Bharabhais to which the watercourse drains. The SEPA Flood Maps also show that there are isolated areas with a ‘medium’ to ‘high’ risk of flooding from surface water flooding, although this is generally confined to surface water bodies such as Loch Urghag and Loch Mòr Bharabhais. Therefore, this does not indicate widespread flooding from river or surface flooding through the Project.

The SEPA Flood maps also show there is a ‘medium’ to ‘high’ risk of annual flooding from coastal flooding along the Lewis and Harris coastline as well as the lower section Abhainn Eirearaigh and Loch Mòr Bharabhais. There is also a ‘medium’ to ‘high’ risk of coastal flooding toward the southern area of the Project, along the coastline of Stornoway Harbour.

Should the Project take place in areas characterised as being medium or high risk of flooding then a standalone Flood Risk Assessment will fully assess the potential likely significant effects to the Project.

Statutory Designated Receptors

Review of NatureScot (2020) Geographic Information System (GIS) datasets available through the Scotland’s Environment mapping service was used to identify statutory designated sites related to the water environment within the Wider Study Area.

Statutory designations include those of international importance e.g. Special areas of Conservation (SACs), Special Protection Areas (SPAs) and Wetlands of International Importance (Ramsar), Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNR) and of local importance, Local Nature Reserves (LNR).

Statutory designated sites within the Wider Study Area and their hydrological connectivity to the Project are detailed in **Table 7.7-2.**

Table 7.7-2 Designated Receptors within Wider Study Area

Designated Site	Distance from Project	Qualifying Interest	Hydrological Connectivity to Project
Lewis Peatlands Ramsar	Receptors present within the Onshore Cable Corridor Area of Search.	Significant area of intact blanket bog (peatland). Nationally important populations of red-throated diver *Gavia stellata*, black-throated diver *Gavia arctica*, golden plover *Pluvialis apricaria* and greenshank *Tringa nebularia*, (Chapter 7.3: Onshore and Intertidal Ornithology)	Hydrologically connected – designated site is situated within and downslope of the Onshore Cable Corridor Area of Search.
Loch Dalbeg SSSI	Located approximately 9.56 km southwest of the westernmost landfall option.	Freshwater habitat: Mesotrophic Loch	Hydrologically disconnected – designated site is disconnected by intervening waterbodies including Abhainn Arnol as well as other, smaller waterbodies.
Loch Tuamister SSSI	Located approximately 6.74 km southwest of the Onshore Cable Corridor Area of Search and westernmost landfall area option.	Freshwater habitat: Eutrophic Loch Open water fen transition	Hydrologically disconnected – designated site is disconnected by intervening waterbodies including Abhainn Arnol as well as other, smaller waterbodies.
Loch Scarrasdale Valley Bog SSSI	Located approximately 7.46 km southeast of the easternmost landfall option area.	Habitat: developing valley blanket bog	Hydrologically disconnected – located in separate hydrological sub-catchment from Onshore Development Areas of Search.
Gress Saltings SSSI	Located approximately 8.1 km east of the Onshore Cable Corridor Area of Search.	Coastlands: Saltmarsh	Hydrologically connected – coastal aspects of this designated site are connected via Loch a Tuath.
Tong Saltings SSSI	Located approximately 2.6 km east of the Onshore Cable Corridor Area of Search.	Coastlands including mudflats, saltmarshes and sand dunes. Habitat supports wintering, breeding and feeding birds, including terns, waders and wildfowl.	Hydrologically connected – Onshore Cable Corridor Area of Search is directly upslope of designated site and connected via Abhainn Lacasdal.

Designated Site	Distance from Project	Qualifying Interest	Hydrological Connectivity to Project
Achmore Bog SSSI	Located approximately 9 km southwest of the Onshore Cable Corridor Area of Search.	Blanket bog habitat	Hydrologically disconnected – located in separate hydrological sub-catchment from Onshore Development Area of Search.
Lewis Peatlands SAC	Receptors present within the Onshore Cable Corridor Area of Search.	Blanket Bog Depressions on peat substrates Otter populations Acid peat-stained lakes and ponds Wet heathland and cross-leaved heath	Hydrologically connected – designated site is situated within and downslope of the Onshore Cable Corridor Area of Search.
Inner Hebrides and the Minches SAC (see Chapter 6.1: Physical and Coastal Processes, and Chapter 6.3 Marine Sediment and Water Quality)	Located approximately 2.1 km southeast of the Onshore Cable Corridor Area of Search.	Harbour porpoise *Phocoena phocoena*	Hydrologically Connected – designated site is located downslope of the onshore Study Area via Stornoway Harbour and Loch a Tuath
Ness and Barvas, Lewis SPA	Located immediately north of the Onshore Cable Corridor Area of Search and within the central landfall option area.	Breeding population of the Annex 1 species corncrake	Hydrologically connected – designated site is situated within and downslope of the Onshore Development Area of Search.
Lewis Peatlands SPA	Receptors present within the Onshore Cable Corridor Area of Search.	Annex 1 Species: red-throated diver, black-throated diver, golden eagle *Aquila chrysaetos*, merlin *Falco columbarius*, golden plover, and dunlin *Calidris alpina*. SPA supports populations of migratory species greenshank.	Hydrologically connected – designated site is situated within and downslope of the Onshore Cable Corridor Area of Search.

Public and Private Water Supplies

Data requests will be sent to Comhairle nan Eilean Siar requesting information on PWS within 2 km of the Project. Properties identified will be contacted via a questionnaire and, should it be required, site visits will verify the information provided. The assessment of PWS will follow a source-pathway-receptor model.

Scottish Water will be consulted to determine whether assets which could be affected by the Project are within the Onshore Development Area of Search.

Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

A National Vegetation Classification (NVC) Survey will be undertaken as part of the Environmental Impact Assessment (EIA). The location, type, and extent of the GWDTEs will be determined through the NVC survey, which inform the assessment of the hydrological function of the GWDTEs, in accordance with SEPA Land Use Planning System Guidance Note 31 (2017).

An assessment of GWDTEs will be included within Chapter 7.2: Onshore Ecology of the EIAR and will be informed by both NVC data and a separate hydrogeological assessment. The assessment will consider the condition of the GWDTE and if it is truly groundwater dependent or ombrotrophic (rainwater fed). Measures to safeguard groundwater fed communities will be compliant with SEPA guidance.

7.7.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Hydrology and Hydrogeology assessment, which will be incorporated into the design of the Project (**Table 7.7-3**).

Table 7.7-3 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
7.16	Surface Hydrology	If possible and appropriate a 50 m watercourse buffer from substation infrastructure will be implemented. Inclusion of Water Construction Environmental Management Plans (WCEMP) to detail best construction practice derived from pollution prevention and construction guidance. Efforts to minimise the number of watercourses crossing points where possible.
7.17	Groundwater	Inclusion of WCEMP to detail best construction practice derived from pollution prevention and construction guidance.
7.18	Designated Receptors	Inclusion of WCEMP to detail best construction practice derived from pollution prevention and construction guidance.
7.19	Flood Risk	If required, a standalone Flood Risk Assessment (FRA) will be prepared to fully assess potential likely significant effects from flooding on Project infrastructure.

ID	Parameter	Mitigation Measures Embedded into the Project Design
		Inclusion of WCEMP to detail best construction practice derived from pollution prevention and construction guidance.
7.20	Public and PWS	Where possible the public and private water supply assets identified through consultation and/or a walkover survey will be avoided. If required a PWS risk assessment may be carried out to assess risk to identified PWS and identify appropriate mitigation which may include a water monitoring programme. If possible and appropriate a 50 m watercourse buffer from substation infrastructure will be implemented. Inclusion of WCEMP to detail best construction practice derived from pollution prevention and construction guidance.
7.21	GWDTEs	If possible and appropriate micro siting will be implemented to create optimal placement of onshore infrastructure that reduce potential direct and indirect likely significant effects to identified GWDTEs. Inclusion of WCEMP to detail best construction practice derived from pollution prevention and construction guidance.

7.7.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.7.5.1 Likely Significant Effects

Potential likely significant effects on Hydrological and Hydrogeological receptors have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 7.7-4.**

Table 7.7-4 EIA Scoping Assessment for Hydrology and Hydrogeology

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Project Aspect	Justification	Assessment Method
Construction and Decommissioning					
Increased run-off and Flood Risk	7.19	In	Landfall and Landfall Substation Area of Search, Grid Substation Area of Search	Areas of hard standing associated with the onshore substations have the potential to increase volumes of run-off and therefore increase flood risk.	Desk-Based Assessment (DBA) using data sets identified within section 7.7.3.2 and Hydrology and Hydrogeology Study Areas identified within section 7.7.2. This DBA will incorporate a walkover survey to ground truth hydrological receptors and potentially identify receptors not previously recorded.
Effects on Designated Receptors	7.16, 7.17, 7.18, 7.20, 7.21	In	Onshore Development Area of Search	Construction and decommissioning of onshore infrastructure have the potential to result in impacts (e.g. chemical pollution, erosion and sedimentation, and impediments to flow) to hydrologically connected designated receptors within a 10 km study area.	The assessment of receptors will follow the impact assessment approach and assessment methodology outlined in section 7.7.6.
Effects on PWS	7.16, 7.17, 7.20	In	Onshore Development Area of Search	Construction and decommissioning of onshore infrastructure have the potential to result in	Consultation will be carried out with Scottish Water to identify PWS assets within the PWS Study Area identified within section 7.7.2.

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Project Aspect	Justification	Assessment Method
				impacts to Scottish Water assets and hydrological receptors within drinking water catchments.	Should receptors be identified, the assessment of receptors will follow the impact assessment approach, and assessment methodology outlined in section 7.7.6.
Effects on PWS	7.16, 7.17, 7.20	In	Onshore Development Area of Search	Construction and decommissioning of onshore infrastructure have the potential to result in impacts to hydrological and hydrogeological receptors which supply PWS.	Consultation will be carried out with the local environmental health office to identify PWS within the PWS Study Area identified within section 7.7.6. Following consultation, further consultation may be required with residents. If required, a site visit will be conducted to inspect PWS and ground-truth information received from residents. Should receptors be identified, the assessment of receptors will follow the impact assessment approach and assessment methodology outlined in section 7.7.6.
Effects on Groundwater Dependent	7.17, 7.21	In	Onshore Development Area of Search	Construction and decommissioning of onshore infrastructure have the potential to impact,	Following an NVC habitat survey, an assessment of potential GWDTEs will be carried out to

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Project Aspect	Justification	Assessment Method
Terrestrial Ecosystems				directly and indirectly, the hydrological function of wetland habitats.	confirm which potential GWDTE are truly ground water dependent. Should receptors be identified, the assessment of receptors will follow the impact assessment approach and assessment methodology outlined in section 7.7.6.
Acidification of Watercourses		**Out**	Onshore Development Area of Search	There is no tree felling associated with the Project which could cause acidification of watercourses.	
Operation and Maintenance					
Effects on Designated Receptors	7.16, 7.17, 7.18, 7.20, 7.21	In	Onshore Development Area of Search	Operation and Maintenance of onshore infrastructure may result in potential likely significant effects (e.g. chemical pollution, erosion and sedimentation, and impediments to flow) to hydrologically connected designated receptors within a 10 km study area.	The assessment of receptors will follow the impact assessment approach detailed in section 7.7.6.
Increased run-off and Flood Risk	7.19	In	Landfall and Landfall Substation Area of Search, Grid	Permanent areas of hard standing project infrastructure will cause a permanent increase to the volume of run-off and therefore increase flood risk.	

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Project Aspect	Justification	Assessment Method
			Substation Area of Search		

7.7.6 Proposed Approach to EIA

7.7.6.1 Baseline Data Collection

The Desk-Based Assessment (DBA) of the baseline condition, of the Onshore Development Area of Search, will be used to locate the Project infrastructure. The online SEPA and BGS datasets information will be supplemented by available documentary, cartographic and photographic evidence. As part of the assessment the following will be investigated:

- Ground conditions and previous mining records of the infrastructure within the onshore development area of search;
- Hydrological processes downstream of the infrastructure within the onshore development area of search;
- Aquifer classification and vulnerability;
- Surface water quality;
- Public and PWS;
- GWDTEs in accordance with Land Use Planning System SEPA Guidance Note 31 and Guidance Note 4 (data on these will be cross-referenced against survey findings within Chapter 7.2: Onshore Ecology);
- Flood risk;
- Contaminated land presence within the vicinity of the infrastructure within the onshore development area of search.

The purpose of the DBA is to assess any potential likely significant effects resulting from the Project and to inform the site walkover.

The results of the DBA, the site walkover survey and consultation responses would be compiled into the EIAR chapter and Technical Appendices as appropriate. The assessment will consider relevant legislation and guidance and would be in accordance with current best practice listed in section 7.7.3.2.

7.7.6.2 Flood Risk

The Flood Risk Management Act (Scotland (2009) places a general duty on Scottish Ministers, SEPA and responsible authorities (including local planning authorities) to exercise their flood risk related functions.

Scottish Planning Policy (SPP) sets out a flood risk framework to guide development that establishes 3 categories of coastal and watercourse flood risk and the appropriate planning approach within each category (similar to the sequential and exception test). The SPP flood risk framework needs to be viewed in conjunction with SEPA’s land use vulnerability guidance where changes in land use are proposed which sets the scene for the level of FRA.

Information gathered in the baseline will inform the placement of infrastructure to avoid areas of medium to high risk of flooding. If this is not possible a standalone FRA will be carried out to provide a review of flood risk conditions.

7.7.6.3 Water Framework Directive (WFD) Compliance Assessment

A WFD compliance assessment will be carried out to consider the potential likely significant effects of the Project in respect of the European Communities Water Framework Directive 2006/60/EC (WFD), which has been retained in UK law following the UK's exit from the European Union (EU). The WFD is implemented in Scotland under the Water Environment and Water Services (Scotland) Act 2003.

Consideration of the WFD is required for projects which have the potential to detrimentally impact the chemical and/or ecological status of a waterbody or to prevent improvements that may otherwise result in a waterbody meeting its WFD objectives. The WFD aim is for all waterbodies to be at good status. In a WFD compliance assessment consideration must be shown if an activity has the potential to:

- Cause or contribute to deterioration of the status of a surface water or groundwater water body;
- Prevent the waterbody achieving good status in the future.

There is no specific guidance produced by SEPA for undertaking a WFD assessment in Scotland. Therefore, the assessment will follow the 3 staged approach in accordance with Environment Agency guidance for completing WFD assessments and the Planning Inspectorate's Advice Note Eighteen published in June 2017:

- Stage 1 (Screening) - Excludes any activities that do not need to go through the scoping or impact assessment stages;
- Stage 2 (Scoping) - Identifies the receptors such as morphology, habitats, fish, invasive non-native species (INNS) and protected areas that are potentially at risk from the activities of the onshore elements of the Project and need impact assessment;
- Stage 3 (Impact Assessment) - Considers the potential likely significant effects of the activities taking into consideration embedded mitigation, identifies additional mitigation if required, and shows if the activities may cause deterioration or prevent the waterbody achieving good status.

7.7.6.4 Relevant Data Sources

The relevant data sources include desktop information as described in section 7.7.3.2, as well as hydrological surveys conducted to ground-truth the presence of hydrological receptors.

7.7.6.5 Consultation

This section provides a summary of the engagement and consultation activities to be undertaken by the Applicant to inform the EIA. A detailed stakeholder mapping exercise was undertaken to identify key statutory and non statutory stakeholders of the Project. **Table 7.7-5** includes a preliminary list of the proposed consultees for Hydrology and Hydrogeology discussions for this Project.

Table 7.7-5 Preliminary List of Consultees

Consultee	Description
SEPA	The Scottish Environment Protection Agency is Scotland's environmental regulator and national flood forecasting, flood warning and strategic flood risk management authority
Comhairle nan Eilean Siar	Local authority for Na h-Eileanan an Iar council area of Scotland.
Scottish Water	Scottish Water is a statutory corporation that provides water and sewerage services across Scotland.

During the identification and assessment of PWS, further consultation with residents may be required to information on the location of PWS and sources.

7.7.6.6 Policy, Legislation and Guidance

The following legislation, guidance and information sources have been considered in carrying out this assessment:

Table 7.7-6 Legislation, Policy and Guidance relevant to the Hydrology and Hydrogeology assessment

Relevant Legislation and Policy
Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations (2017) (the EIA Regulations)
Water Framework Directive (WFD) (2000/60/EC)
The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations)
The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017
The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR)
The Water Quality (Scotland) Regulations 2010
The Private Water Supplies (Scotland) Regulations 2006
The Public and Private Water Supplies (Miscellaneous Amendments) (Scotland) Regulations 2017
Relevant Hydrology and hydrogeology policy and guidance: Netregs Pollution Prevention Guidance (PPGs) and Guidelines for Pollution Prevention (GPPs)
The Scottish Government (2001), PAN 61: Planning and Sustainable Urban Drainage Systems
The Scottish Government (2019), The Conservation (Natural Habitats, & c.) Amendment (Scotland) Regulations 2019

Relevant Legislation and Policy
SEPA (2010b), Land Use Planning System Guidance Note 2, Version 8 (LUPS-GU2)
SEPA (2010a), Engineering in the water environment: good practice guide: River crossings
SEPA (2015a), Culverting of watercourses: Policy Statement and Supporting Guidance
SEPA (2017a), Land Use Planning System Guidance Note 31, Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems, Version 3, (LUPS-GU31)
SEPA (2019), Climate change allowances for flood risk assessment in land use planning (LUPS-CC1)
SEPA (2002), Managing River Habitats for Fisheries
The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (the CAR Regulations)
SEPA (2022a), CAR - A Practical Guide, Version 9
SEPA (2009), River Basin Management Plan
The Construction Industry Research and Information Association (CIRIA) (2015), Environmental Good Practice on Site (C741)
CIRIA (2001), Control of Water Pollution from Construction Sites (C532)
CIRIA (2015), The SuDS Manual (C753)
CIRIA (2006), Control of Water Pollution from Linear Construction Projects (C648)
CIRIA (2017), Guidance on the Construction of SuDS (C768)
SEPA WAT-RM-08 (2019) Regulatory Method: SuDS
SEPA WAT-SG-75 (2018) Sector-specific Guidance – Construction Sites
Water Assessment and Drainage Guide (WADAG)

7.7.6.7 Assessment Methodology

To undertake the EIA, the baseline data collected as part of the DBA and the site walkover survey will be used to identify receptors that may be significantly affected by the Project. The findings of the Hydrology, Hydrogeology and ground conditions assessment will inform the design and location of the onshore infrastructure throughout the EIA process and mitigation including any embedded mitigation measures would be detailed within Hydrology and Hydrogeology Chapter.

The significance of the hydrological potential likely significant effects of the site would be classified by considering the sensitivity of receptors and the magnitude of the potential likely significant effect on them, combined with the likelihood of an event occurring.

The sensitivity of a receptor is defined as its ability to absorb an effect without perceptible change and can be classified as either none (if the receptor is not present within the study area), low, moderate, or high. These classifications are dependent on factors such as the quality of the surface and subsurface water within the receptor, its purpose (e.g. whether used for drinking, fisheries, etc.) and existing influences, such as land use. The magnitude of any potential Likely Significant Effect is determined by the timing, scale, size, and duration of the potential Likely Significant Effect resulting from the site. The magnitude of potential likely significant effects is classified as negligible, minor, moderate, or major.

Sensitivity of Receptors

The sensitivity of the baseline conditions, including the importance of environmental features on, or near to, the onshore elements of the Project or the sensitivity of potentially affected receptors, will be assessed in line with good practice guidance, legislation, statutory designations and/or professional judgement. **Table 7.7-7** details the framework for determining the sensitivity of receptors.

Table 7.7-7 Estimating the Sensitivity of Receptors

Sensitivity of Receptor	Definition
High	A large, medium or small waterbody with a SEPA water quality classification of 'High' or 'Good'. The hydrological receptor and downstream environment has no or limited capacity to attenuate natural fluctuations in hydrochemistry and cannot absorb further changes without fundamentally altering its baseline characteristics/natural processes. Aquifer classified by the BGS as 'moderately or highly productive aquifer' and is of local or regional importance. May affect statutorily designated nature conservation sites or local areas of nature conservation dependent on groundwater. The hydrological receptor will support abstractions for PWS, or private water abstractions which supply more than 25 people and/or 100 livestock (at any given point in the year) and/or is used for the mass-production of food and drinks. GWDTEs which are classified by SEPA as "highly groundwater dependent" and have no (<1%) or minor (1-25%) functional impairment by man-made influence (such as drainage or forestry). The hydrological receptor is of high environmental importance and is designated as European or International Importance such as a SAC, SPA or Ramsar, or is of national importance such as a SSSI and NNR. The receptor act as an active floodplain or other flood defence, or is located within an active flood plain, in accordance with SPP 2014. Soil type and associated land use are highly sensitive (e.g. peat/blanket bog). Class 1 or 2 priority peatland, carbon-rich and peaty soils cover >20% of the Project area. Peat depth surveys will be carried out to determine the extent and depth of the peat present across the Onshore Development Area of Search as discussed in Chapter 7.6: Peat, Geology, Soils and Contaminated Land. Areas containing geological or geomorphological features considered to be of national importance (e.g. geological SSSIs). Receptor contains areas of regionally important economic mineral deposits.
Medium	A large, medium, or small waterbody with a SEPA water quality classification of 'Moderate'.

Sensitivity of Receptor	Definition
	The hydrological receptor and downstream environment will have moderate capacity to attenuate natural fluctuations in hydrochemistry but cannot absorb certain changes without fundamentally altering its baseline characteristics/natural processes. Aquifer of limited value (less than local) and is classified by the BGS as a 'low productivity aquifer' as water quality does not allow potable or other quality sensitive uses. Exploitation of local groundwater is not far-reaching. Local areas of nature conservation known to be sensitive to groundwater effects. GWDTEs/wetlands which are classified by SEPA as "highly groundwater dependent" but have moderate (25%-50%) functional impairment by man-made influence (such as drainage or forestry). GWDTEs which are classified by SEPA as "moderately groundwater dependent" have no functional impairment by man-made influence (such as drainage or forestry). The hydrological receptor does not act as an active floodplain or other flood defence but is considered to provide some degree of natural flood management (e.g. peat soils). The hydrological receptor is of local environmental importance (such as LNR). Soil type and associated land use are moderately sensitive (e.g. commercial forestry). Class 1 or 2 priority peatland, carbon-rich and peaty soils cover <20% of the Project. Peat depth surveys will be carried out to determine the extent and depth of the peat present across the Onshore Development Area of Search as discussed in Chapter 7.6: Peat, Geology, Soils and Contaminated Land. Class 3 and 5 peatland areas, carbon rich and peaty soils. Receptor contains areas of locally important economic mineral deposits. Areas containing geological features of designated regional importance including Regionally Important Geological/geomorphological Sites (RIGS), considered worthy of protection for their historic or aesthetic importance.
Low	A large, medium, or small waterbody with a SEPA water quality classification of 'Poor' or 'Bad'. The hydrological receptor and downstream environment will have capacity to attenuate natural fluctuations in hydrochemistry but can absorb any changes without fundamentally altering its baseline characteristics/natural processes. Poor groundwater quality and/or very low permeability make exploitation of groundwater unfeasible. Changes to groundwater not expected to affect local ecology. The hydrological receptor does not support abstractions for PWS or private water abstractions. GWDTEs which are classified by SEPA as "highly groundwater dependent" but have major (>50%) functional impairment by man-made influence (such as drainage or forestry). GWDTEs which are classified by SEPA as "moderately groundwater dependent" but have functional impairment by man-made influence (such as drainage or forestry). GWDTEs which are classified by SEPA as "highly or moderately groundwater dependent" but are ombrotrophic. The hydrological receptor does not act as an active floodplain or other flood defence. The hydrological receptor is not of regional, national, or international environmental importance. The hydrological receptor is not designated for supporting freshwater ecological interest.

Sensitivity of Receptor	Definition
	Geological features or geology not protected and not considered worthy of specific protection. Soil type and associated land use not sensitive to change in hydrological regime (e.g. intensive grazing). Receptor contains non-peatland areas, with no carbon-rich and/or peaty soils.
Negligible	The receptor is resistant to change and is of little environmental value.

Magnitude of Effect

The magnitude of potential likely significant effects will be identified through consideration of the Project, the degree of change to baseline conditions predicted because of the Project, the duration and reversibility of an effect and professional judgement, good practice guidance and legislation. Where possible, cables will be routed to follow existing linear infrastructure that have already created disturbance such as roads, reducing the magnitude of potential effects. Sub-station construction will involve the permanent removal of vegetation and permanent access roads, so the siting of the sub-station is the key to minimising the magnitude of effects.

The criteria for assessing the magnitude of an effect are presented in **Table 7.7-8**.

Table 7.7-8 Framework for Determining the Magnitude of Effects

Magnitude of Impact	Definition
High	A short or long-term major shift in hydrochemistry or hydrological conditions sufficient to negatively change the ecology of the receptor. This change will equate to a downgrading of a SEPA water quality classification by 2 classes e.g. from 'High' to 'Moderate'. A sufficient material increases in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with SPP). A major loss of (greater than 50% of Hydrology Study Area) or total loss of highly dependent and high value GWDTE, or where there will be complete hydrological severance which will fundamentally affect the integrity of the feature. A major permanent or long-term negative change to groundwater quality or available yield. The yield of existing supplies may be lost or major long-term or short-term reduction in quantity and/or deterioration in quality. Changes to groundwater quality or water table level that will negatively alter local ecology or will lead to a groundwater flooding issue. Major or total loss of or alteration to peatland resource such that post development characteristics or quality will be fundamentally or irreversibly changed. Long term/permanent change to human or environmental health.

Magnitude of Impact	Definition
	Catastrophic failure of site infrastructure due to ground instability. Long term/permanent change to baseline resource. Major or total loss of a geological site or mineral deposit, where the value of the site would be severely affected.
Medium	A short or long term non-fundamental change to the hydrochemistry or hydrological environment, resulting in a change in ecological status. This change will equate to a downgrading of a SEPA water quality classification by 1 class e.g. from 'High' to 'Good'. A moderate increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with SPP). A loss of part (approximately 10-50% of Hydrology Study Area) of a moderately dependent and moderate value GWDTE – significant hydrological severance affects the integrity of the feature, but it could still function. Changes to the local groundwater regime that may slightly affect the use of the receptor. The yield of existing supplies may be reduced or quality slightly deteriorated. Fundamental negative changes to local habitats may occur, resulting in impaired functionality. Loss of, or alteration to the baseline resource such that post development characteristics or quality will be partially changed. Mid-term/permanent change to human or environmental health. Ground failure that requires remediation but does not cause catastrophic failure of site infrastructure. Mid-term/permanent change to baseline resource. Partial loss of a geological site or mineral deposit, with major effects to the settings, or where the value of the site would be affected.
Low	A detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. This change will not result in a downgrading of the SEPA water quality classification. A marginal increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with SPP). A detectable but non-material effect on the receptor (up to 5%) or a moderate effect on its integrity as a feature or where there will be a minor severance or disturbance such that the functionality of the receptor will not be affected. A detectable effect on a GWDTE (loss of between 5-10% of Hydrology Study Area) or a minor effect on a GWDTE's integrity as a feature or where there will be a minor severance or disturbance such that the functionality of the receptor will not be affected. Changes to groundwater quality, levels or yields do not represent a risk to existing baseline conditions or ecology. Small loss of soils or peatland, or where soils will be disturbed but the value not impacted. Short-term change to human or environmental health.

Magnitude of Impact	Definition
	Ground settlement/subsidence that does not adversely affect site infrastructure or require remedial action. Short-term change to baseline resource. Small effect on a geological site or mineral deposit, such that the value of the site would not be affected.
Negligible	No perceptible changes to the baseline hydrochemistry or hydrological environment. No change to the SEPA water quality classification. No increase in the probability of flooding onsite and offsite. A slight or negligible change from baseline condition of geological resources. Change hardly discernible, approximating to a 'no change' in geological condition. Minimal detectable effect on a GWDTE (between to 0.1-5% of Hydrology Study Area) or no discernible effect on its integrity as a feature or its functionality. Minimal or no change to soils or peatland deposits. Minimal or no change to human or environmental health. Minimal or no change to ground stability. A very slight change from the baseline conditions. The change is barely distinguishable and approximates to the 'no-change' situation. Minimal or no change to a geological site or mineral deposit.

Significance of Effect

The sensitivity of the receptor or resource and the magnitude of the predicted impact will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects **Table 7.7-9** summarises guideline criteria for assessing the significance of potential likely significant effects.

Table 7.7-9 Significance of Effect Evaluation Matrix

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

Effects predicted to be of major or moderate significance are 'significant' in the context of the EIA Regulations and are shaded in orange in the above table.

7.7.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Hydrology and Hydrogeology include:

1. Do you agree that the data sources identified are sufficient to inform the Hydrology and Hydrogeology baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all hydrological and hydrogeological receptors and potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the potential likely significant effects table for Hydrology and Hydrogeology?
4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential likely significant effects of the Project on hydrological and hydrogeological receptors?

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The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013.

The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017.

The Water Quality (Scotland) Regulations 2010.

Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations, 2017. (the EIA Regulations).

Water Framework Directive (WFD) (2000/60/EC).

7.8 Airborne Noise and Vibration

7.8.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Airborne Noise and Vibration within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

The effects of Airborne Noise and Vibration from the construction, operation, and decommissioning of infrastructure located within the Onshore Development Area of Search, as well as airborne noise from the WTGs will be assessed in accordance with appropriate guidance and criteria agreed in consultation with Comhairle nan Eilean Siar Environmental Health Department, and other key stakeholders. It will consider the impacts of the Project on nearby sensitive receptors.

7.8.2 Study Area

The assessment of airborne noise during the construction, operation, and decommissioning of the Project will be carried out at the nearest identified Noise Sensitive Receptors (NSRs) as described in section 7.8.3. NSRs typically include residential properties, care homes, place of worship, and other properties (e.g. schools, hotels) where noise nuisance may impact the quality of life or services in the property. These receptors surround the Onshore Development Area of Search shown in **Figure 1.1-1**. This assessment will be carried out on the basis that should noise effects be acceptable at these locations, they will also be acceptable at locations further from the Project. Likewise, an assessment of vibrational effects during the construction and decommissioning of the Project will also be carried out at these nearest receptors.

Assessment of airborne noise and ground-borne vibration will be limited to the effects on human receptors.

7.8.3 Baseline Conditions

A desk-based review of nearby potential NSRs was undertaken using Geographic Information System (ArcGIS Pro), with input from Ordnance Survey AddressBase Plus data, and verified against freely available online aerial imagery. The nearest NSRs to each element of the Onshore Development Area of Search will be identified within the EIA Report and refined following consultation and once the landfall area(s) have been finalised.

To establish the baseline noise level at locations representative of the nearest NSRs, surveys will be carried out in line with BS 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound'* (BS 4142) and BS 5228-1:2009+A1:2014 '*Code of practice for noise and vibration control on construction and* *open sites – Part 1: Noise'* (BS 5228-1). The exact number, locations and strategy for monitoring will be discussed and agreed upon with the Council Environmental Health Officer.

The requirement for a baseline survey relating to the assessment of airborne noise from the WTGs will be determined following an initial desktop study. Should the results indicate that a baseline survey is required (i.e. should the predicted noise level exceed the simplified lower limit given in ETSU-R-97 at any potential noise sensitive receptor), the location of monitoring locations will be discussed and agreed upon with the Council Environmental Health Officer.

Unlike airborne noise, assessment of vibration effects involves comparison of predicted vibration levels against absolute threshold limits which are independent of baseline levels. As such, a baseline vibration survey is not required.

7.8.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the airborne noise and vibration assessment, which has been incorporated into the design of the Project at this stage (**Table 7.8-1**).

Table 7.8-1 Embedded Mitigation Measures

ID	Parameter	Mitigation Measures Embedded into the Project Design
7.1	Project Design	Noise and vibration constraints will be taken into account when finalising the design.
7.2	Good Practice	Adherence to standard noise and vibration control good practice recommendations during construction and decommissioning.

7.8.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.8.5.1 Likely Significant Effects

Potential likely significant effects on Airborne Noise and Vibration receptors have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 7.8-2**.

Table 7.8-2 EIA Scoping Assessment for Airborne Noise and Vibration

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Onshore construction and decommissioning activities generating noise, including noise generated from construction vehicle activity.	7.2	In	Potential for levels to exceed the limits set out in BS 5228 at nearby sensitive receptors.	Noise from all onshore construction and decommissioning activities will be assessed in line with the guidance detailed within BS 5228-1. Baseline survey will determine the noise assessment criteria at each NSR.
Onshore construction and decommissioning activities generating vibration.	7.2	In	Potential for levels to exceed the limits set out in BS 5228 at nearby sensitive receptors.	Desktop assessment of vibration from all onshore construction and decommissioning activities will be assessed in line with the guidance detailed within BS 5228-2.
Onshore construction and decommissioning activities along cable route generating noise and vibration.		**Out**	Anticipated duration of construction activities at each section of the cable route to be of short duration and less than the one month criteria set out in BS 5228.	
Operation and Maintenance				
Operation of Onshore Infrastructure (e.g. substation) generating noise	7.1	In	Potential for noise levels to exceed assessment criteria set out in BS 4142 at nearby sensitive receptors.	Noise from operation of all onshore infrastructure will be assessed in line with the guidance detailed within BS 4142. Consultation with Comhairle nan Eilean Siar Environmental Health and results of

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
				baseline survey will determine the noise assessment criteria at each NSR.
Operation of Offshore turbines generating noise	7.1	In	Potential for noise levels to exceed assessment criteria set out in ETSU-R-97 at nearby sensitive receptors.	Onshore operational noise effects from offshore turbines are generally scoped out due to the large separation distances between the offshore site and onshore NSRs. Given the proximity of the Array Area to the coast of the Isle of Lewis (approximately 5-13 km), an initial desktop assessment of onshore effects to ETSU-R-97 and associated Good Practice Guide (GPG), will be undertaken once a candidate turbine has been finalised. The results of this will determine if a baseline survey will be required.
Operation of onshore infrastructure resulting in vibration		**Out**	Vibration from onshore infrastructure is anticipated to be negligible and as such is scoped out.	
Changes to traffic movements due to operation of the Project generating noise		**Out**	It is anticipated that traffic movements during the operation of the Project will be negligible, and as such operational traffic has been scoped out.	

7.8.6 Proposed Approach to EIA

7.8.6.1 Consultation

Consultation will be undertaken with Comhairle nan Eilean Siar Environmental Health Department and other key stakeholders to agree baseline survey locations, assessment methodology, and assessment criteria for the construction and operation of the Project. The consultation will also identify any potential cumulative impacts.

7.8.6.2 Policy, Legislation and Guidance

The following legislation, policy and guidance presented in **Table 7.8-3** is relevant to the assessment of noise during construction and operation of the Project:

Table 7.8-3 Legislation, policy and guidance relevant to the Airborne Noise and Vibration assessment

Relevant Legislation, Policy and Guidance
Scottish Planning Policy 2014 [Online] Available at: https://www.gov.scot/Resource/0045/00453827.pdf (Accessed 01/03/2023)
Planning Advice Note: Planning Advice Note (PAN) 1/2011 Planning and Noise, The Scottish Government, 2011
The Control of Pollution Act 1974 (CoPA 1974) c. 40, Available at: https://www.legislation.gov.uk/ukpga/1974/40/contents (Accessed 17/03/2023)
The Environmental Protection Act (EPA) 1990 c. 43, Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents (Accessed 17/03/2023)
BS 5228:2009+A1:2014 *Code of Practice for noise and vibration control on construction and open sites* – Part 1: Noise and Part 2: Vibration
BS 4142:2014+A12019 *Methods for rating and assessing industrial and commercial sound*
ETSU-R-97 *The Assessment and Rating of Noise from Wind Farms*
A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise

7.8.7 Assessment Methodology

7.8.7.1 Construction Noise and vibration

It is proposed that a qualitative construction noise assessment be undertaken following guidance contained in British Standard 5228:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites (*BS 5228*)*. BS 5228 contains detailed information on noise reduction measures and promotes the 'Best Practicable Means' (BPM) approach to minimise noise and vibration impacts on local residents.

The assessment will predict noise from construction activities based on likely number of plant items, noise emission data, on-times and construction traffic. The predicted noise levels will be assessed against the

Example Method 2 – the '5 dB(A) change' outlined in BS 5228. Based on this method, noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient sound levels plus site noise) exceeds the pre-construction ambient by 5 decibels (dB) or more, subject to lower cut off values of 65 dB, 55 dB and 45 dB from site noise alone, for daytime, evening and night-time respectively. BS 5228 states that noise levels are potentially significant for construction activities that may have a medium to high magnitude of impact for a duration longer than10 or more days/nights in any 15 consecutive days/nights, or for total number of days exceeding 40 in any 6 consecutive months. Based on the above, the following thresholds have been identified:

- 65 dB(A) during daytime (0700-1900, includes 0700 to 1300 Saturday);
- 55 dB(A) during evenings and weekends (1900-2300 weekdays, 1300-2300 Saturdays and 0700-2300 Sundays);
- 45 dB(A) at night (2300-0700).

The above thresholds apply in the amenity spaces of the nearest NSRs. The proposed construction noise magnitude criteria have been derived from the thresholds above. Please note these magnitudes are subject to the total noise being 5 dB above the pre-construction ambient levels at assessment locations. **Table 7.8-4** below presents the subsequent magnitude of effects:

Table 7.8-4 Criteria for Construction Noise Assessment, dB(A).

Period	**Magnitude of Effect**			
	Negligible	**Small**	**Medium**	**Large**
Daytime	<55	55-65	65-75	>75
Evening and Weekend	<45	45-55	55-65	>65
Night-time	<35	35-45	45-55	>55

Where appropriate, the assessment of construction noise will also consider off-site activities such as construction traffic and deliveries, where the necessary information is available, following guidance contained within Calculation of Road Traffic Noise (CRTN)[28] and The Design Manual for Roads and Bridges (DMRB)[29].

Ground-borne vibration will be assessed against the absolute threshold limits in BS 5228-2. Where any NSR is expected to experience high vibration levels (e.g. NSRs very close to construction activity or transport

[28] Calculation of Road Traffic Noise, 1988.

[29] The Design Manual for Roads and Bridges (DMRB) HD213/11, Volume 11, 2011.

haul road etc.) appropriate vibration control measures will be outlined in the Construction Environmental Management Plan (CEMP) which may include vibration monitoring during construction.

7.8.7.2 Operational Noise of Onshore Elements

The potential effect of operational noise levels will be determined by assessing predictions of noise at the nearest NSRs in accordance with British Standard BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142). The assessment shall be based on the prediction of noise due to the operation of the Project (including any embedded mitigation) and that 'additional mitigation' would be considered for any potential residual significant adverse effects.

Noise levels due to operation of the Project will be calculated using the environmental noise propagation model ISO 9613-2:1996. Where required, rating corrections will be applied to the specific noise level in order to account for acoustic features (tonality, intermittency and impulsivity) which have the potential to increase the level of perception of the noise at nearby dwellings. Any required character corrections will be added to the specific sound level in order to determine the Rating level.

Predicted rating noise levels from the Project will be assessed using the methods set out in BS 4142. An initial assessment will be undertaken as required by BS 4142 in which the amount by which the predicted Rating level exceeds the background noise level is calculated. The results of the initial assessment are then subject to contextual factors, which will be taken into account in determining overall significance.

It is proposed that the criteria set out in **Table 7.8-5** are used for the initial assessment of impact magnitude, in line with the recommendations of BS 4142.

Table 7.8-5 Proposed Impact Magnitude Criteria for Operational Noise

Impact Magnitude	Description
Large	A Rating level greater than 10 dB above background, subject to context
Medium	A Rating level greater than 5 dB above background, subject to context
Small	A Rating level between 0- and 5 dB above background, subject to context
Negligible	A Rating level equal to or lower than background, subject to context

Following the initial assessment, contextual factors inherent in determining the overall level of noise impact will be considered, as follows:

- The absolute level of sound;
- The character of the background noise environment compared to the character of the specific sound (i.e. the noise due to the Project);
- The sensitivity of the receptors under consideration;

- Factors relating to individual properties, such as existing screening, or local noise sources specific to that location.

7.8.7.3 Operational Noise of Offshore Elements

Operational noise impacts from WTGs are associated primarily with the aerodynamic noise generated by the movement of the turbine blades through the air, and to a lesser extent by the operation of mechanical components housed within the turbine itself. Unlike other types of assessment methodologies (such as that described in section 7.8.7.2), use of the ETSU-R-97 methodology does not result in a magnitude of effect, but rather is a test of acceptability. Operational noise impacts are assessed on the basis of the level of noise produced by the Development relative to ETSU-R-97 noise limits (or an apportionment thereof).

ETSU-R97 specifies noise limits, development must balance the environmental impacts of the Proposed Development against the national and global benefits which would arise through the development of renewable energy sources.

Noise criteria (or limits) are specified, which are a combination of a margin of 5 dB above the prevailing, wind speed-dependent, background noise level and fixed lower noise limits, which are applicable in low background noise situations. The fixed lower noise limits are defined as:

- 35 - 40 dB, LA90,10min during the day, with the value chosen dependent on the number of affected properties, the effect of the number of kWh (kilowatt-hours) generated and the duration and level of exposure;
- 43 dB, LA90,10min at night, a level chosen to safeguard against sleep disturbance;
- 45 dB, LA90,10min at properties where the occupier has a financial involvement in the proposed development, during both the day and night.

A baseline survey will be undertaken, measurement locations and NSRs considered representative will be discussed and agreed upon with the Council Environmental Health Officer, prior to the candidate turbine being selected, to ensure that noise limits can be met through the design of the Array.

7.8.8 Scoping Questions for Consultees

Scoping questions for consultees in relation to Airborne Noise and Vibration include:

1. Have all potential Airborne Noise and Vibration receptors and potential likely significant effects that could result from the Project been identified?
2. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Airborne Noise and Vibration?
3. Are there any planned/consented developments in the vicinity of the Project that could give rise to the need for a cumulative assessment?

7.8.9 References

A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind turbine Noise, IOA, 2013.

BS 4142:2014+A12019 Methods for rating and assessing industrial and commercial sound.

BS 5228:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration.

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7.9 Land Use, Tourism and Recreation

7.9.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Land Use, Tourism and Recreation within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

Other chapters of relevance to the Land Use, Tourism and Recreation topic include:

- Chapter 6.12: Offshore Infrastructure, Other Sea Users, Tourism and Recreation
- Chapter 6.13: Seascape, Landscape and Visual Impact Assessment (SLVIA);
- Chapter 7.1: Landscape and Visual Impact Assessment (LVIA);
- Chapter 7.4: Onshore Archaeology and Cultural Heritage;
- Chapter 8.2: Socio-Economics.

7.9.2 Study Area

There are no recognised standards or legislative requirements for assessing Land Use, Tourism and Recreation; therefore, a combination of professional judgement, established Environmental Impact Assessment (EIA) best practice and relevant legislation, policy and guidance has been used to form the approach to this assessment. Study Areas in this chapter are receptor specific and detailed in the following sections.

7.9.2.1 Tourism and Recreation

Primary Study Area

The Primary Study Area for the Recreation and Tourism assessment will consider all onshore tourist and recreational features within 10 kilometres (km) of the Array Area. The magnitude of effect for Land Use, Tourism and Recreation will be based on impacts to receptor’s accessibility (direct) and amenity value (indirect) – visual, noise and air quality impacts. No direct impacts are anticipated due to the offshore infrastructure; however, a 10 km Study Area is necessary to capture the receptors most likely to be impacted by indirect impacts as the Array Area will be perceived over long distances and will have the ability to impact on the landscape that some tourist and recreational receptors are known for.

Distances from the Array Area will be measured from the nearest turbine. Any additional tourist and recreational features outside of this Study Area that are anticipated to be affected by the Project through the Scoping process will also be considered.

7.9.2.2 Land Use

The Land Use Study Area consists of all land within the areas of search that will be occupied by the Project, either temporarily during construction and decommissioning, or permanently during the operational phase.

7.9.3 Baseline Environment

7.9.3.1 Data Sources

The data sources used to inform the Land Use, Tourism and Recreation Chapter of the Scoping Report are presented within **Table 7.9-1**. These data sources will be taken forward and used to inform the EIA, alongside any additional site-specific data that is collected for the Project, including a project specific Social Impact Assessment, and further datasets that may be provided following consultation.

Table 7.9-1 Summary of Key Publicly Available Datasets for Land Use, Tourism and Recreation

Source	Spatial Coverage	Year	Summary
VisitScotland	This information covers the Recreation/Tourism study area and is available at a national level.	Updated 2023	Used to identify baseline information surrounding population and labour statistics.
Visit Outer Hebrides	This information covers the Recreation/Tourism study area and is available at a national level.	Updated 2023	Used to identify Recreation/Tourism receptors.
Trip Advisor	This information covers the Recreation/Tourism study area and is available at an international level.	Updated 2023	Used to identify Recreation/Tourism receptors and accommodation.
AirBnB	This information covers the Recreation/Tourism study area and is available at an international level.	Updated 2023	Used to identify accommodation providers.
NatureScot	This information covers the Land Use study area and is available at a national level.	2019	Used to identify the current land use of the project site.

7.9.3.2 Overview of Baseline Environment

Recreation and Tourism

In 2017, tourists that come to the Outer Hebrides mainly came for leisure (68%), followed by business (19%), visiting friends and relatives (12%) and for other reasons (1%) (Visit Scotland, 2018). In the same year, the majority of tourists came from Scotland (55%), followed by the rest of the United Kingdom (UK) (28%), Europe (11%), North America (4%) and other oversea locations (2%). 82% of tourism in the Outer Hebrides is accounted for by UK nationals. No data is available on tourism in the Outer Hebrides since 2017, following the COVID-19 pandemic.

Out of the tourists who visited the Outer Hebrides in 2017, some of the main reasons for visiting were:

- The scenery and landscape (71%);
- Always wanted to visit (49%);
- To get away from it all (36%);
- Been before and wanted to come again (33%);
- The history and culture (32%).

Within the Primary Study Area for Recreation and Tourism, various visitor attactions have been identified (VisitScotland, 2023; Trip Advisor 2023). These include, but are not limited to:

- Carloway Mill;
- The Blackhouse;
- Gearannan Blackhouse Village;
- Doune Broch Centre;
- Steinacleit Stone Circle;
- Bosta Iron Age House;
- Carloway Broch;
- Norse Mill and Kiln;
- The Sheiling;
- The Callanish Stones;
- Morven Gallery.

Within the Secondary Study Area for Recreation and Tourism, the following visitor attractions were identified, but are not limited to:

- Lews Castle;
- Lews Castle Grounds;
- Stornoway Trust Sawmill & Workshop;
- Stornoway Golf Club;

- Woodlands Centre;
- Museum Nan Eilean Stornoway.

There are tours that operate around the Isle of Lewis which feature some of the previously identified tourist and recreational features listed above. Day Tours of Lewis is a daily tour which goes round the island's historic and cultural assets. This tour includes previously identified tourist and recreational features:

- Bosta Iron Age House;
- Carloway Broch;
- The Blackhouse.

As well as the previously noted visitor attractions, beaches such as Dalbeg Beach and Bosta Beach are popular tourist and recreational destinations. These beaches are popular with families, dog walkers as well as for surfing and stand-up paddle-boarding. Chapter 6.12: Offshore Infrastructure, Other Sea Users, Tourism and Recreation, considers the direct effects of the offshore infrastructure on these users, and Chapter 6.13: Seascape, Landscape, and Visual Impact Assessment (SLVIA) considers the visual effects of the offshore infrastructure. Visual effects arising from the onshore infrastructure are considered in Chapter 7.1: Landscape, and Visual Impact Assessment (LVIA).

There are 5 core paths within the identified Primary and Secondary Study Areas for Recreation And Tourism (Comhairle nan Eilean Siar Council, 2010). These are:

- Core Paths 1 (Butt of Lewis West Coast Path) – Primary Study Area;
- Core Path 3 (Na Gearrannan to Bragar Coastal Path) – Primary Study Area;
- Core Path 4 (Newmarket Gateway All Abilities Path) – Secondary Study Area;
- Core Path 5 (Great Bernera Circular Route) – Primary Study Area;
- Core Path 6 (Lewis Castle Grounds Path) – Secondary Study Area.

These core paths are all likely to experience indirect impacts, in particular Core Path 1 and Core Path 3. Core Path 6 has the potential to experience direct impacts as a result of its proximity to onshore infrastructure.

There are different types of tourist accommodation within the Primary and Secondary Recreation and Tourism Study Areas (AirBnB, 2023; VisitScotland, 2023). Accommodation types and quantities fluctuate over time, however, as of 2023, there are approximately:

- 76 self-catered accommodation types;
- 3 camping/campervan parking areas;
- 1 hostel;
- 1 small hotel.

Land Use

Land use is the anthropogenic management and occupation of the environment and what the land is used for now and in the future. Developments can affect the ability of land to be effectively used for its current purpose, whilst also affecting its potential use in the future. This can be due to direct loss of land to new infrastructure, which is therefore no longer available for its current land use, or disruption to existing land use operations as a result of construction and/or operational activities of a new development (e.g. access restrictions).

The Land Use Study Area sits in a great plateau of low lying peatlands extending southwards towards bold, rugged hills in the southern half of the island (NatureScot, 2019). The peatlands have provided a source of fuel since the Bronze age and are traditionally used for summer grazing 'shieling' and for fishing in the many freshwater lochs and burns. Many peat mounds, approximately 2 metres (m) high and 510 m long, grow along the Stornoway to Barvas road which follows the Project's Onshore Cable Corridor Area of Search.

The Land Use Study Area consists of mostly undeveloped land with small scatterings of residential dwellings and villages/towns, commonly found along the coast. The predominant land use within the Land Use Study Area is predominantly agricultural, comprising large areas of Common Grazing, as detailed in the Crofting Register (Crofting Commission, 2023). The majority of land in the Land Use Study Area has capacity to be utilised for rough grazings, with low quality plants, or for improved grassland, which will have few problems with pasture establishment but may be difficult to maintain; however, some landfall areas sit on land capable of producing a narrow range of crops, primarily grassland with short arable breaks of forage crops and cereal (Scottish Government, 1983). Whilst the majority of the Land Use Study Area lies within Common Grazings, some Croft land also falls within the Land Use Study Area, Crofting is an ancient form of land tenure in the Highland and Islands of Scotland, which has historically been practiced on the Isle of Lewis (The Furrow, 2020). It is the predominant land use in the Western Isles and around 77% of the land area is held in crofting tenure and is subject to crofting legislation. Raising store lambs is the most important form of crofting, followed by the rearing of calves (Comhairle nan Eilean Siar Council, 2020). As of 2023, there are 3,905 registered crofters on the Isle of Lewis (Crofting Commission, 2023).

7.9.4 Embedded Mitigation

This section outlines the embedded mitigation relevant to the Land Use, Tourism and Recreation assessment, which has been incorporated into the design of the Project (**Table 7.9-2**).

Table 7.9-2 Embedded Mitigation Measures for Land Use, Tourism and Recreation

ID	Parameter	Mitigation Measures Embedded into the Project Design
7.1	Project Design	Mitigation through design to minimise indirect impacts on land use, recreational users and tourists.
7.22	Appropriate signage, fencing and re-routing of core paths	Direct impacts on core path users will be mitigated via appropriate signage, fencing and re-routing of core paths during the construction phase should any interference with core paths occur.

7.9.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.9.5.1 Likely Significant Effects

Potential likely significant effects on Land Use, Tourism and Recreation have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 7.9-3.**

Table 7.9-3 EIA Scoping Assessment for Land Use, Recreation and Tourism

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Direct and indirect impacts on core path users.	7.1, 7.22	In	There is potential for likely significant effects by directly or indirectly impacting the accessibility of core paths during construction (e.g. the proximity of the Project impacts the surrounding landscape that the core path is known for).	Site-based assessments will be undertaken based on any anticipated changes to the accessibility of core paths in the Primary and Secondary Recreation and Tourism Study Areas during the construction phase. Where appropriate, landscape and visual effects are considered in Chapter 6.13: Seascape, Landscape and Visual Impact Assessment (SLVIA); and Chapter 7.1: Landscape and Visual Impact Assessment (LVIA).
Direct and indirect impacts on users or tourist/recreational resources.	7.1, 7.22	In	There is potential for likely significant effects on users and/or tourist/recreational resources (e.g. the proximity of the Project's construction impacts the surrounding landscape that the receptor is known for).	Qualitative desk-based and site-based assessments will be undertaken based on any anticipated changes to the amenity value of tourist/recreational receptors in the Primary and Secondary Recreation and Tourism Study Areas during the construction phase. For the purposes of these assessments, amenity is considered to be a combination of the purpose of the tourism or recreational resource, the visual amenity, noise and air quality experienced by the users of tourism/recreational resources. Where appropriate, landscape and visual effects are considered in Chapter 6.13: Seascape, Landscape

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
				and Visual Impact Assessment (SLVIA); and Chapter 7.1: Landscape and Visual Impact Assessment (LVIA).
Direct and indirect impacts on land use practices.	7.1, 7.22	In	There is potential for likely significant effects during construction on land use practices through direct or indirect interference/displacement.	Qualitative desk-based and site-based assessments will be undertaken to understand if there will be any temporary/permanent interference and/or displacement of agricultural practices, such as crofting in the Land Use Study Area during the construction phase.
Direct and indirect impacts on accommodation providers.	7.1, 7.22	In	There is potential for likely significant effects on accommodation providers (e.g. the proximity of the Project's construction impacts the use of a certain accommodation providers, including via the use of accommodation from construction personnel).	Qualitative desk-based and site-based assessments will be undertaken based on any anticipated changes to the tourist accommodation in the Primary and Secondary Recreation and Tourism Study Areas during the construction phase. Where appropriate, landscape and visual effects are considered in Chapter 6.13: Seascape, Landscape and Visual Impact Assessment (SLVIA); and Chapter 7.1: Landscape and Visual Impact Assessment (LVIA).
Operation and Maintenance				
Direct and indirect impacts on core path users.	7.1, 7.22	In	There is potential for likely significant effects by directly or indirectly impacting the accessibility of core paths during operation (e.g. the proximity of	Site-based assessments will be undertaken based on any anticipated changes to the amenity value of core paths in the Primary and Secondary

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			the Project impacts the surrounding landscape that the core path is known for).	Recreation and Tourism Study Areas during the operational phase. For the purposes of these assessments, amenity is considered to be a combination of visual amenity, noise and air quality experienced by the users of core paths. Where appropriate, landscape and visual effects are considered in Chapter 6.13: Seascape, Landscape and Visual Impact Assessment (SLVIA); and Chapter 7.1: Landscape and Visual Impact Assessment (LVIA).
Direct and indirect impacts on users or tourist/recreational resources.	7.1, 7.22	In	There is potential for likely significant effects on users and/or tourist/recreational resources (e.g. the proximity of the Project's operation impacts the surrounding landscape that the receptor is known for).	Qualitative desk-based and site-based assessments will be undertaken based on any anticipated changes to the amenity value of tourist/recreational receptors in the Primary and Secondary Recreation and Tourism Study Areas during the operational phase. For the purposes of these assessments, amenity is considered to be a combination the purpose of the tourism / recreational resource, visual amenity, noise and air quality experienced by the users of tourism/recreational resources. Where appropriate landscape and visual effects are considered Chapter 6.13: Seascape, Landscape and Visual Impact Assessment (SLVIA); and Chapter 7.1: Landscape and Visual Impact Assessment (LVIA).

Potential likely significant effects	**Relevant Embedded Mitigation**	**Scoping Result**	**Justification**	**Assessment Method**
Direct and indirect impacts on land use practices.	7.1, 7.22	In	There is potential for likely significant effects during operation on land use practices through direct or indirect interference/displacement.	Qualitative desk-based and site-based assessments will be undertaken to understand if there will be any temporary/permanent interference and/or displacement of agricultural practices, such as crofting in the Land Use Study Area during the operational phase.
Direct and indirect impacts on accommodation providers.	7.1, 7.22	In	There is potential for likely significant effects on accommodation providers (e.g. the proximity of the Project's operation impacts the use of certain accommodation providers, including via the use of accommodation from Project personnel).	Qualitative desk-based and site-based assessments will be undertaken based on any anticipated changes to tourist accommodation in the Primary and Secondary Recreation and Tourism Study Areas during the operational phase. For the purposes of these assessments, amenity is considered to be a combination of visual amenity, noise and air quality experienced by the users of tourism/recreational resources.

7.9.6 Proposed Approach to EIA

7.9.6.1 Consultation

At this stage of the assessment, no consultation has been undertaken in relation to Land Use, Tourism and Recreation. It is anticipated that the following consultees in **Table 7.9-4** will be contacted.

Table 7.9-4 Preliminary list of consultees

Consultee	Description
Comhairle nan Eilean Siar Council	This consultee would help to identify any recreational, tourism or land use receptors which may be sensitive to the Project which were not identified during Scoping.
Scottish Rights of Way Access Society (ScotWays)	This consultee would help to identify any recreational routes which may be sensitive to the Project which were not identified during Scoping.
Community Councils and Community Trusts	This consultees would help to identify any recreational, tourism or land use receptors which may be sensitive to the Project which were not identified during Scoping.
British Horse Society	This consultee would help to identify any recreational routes which are commonly used by equestrian which may be sensitive to the Project which were not identified during Scoping.
VisitScotland	This consultee would help to identify any onshore tourist receptors which may be sensitive to the Project which were not identified during Scoping.
Visit Outer Hebrides	This consultee would help to identify any recreational and tourism receptors which may be sensitive to the Project which were not identified during Scoping.
Scottish Crofting Federation	This consultee will help to identify any land located within the Land Use Study Area that is of high crofting value.

In addition to the groups mentioned in **Table 7.9-4**, focus groups with local businesses operating in the tourism and recreation sector may be utilised to further inform the EIA.

7.9.6.2 Policy, Legislation and Guidance

The policy, legislation and guidance listed in **Table 7.9-5** will be used for the purposes of this assessment.

Table 7.9-5 Legislation, Policy and Guidance relevant to the Land Use, Recreation and Tourism assessment

Legislation, Policy and Guidance
Land Reform Act (Scotland) 2003 (as amended 2016)
Scottish Government (2023) National Planning Framework 4
Comhairle nan Eilean Siar Council (2018) Local Development Plan
Comhairle nan Eilean Siar Council (2021) Outer Hebrides Local Development Plan Supplementary Guidance for Wind Energy Development
Scottish Tourism Alliance (2020) Scotland's Tourism Strategy
Outer Hebrides Tourism (2020) Tourism Outer Hebrides
Mountaineering Scotland, Wind Farms and Tourism in Scotland: A Review with focus on Mountaineering and Landscape (2017)

7.9.6.3 Assessment Methodology

There are no recognised standards or methodologies for assessing the effects of offshore wind farms on Land Use, Tourism and Recreation. The methodology presented in this chapter builds upon the general assessment methodology presented in Chapter 4: Proposed Approach to EIA. The significance of the effects can be identified by considering the sensitivity of the receptors and magnitude of any impacts on those receptors. The assessment therefore uses professional judgement rather than formal guidelines for a methodology and assesses impacts on a case by case basis. The methodology utilised will be informed by previous experience and established EIA best practice. It will include:

- Consultation with relevant statutory and non-statutory bodies;
- Completion of baseline conditions describing the Land Use, Tourism and Recreation baseline and identifying tourist and recreational activities/facilities within the Primary and Secondary Recreation and Tourism Study Areas, as well as the current land use within the Land Use Study Area;
- An assessment of the sensitivity of all identified receptors within their respective Study Areas;
- An assessment of the impact the Project is anticipated to have on all identified receptors within their respective Study Areas;
- The predicted significance of effect the Project will have on all receptors in their identified Study Areas;
- Identification of possible measures to avoid and mitigate against any potential adverse effects resulting from the Project.

The primary concerns when evaluating potential impacts associated with the Project include:

- Immediate direct and indirect impacts stemming from the construction phase;
- Prolonged direct and indirect impacts emerging throughout the operational phase, but are mitigated during decommissioning;

- Persistent direct and indirect consequences that endure beyond the decommissioning phase.

The assessment will focus on assessing the likely effects (positive, negative or neutral) resulting from the Project. These outcomes are categorised as follows:

- Direct effects: These stem from the Project's direct impact, such as physical disruption to land-use resources, potentially affecting tourism and recreational sites. This could include the Project's footprint or construction/decommissioning activities that might limit or block access to tourism destinations.
- Indirect effects: For instance, visual changes caused by the Project that impact the quality of nearby recreational sites.
- Cumulative effects: This pertains to situations where the combined impact of the Project and one or more additional developments is more significant than the Project's impact by itself.

Appropriate conclusions from Chapter 6.12: Offshore Infrastructure, Other Sea Users, Tourism and Recreation; Chapter 6.13: Seascape, Landscape and Visual Impact Assessment (SLVIA); Chapter 7.1: Landscape and Visual Impact Assessment (LVIA); and Chapter 8.2: Socio-Economics will be utilised to inform the assessments within the Land Use, Tourism and Recreation EIAR chapter.

The methodology for assessment of effects will consider the sensitivity of receptors and the anticipated magnitude of impact. These will be combined to inform the significance of effect.

The sensitivity of receptors considers their ability to adapt to change. **Table 7.9-6** details the framework for determining the sensitivity of each receptor.

Sensitivity of the receptor, in terms of landscape and visual impact, is assessed within Chapter 6.13: Seascape, Landscape and Visual Impact Assessment (SLVIA); Chapter 7.1: Landscape and Visual Impact Assessment (LVIA); operational conclusions will be drawn into this assessment where appropriate and interpreted in the context of tourism and recreation.

Table 7.9-6 Framework for Determining Sensitivity of Receptors for Land Use, Tourism and Recreation

Sensitivity of Receptor	**Definition**
High	The asset is of very high recreational, tourist or land use value, or of importance at International/UK level and has little or no capacity to absorb change without fundamentally altering its present character. For example, it is a destination (for attractions), with a substantial proportion of visitors international/national level and/or possesses priority in national policy.
Medium	The asset is of some recreational, tourist or land use value, or is of regional importance to Scotland/Outer Hebrides and has moderate capacity to absorb change without substantially altering its present character. For example, it is a destination (for attractions) with a substantial proportion of visitors at a regional level and/or possesses priority in regional policy.

Sensitivity of Receptor	Definition
Low	The asset has low recreational, tourist or land use value, or is of local importance to the Outer Hebrides/Isle of Lewis and is tolerant to change without detriment to its character. For example, it is a destination (for attractions) with a substantial proportion of visitors at a local level and/or possesses priority in local policy.
Negligible	The receptor is resistant to change and is of little tourism, recreational or land use value.

The magnitude of potential effects will be identified through:

- Careful consideration of the Project;
- The degree of change to baseline conditions predicted as a result of the Project;
- The sensitivity of a receptor;
- The duration and reversibility of an impact;
- Professional judgement established EIA best practice, and relevant legislation, policy and guidance.

The criteria for assessing the magnitude of an effect are presented in **Table 7.9-7.**

Table 7.9-7 Framework for Determining Magnitude of Impact for Land Use, Tourism and Recreation

Sensitivity of Receptor	Definition
High	Total loss or major alteration (positive or negative) to one, or more, key elements of an identified Land Use, Tourism or Recreation asset/receptor.
Medium	Loss of, or alteration (positive or negative) to one, or more, key elements of an identified Land Use, Tourism or Recreation asset/receptor.
Low	Slight alteration (positive or negative) to one, or more, key elements of an identified Land Use, Tourism or Recreation asset/receptor.
Negligible	Barely perceptible alteration (positive or negative) to one, or more, key elements of an identified Land Use, Tourism or Recreation asset/receptor.

The sensitivity of the receptor and the predicted magnitude of impact will be used as a guide, in addition to professional judgement, to predict the likely significance of effects. **Table 7.9-8** summarises guideline criteria for assessing the significance of effect.

Table 7.9-8 Framework for Assessment of the Significance of Effects

		Magnitude of Impact			
Sensitivity of Receptor		**Negligible**	**Low**	**Medium**	**High**
	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

7.9.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Land Use, Tourism and Recreation include:

1. Do you agree that the data sources identified are sufficient to inform the Land Use, Tourism and Recreation baseline for the EIA?
2. Have all relevant Land Use, Tourism and Recreation receptors been identified that have the potential to be impacted by the Project?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Land Use, Tourism and Recreation?
4. Have all relevant Scoping consultees been identified for the Land Use, Tourism and Recreation assessment?

7.9.8 References

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7.10 Air Quality and Human Health

7.10.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Air Quality and Human Health within the Onshore Development Area of Search, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

7.10.2 Study Area

The Air Quality Study Area has been defined based on the Project activities onshore.

The following distances from the final infrastructure design will be analysed (IAQM 2014[30]):

- A 'human receptor' within:
  - 350 m of the boundary of the onshore works; or
  - 50 m of the routes used by construction vehicles on the public highway, up to 500 m from the site entrance(s) for the onshore works;
- An 'ecological receptor' within.
  - 50 m of the boundary of the onshore works; or
- 50 m of the route(s) used by construction vehicle on the public highway, up to 500 m from the site entrance(s) for the onshore works.

7.10.3 Baseline Environment

A desk study was undertaken to obtain a high-level understanding of the current air quality in the Air Quality Study Area, and to determine if any Air Quality Management Areas (AQMAs) are within or adjacent to the Air Quality Study Area.

According to the 2020-2022 air quality reports there are no significant changes and no new air pollution sources that have been identified (Air Quality Annual Progress Report (APR) for Comhairle nan Eilean Siar, 2020-2022).

[30] http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

7.10.3.1 Data Sources

The data sources used to inform this Air Quality and Human Health Chapter of the Scoping Report are presented within **Table 7.10-1.** Comhairle nan Eilean Siar does not undertake any monitoring of pollutants, hence there is no data present to inform the baseline environment (APR for Comhairle nan Eilean Siar, 2020-2021).

Table 7.10-1 Summary of key publicly available datasets for Air Quality and Human Health

Source	Spatial Coverage	Year	Summary
APR for Comhairle nan Eilean Siar	Western Isles	2020	This report provides an overview of air quality in the Western Isles during 2020. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.
APR for Comhairle nan Eilean Siar	Western Isles	2021	This report provides an overview of air quality in the Western Isles during 2021. It fulfils the requirements of LAQM as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.
APR for Comhairle nan Eilean Siar	Western Isles	2022	This report provides an overview of air quality in the Western Isles during 2022. It fulfils the requirements of LAQM as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

7.10.3.2 Overview of Baseline Environment

Defra and the Devolved Administrations provide mapped background air pollution concentration data to local authorities to support air quality assessment. The current version of the background maps uses a 2010 base year, and the current version of the EFT is v5.2.

According to Scottish Air Quality (Scottish Air Quality Maps, 2023*):*

- No exceedances of the Scottish annual mean for both roadside locations and background NO_2 were recorded at Isle of Lewis;
- No exceedances of the Scottish annual mean for both roadside locations and background PM_{10} were recorded at Isle of Lewis;

- No exceedances of the Scottish annual mean for both roadside locations and background $PM_{2.5}$ were recorded at Isle of Lewis.

Passive diffusion tube monitoring for Nitrogen Dioxide (NO_2) was last carried out in 2015/2016. Comhairle nan Eilean Siar works closely with SEPA and has in place a Development Strategy which considers environmental impacts on the local authority area and transport infrastructure. There are currently no air quality issues within this local authority area (APR for Comhairle nan Eilean Siar, 2021). The annual reports conducted by the local air management for the Western Isles from the years 2020-2022 indicate that detailed assessments are not required for any pollutant and there are no AQMA's declared within the local authority area. The next monitoring round for NO_2 was indicated to be carried out in 2022, with results expected to be included into the Air Quality EIA chapter. Comhairle nan Eilean Siar did not undertake monitoring for NO_x, PM_{10}, or $PM_{2.5}$ in 2020-2021. **Table 7.10-2** below outlines Scotland's air quality standards for various pollutants.

Table 7.10-2 Air Quality Standards in Scotland

Pollutant	**Annual Mean (μg/m³)**
NO_2	40
PM_{10}	18
$PM_{2.5}$	10

7.10.4 Embedded Mitigation

The Institute of Air Quality Management (IAQM[31]) method states that with the implementation of effective site-specific mitigation measures the environmental effect will not be significant in most cases. Should a risk be identified during the detailed design process, appropriate mitigation measures will be identified, along with a suitable monitoring program (e.g. an Air Quality Management Plan (AQMP)).

7.10.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

7.10.5.1 Likely Significant Effects

Potential likely significant effects on Air Quality and Human Health have been identified which may occur during the construction, operation (including maintenance) and decommissioning phases of the Project. These impacts are outlined in **Table 7.10-3**.

[31] http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

Table 7.10-3 EIA Scoping Assessment for Air Quality and Human Health

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Construction works are associated with dust raising activities (earthworks, traffic on unpaved areas, construction works). This may influence human and ecological receptors sensitive to dust and PM_{10}.	In line with IAQM guidance.	In	The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s) / infrastructure, method of construction, construction materials, and duration of build, hence it is vital to access all this to adequately determine the impact they will have on sensitive receptors.	The impact assessment will be based upon the dust risk methodology set out by the IAQM. The assessment will be designed to identify the appropriate mitigation depending upon the scale, nature and duration of dust raising activities and the proximity to receptors. The dust assessments relate to both sensitive human and ecological receptors.
Construction related traffic will be associated with emissions of dust and exhaust gases, which may affect human and ecological receptors	In line with IAQM guidance.	In	Due to lack of traffic data, there is not enough information to scope out construction traffic.	Embedded mitigation, as set out by the IAQM, is designed to reduce impact levels to negligible or at worst minor impacts, considering distance to and sensitivity of receptors.
Decommissioning activities will generally be the reverse of the construction sequence, involving similar types and numbers of vessels and equipment.	In line with IAQM guidance.	In	The key issues when determining the potential dust emission magnitude during the decommissioning phase include the size of the building(s)/infrastructure, method of decommissioning, materials used, and duration of decommissioning.	The impact assessment will be based upon the dust risk methodology set out by the IAQM. The assessment will be designed to identify the appropriate mitigation depending upon the scale, nature and duration of dust raising activities and the

Potential Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
				proximity to receptors. The dust assessments relate to both sensitive human and ecological receptors.
Operation and Maintenance				
Operational related traffic		**Out**	Due to the size of the project, the AADT is expected to be less than 200 HDV during the operational and maintenance phase; therefore, no embedded mitigation is required.	

7.10.6 Proposed Approach to EIA

7.10.6.1 Relevant Data Sources

The data sources outlined in **Table 7.10-4** will be used to assess the impacts which might arise during the construction, operation, and decommissioning phases of the Project.

Table 7.10-4 Relevant Data Sources

Source	Spatial Coverage	Year	Summary
Air Quality Monitoring in the Vicinity of Demolition and Construction Sites	International	2018	Constructing buildings, roads and other infrastructure can have a substantial, temporary impact on local air quality. This document provides updated guidance on air quality monitoring in the vicinity of demolition and construction sites.
LAQM Technical Guidance	UK	, 2022	LAQM is the statutory process by which local authorities monitor, assess, and take action to improve local air quality.
LAQM Policy Guidance	Scotland	2016	The guidance is intended to help local authorities with their local air quality management duties under Part IV of the Environment Act 1995.
Air Quality APR for Comhairle nan Eilean Siar	Western Isles	2020-2022	This report provides an overview of air quality in the Western Isles during 2020-2022. It fulfils the requirements of LAQM as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

7.10.6.2 Consultation

Regulatory engagement will be limited to verifying the use of the IAQM dust assessment method and verifying the basis for scoping out Air Quality and Human Health impacts associated with construction traffic.

7.10.6.3 Policy, Legislation and Guidance

Table 7.10-5 lists policies and guidance documents relevant to the Air Quality and Human Health assessment. Where certain guidance documents have been produced in relation to UK offshore wind farm projects, these will be reviewed as part of the Environmental Impact Assessment (EIA) process and due consideration will be given to how this guidance is applied to the Project. The European Union (EU) directives have set out air quality standards for Scotland and other member states for a wide variety of pollutants. These directives include how ambient air quality should be monitored, assessed, and managed.

Table 7.10-5 Policy, legislation, and guidance relevant to the Air Quality and Human Health assessment

Relevant policy, legislation, and guidance
Air Quality Standards Regulations No. 204, 2010
Assessment of dust from demolition and construction sites (IAQM 117, 2014)
Guidance on land-use planning and development control: Planning for air quality v1.2. (IAQM, 2017)
Air Quality Monitoring in the vicinity of Demolition and Construction Sites. (IAQM 118, 2018)
National Planning Framework 4 (NPF4)
The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland. (Defra, 2007)
LAQM Technical Guidance TG (22) ((Department for Environment Food and Rural Affairs, (Defra, 2022)

7.10.6.4 Assessment Methodology

The Air Quality and Human Health assessment will cross reference the spatial aspects of the Project, and cross reference ecology and social topics. However, these are minor considerations as dust impacts are readily mitigated.

The impact assessment will be based upon the dust risk methodology set out by the IAQM. The assessment will be designed to identify the appropriate mitigation depending upon the scale, nature and duration of dust raising activities and the proximity to receptors. The dust assessments relate to both sensitive human and ecological receptors.

An assessment using the same methodology as for the construction activities will be undertaken at the decommissioning phase for dust impacts.

7.10.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Air Quality and Human Health include:

1. Do you agree that the data sources identified are sufficient to inform the Air Quality baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Do you agree with the Air Quality Study Area (which will incorporate all receptors and potential likely significant effects) identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table for Air Quality and Human Health?

4. Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Project on Air Quality and Human Health receptors?

7.10.8 References

Air Quality Annual Progress Report (APR) for Comhairle nan Eilean Siar, (2020). *In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management.*

Air Quality Annual Progress Report (APR) for Comhairle nan Eilean Siar, (2021). *In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management.*

Air Quality Annual Progress Report (APR) for Comhairle nan Eilean Siar, (2022). *In fulfilment of Part IV of the Environment Act 1995 Local Air Quality Management.*

Design Manual for Roads and Bridges (2019). *LA 105 Scotland National Application Annex to LA 105 Air quality.*

IAQM (2014). *Assessment of dust from demolition and construction, Institute of Air Quality Management*, London.

IAQM (2018). *Air Quality Monitoring in the Vicinity of Demolition and Construction Sites,* Institute of Air Quality Management, London.

Scottish Air Quality Maps (2023). *Maps of annual concentrations*. Available via https://www.scottishairquality.scot/data/mapping [Accessed 01/08/2023].

Local Air Quality Management - Technical Guidance (TG22). Part IV of the Environment Act 1995 as amended by the Environment Act 2021 Environment (Northern Ireland) Order 2002 Part III.

8 Whole Project Chapters

8.1 Climate

8.1.1 Introduction

This chapter of the Scoping Report considers the likely significant effects of the Project associated with climate change, outlining potential impacts arising from construction, operation and maintenance (O&M) and decommissioning of the Project, and presents the proposed methodology for the Greenhouse Gas (GHG) assessment and Climate Change Risk Assessment (CCRA) which will make up the Environmental Impact Assessment's (EIA) Climate Chapter. This includes all infrastructure associated with both the Offshore Development Area of Search and Onshore Development Area of Search.

The Climate Chapter of the EIA will be undertaken in alignment with the Institute of Environmental Management and Assessment (IEMA) guidance, 'Guide: Assessing GHG Emissions and Evaluating their Significance' (2022) and 'Environmental Assessment Guide to: Climate Change Resilience & Adaption' (2020). It will consider both the likely significant effects of the Project on climate change (the GHG assessment), as well as the impacts of climate change to the Project (the CCRA). 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 also identify mitigation measures to reduce GHG emissions through the entire lifecycle of the Project;
- **CCRA –** this will include an assessment of physical climate-related risks which could impact the construction, O&M and decommissioning of the Project under present day and future projected climatic conditions. This assessment will also include the consideration of mitigation measures and management plans (at a high level) which are anticipated to be included within the Project's design, as well as a high level recommendation of risks which would benefit from additional management.

The main goal of the Project is to support the supply of secure, low carbon, and renewable electricity, aiming to decarbonize the UK's energy sector. Implementation of the Project is anticipated to have a net beneficial effect on atmospheric GHG emissions compared to the 'do nothing' scenario, assuming the electricity generated by the wind farm would have otherwise been produced via fossil fuels.

8.1.2 Study Area

8.1.2.1 GHG assessment

The spatial study area for the GHG emissions assessment ('the GHG Study Area') includes sources and removals of GHG emissions arising from the construction, O&M and decommissioning phases of the Project.

Emissions sources associated with construction vehicles, vessels and processes on site, as well as emissions associated with materials of construction, will be estimated within the construction phase.

Emissions arising from service vessel and vehicle use in maintenance and replacement of development components will be estimated for the operational phase. Emissions associated with the Project's operational energy consumption will also be considered within the assessment. Estimation of the likely electricity generation output arising from the Project will be contextualised against the current carbon intensity of grid electricity for Scotland.

The temporal boundary for GHG emissions assessment constitutes the construction, O&M and decommissioning phases.

8.1.2.2 CCRA

The CCRA will focus on the assessment of physical climate-related risks across both onshore and offshore aspects of the Project during the construction, O&M and decommissioning phases. The CCRA Study Area will include all aspects of the project as shown on **Figure 1.1-1**, which include:

- Offshore Array;
- Offshore Cable Corridor;
- Landfall and Landfall Substation;
- Onshore Cable Corridor;
- Grid Substation.

8.1.3 Baseline Environment

8.1.3.1 GHG assessment

The IEMA guidance states that a baseline for a GHG assessment can take the form of:

- GHG emissions within the boundary of the GHG quantification but without the proposed project; or
- GHG emissions arising from an alternative project design and/or business as usual for a project of this type.

There are no direct baseline GHG emissions data from within the boundary of the Project to review, as GHG emissions prior to the Project are considered to be zero.

The alternative baseline conditions for the climate change assessment, specifically a GHG impact assessment, will be a business-as-usual scenario whereby the Project does not proceed. The business-as-usual scenario will therefore be continued supply of electricity at the current grid intensity.

8.1.3.2 CCRA

The baseline for the CCRA will be defined using historical climate data and meteorological records sourced from numerous international scientific organizations, including the Intergovernmental Panel for Climate Change (IPCC), World Resource Institute (WRI), International Best Track Archive for Climate Stewardship (IBTrACS), Fathom, National Aeronautics and Space Administration (NASA), European Space Agency (ESA), Met Office UK Climate Projections (UKCP18) and World Bank.

Baseline data will be used to understand the current presence and intensity of a full list of climate hazards (covering a total of 9 acute and chronic hazards) including: extreme temperatures (hot & cold), flooding (river, extreme rainfall and coastal), sea level rise, extreme winds and storms, landslides, wildfires, and water stress & drought.

8.1.3.3 Data Sources

The data sources used to inform the GHG assessment and CCRA within this Scoping Report are presented within **Table 8.1-1**. These data sources will be taken forward and used to inform the EIA, alongside any additional site-specific data that is collected for the Project.

Table 8.1-1 Summary of Key Data Sources Used Within the Climate Assessment

Source	Spatial Coverage	Summary
GHG assessment		
Conversion Factors for Reporting GHG Emissions	National	Current UK grid average GHG intensity and various emissions factors. Previously published by BEIS, now published by Department for Energy, Security and Net Zero (DESNZ), Department for Business and Trade (DBT) and Department for Science, Innovation and Technology (DSIT).
Inventory of Carbon and Energy (ICE)	International	Emission factors for embodied carbon in construction materials.

Source	Spatial Coverage	Summary
Updated Energy Emissions and Projections	National	Projections of future energy use and GHG emissions in the UK. Previously published by BEIS, now published by DESNZ, DBT and DSIT.
National Grid Future Energy Scenarios	National	Projections of future energy scenarios.
UK GHG Emissions National Statistics	National	Annual estimates of GHG emissions in the UK. Previously published by BEIS, now published by DESNZ, DBT and DSIT.
CCRA		
UN IPCC Sixth Assessment Report (AR6)	International	Global data on climate change impacts, adaptation and vulnerability.
WRI	International	Global data on climate trends and sustainability.
IBTrACS	International	Most complete global collection of tropical cyclone data.
Fathom	International	Global Flood Map providing a robust and comprehensive set of hazard data and flood risk information.
NASA	International	Global climate change data, including but not limited to global temperature trends, air quality, storms and hurricanes, and more.
ESA	International	Global climate data, including but not limited aerosols, GHG, sea surface temperature and salinity, ozone, sea level and more.
The Met Office's UK Regional Climates, and UKCP18	National	Future climate projections for land and marine regions as well as observed (past) climate data for the UK.
World Bank Climate Change Knowledge Portal	International	Climate data and climate-risk information.
Department for Environment, Food and Rural Affairs (Defra) UK	National	UK government and devolved administrations' position on the key climate change risks and opportunities faced by the UK.

Source	Spatial Coverage	Summary
Climate Change Risk Assessment 2022		

8.1.4 Embedded Mitigation

As part of the project design process, a number of best practice and designed-in mitigation measures (referred to collectively as embedded mitigation) have been proposed to reduce the potential for effects relating to Climate Change.

8.1.4.1 Greenhouse Gas Emissions

Potential mitigation measures for climate change could include the following:

Table 8.1-2 Proposed GHG Embedded Mitigation Measures

ID	Mitigation Measures Embedded into the Project Design
8.1	A Construction Environmental Management Plan (CEMP) will be implemented to ensure relevant environmental measures and health and safety procedures are followed. The CEMP will outline the roles and responsibilities within the project management framework concerning the oversight and reporting of environmental impacts during the construction phase. The CEMP will be the securing mechanism for many mitigation measures.
8.2	Measures to minimise lifecycle GHG emissions during construction from plant, equipment and construction materials will be outlined in the CEMP. This will include ensuring that construction vehicles and machinery are serviced regularly and in good working order.
8.3	Construction traffic emissions will be minimized 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.

The above mitigation measures are proposed to minimise effects upon climate change receptors; however it should be noted that the Climate assessment informs other chapters on the effects of the Project (i.e. Physical and Coastal Processes, Hydrology and Hydrogeology, Air Quality and Human Health, etc.) and therefore the mitigation appropriate to these will be captured within those chapters.

8.1.4.2 Climate Resilience

Current embedded mitigation relevant to climate change are outlined below in **Table 8.1-3.** These embedded mitigation measures will evolve further as the EIA progresses.

Table 8.1-3 Proposed Climate Change Event Embedded Mitigation Measures

ID	Mitigation Measures Embedded into the Project Design
8.4	An Emergency Management Plan for the 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, flooding). Such protocols could encompass adjusting the construction programme to delaying affected activities, changing shift patterns, and Personal Protective Equipment (PPE).
8.5	The layout of the site will consider the location of the substation, avoiding regions susceptible to flooding. Ensuring that the substation is sheltered/covered will help to mitigate the impact of water damage to any components.
8.6	The specifications of any overhead lines should be designed to withstand extreme winds and storms (e.g. maximum wind speed).
8.7	The wind turbine design parameters should encompass a thorough evaluation of their resilience to extreme temperatures and high winds. For instance, incorporating de-icing mechanisms capable of activation during exceptionally cold conditions would mitigate potential risks and disturbances caused by ice accumulation on turbine operations and functionality.
8.8	A comprehensive drainage design will be integrated into all aspects of both temporary construction sites and permanent operational infrastructure to effectively manage and, if needed, treat surface water runoff.

8.1.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

8.1.5.1 Key receptors

GHG assessment

GHG emissions have a cumulative impact on global warming. GHG emissions have the same worldwide effect wherever and whenever they occur, hence the receptor is global biodiversity. Although indirect effects will occur on locally sensitive receptors (for example, through rising sea levels), conducting a comprehensive assessment of potential climate-related impacts on such receptors is challenging due to the uncertainty that surrounds how the physical environment will react to climate change. Therefore no localised sensitive receptors will be assessed within this chapter. The effects of cumulative GHG emissions from specific projects therefore in general should not be individually assessed, as there is no basis for selecting any one project that has GHG emissions over any other.

As GHG impacts and resulting effects are global, the approach to cumulative effects assessment for GHGs differs from that for many EIA topics where only projects within a geographically bounded study area would be included.

There are no established thresholds for defining the significance of effects on climate in EIA resulting from GHG emissions of different magnitudes. The IEMA 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*".

Significance will be determined based on the Projects whole life GHG emissions:

- Major adverse: the Project's GHG impacts are not mitigated and do not make a meaningful contribution to Scotland's emissions reduction trajectory;
- Moderate adverse: the Project's GHG impacts are partially mitigated, and the Project does not fully contribute to Scotland's emissions reduction trajectory;
- Minor adverse: the 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 Project with negligible effects provides GHG performance that is 'ahead of the curve' for Scotland's emissions reduction trajectory;
- Beneficial: the Project's net GHG impacts are below zero and it causes a reduction in GHG concentration, whether directly or indirectly, compared to the 'without Project' baseline. Such a development substantially exceeds Scotland's emissions reduction trajectory requirements, with a positive climate impact.

CCRA

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 hazards have the potential to pose a wide range of risks to the Project. Impacts could range from damage to assets, disruption to operations (during the construction and operational phase of the 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 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 Project.

Therefore, a number of key site aspects have been identified which could be impacted by physical risks and climate change. These receptors are summarised below:

- Site personnel;
- Access routes;
- Construction equipment;
- Wind turbines;
- Substation/supporting infrastructure;

- Local Population & Customers.

8.1.5.2 Likely Significant Effects

GHG Assessment

The Climate Chapter of the EIA will consider the likely significant impacts of the full lifecycle of the Project in terms of GHG emissions, calculating both the emissions produced by the Project as well as the emissions savings and benefit associated with its development. Potential likely significant effects on GHG emissions which may occur during the construction, O&M and decommissioning phases of the Project are outlined in **Table 8.1-4.**

Table 8.1-4 EIA Scoping for GHG Assessment

Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction				
Emissions associated with the extraction and manufacturing of required raw materials used for Project infrastructure components such as wind turbines and foundations	8.1, 8.2	In	These activities have potential to generate material GHG emissions (aligned with PAS 2080 guidance).	Desktop assessment using project information
Emissions associated with transport of materials to site including via road vehicles and marine vessels	8.1, 8.2, 8.3	In		
Emissions associated with equipment use during construction	8.1, 8.2, 8.3	In		
Emissions associated with the transport of waste from the site including via road vehicles and marine vessels	8.1, 8.2, 8.3	In		
Emissions associated with a reduction in carbon storage (e.g. permanent loss of peatland due to construction of onshore infrastructure)	8.1	In	Peatlands are the largest terrestrial store of carbon and damaged peatland is a major source of GHG emissions globally.	Use of the Scottish Environment Protection Agency (SEPA) Carbon Calculator Tool (Scottish Government, 2022).
Operation and Maintenance				
Emissions savings associated with the operation of the wind farm and production of renewable energy		In	The wind farm's operation and resultant clean energy production are expected to yield a net beneficial effect on GHG	Desktop assessment using project information

Likely Significant Effect	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
			emissions when compared to the baseline 'do nothing' scenario.	
Emissions associated with operation of the wind farm		In	These activities have potential to generate material GHG emissions (aligned with PAS 2080 guidance).	
Emissions associated with maintenance and repair, such as the use of maintenance and serviced operation vessels		In		
Emissions associated with refurbishment and replacement, such as use of spare parts of infrastructure components		In		
Decommissioning				
Emissions associated with decommissioning vessel and vehicle activity		In	These activities have potential to generate material GHG emissions (aligned with PAS 2080 guidance).	Desktop assessment using project information
Emissions associated with end of life disposal of waste materials and Project components		In		
Emissions associated with decommissioning the Project		In		

CCRA

Likely significant effects on CCRA have been identified which may occur during the construction, O&M and decommissioning phases of the Project. These effects are outlined in **Table 8.1-5**.

It is important to highlight that the Project's design will be carefully crafted to endure anticipated climate changes, ensuring resilience against severe storms, flooding, and heatwaves. These embedded 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.

Table 8.1-5 EIA Scoping Assessment for climate change

Likely Significant Effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Risks to staff health and safety	8.4	In	These effects have the potential to cause material impacts to the Project	Desktop assessment using baseline and projected climate data and Project information (e.g. design specifications, health and safety management plans)
Damage to assets (e.g. wind turbines, substation)	8.5, 8.6, 8.7, 8.8	In		
Business disruption (during both construction and operational phase)	8.4, 8.5, 8.6, 8.7, 8.8	In		
Reduced access to sites (both onshore and offshore)	8.4, 8.5, 8.6, 8.7, 8.8	In		
Disruption in power supply to customers	8.4, 8.5, 8.6, 8.7, 8.8	In		
Reputational damage to the Applicant	8.4, 8.5, 8.6, 8.7, 8.8	In		

8.1.6 Proposed Approach to EIA

8.1.6.1 Relevant Data Sources

GHG assessment

Data required to inform the assessment across the construction, O&M and decommissioning phases is summarised below in **Table 8.1-6.**

Table 8.1-6 Project Data Required to Inform the GHG Assessment

Proposed Consultee	Description
Construction	
Product stage	Emissions associated with the extraction and manufacturing of required raw materials used for Project infrastructure components such as wind turbines and foundations.
Vessel and vehicle activity	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
Equipment use during construction	Emissions associated with equipment use during construction.
Reduction in peatland	Area of peatland affected during the construction of onshore infrastructure.
Operation and Maintenance	
Operation of the wind farm	Emissions associated with operation of the wind farm.
Maintenance and Repair	Emissions associated with maintenance and repair, such as the use of maintenance and serviced operation vessels.
Replacement and Refurbishment	Emissions associated with refurbishment and replacement, such as use of spare parts of infrastructure components.
Decommissioning	
Vessel and vehicle activity	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.
Deconstruction techniques	Emissions associated with the deconstruction techniques used for the Project.
Disposal of waste materials and project components	Emissions associated with the disposal techniques of waste materials and project components.

CCRA

Data required to inform the CCRA includes continuous climate and meteorological datasets as listed above in **Table 8.1-1.**

8.1.6.2 Consultation

Consultee comments received in the Scoping Opinion will be considered, and further technical engagement may be sought in order to inform the scope and assessment methodology of the EIA.

8.1.6.3 Policy, Legislation and Guidance

Table 8.1-7 Legislation, Policy and Guidance relevant to the Climate assessment

Relevant Legislation and Policy
CCRA
The United Nations Framework Convention on Climate Change (UNFCCC
The Climate Change Act 2008
The Climate Change (Scotland) Act 2009
Climate Change Scotland: Scottish Climate Change Adaptation Programme
The Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Amendment Order 2020
National Planning Framework (NPF), in particular NPF4
Climate Change Plan
The Innovation and Targeted Oil and Gas Decarbonisation Sectoral Marine Plan
GHG Assessment
IEMA’s Assessing Greenhouse Gas Emissions and Evaluating their Significance guidance (IEMA 2022)
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)
Climate Change Committee (CCC) UK Carbon Budgets

CCRA Guidance

IEMA’s EIA Guide to Climate Change Resilience & Adaptation (IEMA, 2020) has been used to inform the methodology set out within this Scoping Report.

For the CCRA this includes:

- Defining the future (climate) baseline using historic climate records and future climate projects;
- Identifying and determining the sensitivity of receptors and evaluating in-combination climate impacts (whether the susceptibility, vulnerability and importance of receptors changes with future climatic projections);

- Assessing the potential likelihood and magnitude of any physical risks which are identified during the assessment;
- A high level review of any mitigation measures which are planned to be integrated into the Project’s design;
- Inclusion of further mitigation measures if required.

The following criteria will be considered when assessing the magnitude of impacts/risks in the CCRA:

- The acceptability of any disruption in use if the Project fails;
- Its capital value if it had to be replaced;
- Its impact on neighbours;
- The vulnerability of the Project element or receptor;
- If there are dependencies within any interconnected network of nationally important assets on the new development.

8.1.6.4 Assessment Methodology

GHG Assessment

The GHG assessment will be conducted in accordance with emerging best practices and industry standards. As previously mentioned, relevant guidance documents, such as IEMA's guide to assessing GHG emissions (IEMA, 2022) and PAS 2080 (Green Construction Board, 2023), among others, will be taken into consideration.

The primary objective of the Project is to contribute to the provision of secure, low carbon, and renewable electricity. Project implementation is anticipated to yield a positive impact when compared to the existing baseline, represented by the 'do nothing' scenario. To showcase the net beneficial effect resulting from the provision of renewable energy during the Project’s operation, various metrics will be calculated. These include the GHG payback period, total emissions savings, and reductions in GHG emissions of the electricity generated by the Project when compared to other forms of electricity generation.

For the GHG assessment this will include:

- 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;
- Data collection;
- Calculation of the GHG emissions inventory and evaluation of the significance of the emissions;
- Reporting of findings and consideration of further mitigation opportunities.

Calculation Methodology

A calculated approach for quantifying GHG emissions will be taken and will be compatible with international standards. The calculation formula will have the following structure:

GHG Emission Factor x Activity Data = GHG 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

Quantification will be made of the avoided carbon emissions attributable to the Project. Avoided emissions will be estimated by evaluation of the equivalent quantity of emissions from fossil fuels removed from Scotland's electricity generation mix due to the operation of the Project, together with use of appropriate emissions factors.

The carbon payback period for the project will be determined with use of the SEPAs Carbon Calculator Tool (Scottish Government, 2022). This is the industry standard to determine the 'payback period' (e.g. the amount of time the carbon savings from the Proposed Development will take to outweigh the carbon emissions). The tool evaluates payback time for windfarms sited on peatland areas though it has applicability to other aspects of the Project. The areas of the Project included within these calculations will be listed within the EIA and any required caveats will be detailed.

CCRA

The CCRA will adhere to IEMA's climate change resilience and adaptation guide (IEMA, 2020). The current and future baseline will be established using historical climate records and climate projections as detailed above in **Table 8.1-1**., at the national and regional levels. Potential climate hazards and impacts will be identified using the UKCP climate database, alongside other sector-specific guidance and literature.

The sensitivity of receptors concerning potential climate change impacts will be determined by their susceptibility and vulnerability, reflecting their capacity to be affected by change and their level of exposure, respectively. The magnitude of a climate change impact will be assessed based on the combination of likelihood and consequence. Likelihood pertains to the probability of the impact occurring over a relevant time frame, while consequence refers to the nature and severity of harm to the relevant receptor (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 employed.

A high-level vulnerability assessment of the operations and facilities associated with the construction and operational phases of this Project will be undertaken. This will include:

- The consideration of the range of physical climate hazards which could occur in the vicinity of the facilities associated with the Project;
- A summary of adaptation measures which are planned to be integrated into the design specifications of the Project to mitigate the impacts of physical climate-related risks.

Step 1 – Summarise exposure:

The Projects exposure to a range of climate-related hazards (e.g. floods, extreme heat events, sea level rise etc.) will be summarised, including the mapping of potential climate-related risks associated with the construction and operational phases based on Project design information available at the time of writing.

Step 2 – Gather climate data:

Climate data will be sourced across the spatial footprints of the proposed locations of the onshore and offshore infrastructure associated with the Project (data will be collected and averaged across a series of coordinates covering the onshore and offshore aspects of the Project). The climate data will be collected using the Platform and supplemented by any site-specific information. Desk-based data will be collected for 9 hazards (acute and chronic), including extreme temperatures (hot & cold), flooding (river, extreme rainfall and coastal), extreme winds and storms, sea level rise, landslides, wildfires and water stress & drought.

Any trends identified in the projected climate data will be analysed and interpreted to indicate the potential for a change in the presence and intensity of each climate hazard within the Project area for the lifetime of the Project.

Technical guidance on physical scenario analysis from the TCFD and other sources advise the inclusion of a selection of scenarios covering a variety of reasonable outcomes. This includes the inclusion of a scenario representative of keeping global average temperatures at 2°C or lower, most closely aligned with the Paris Agreement. Similarly, both the TCFD and IEMA also recommend the inclusion of a 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 8.1-8** for estimated temperature increases and definitions associated with each SSP.

Table 8.1-8 Climate Scenarios which will be used in the CCRA

Scenario	Definition	Mean annual temperature increase by 2100 compared to pre-industrial averages (1850)
SSP1-2.6	Envisions a central pathway in where trends continue their historical patterns without substantial deviations.	**+1.8ºC** (very likely range of 1.0ºC-1.8ºC)
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).	**+4.4ºC** (very likely range of 3.3ºC-5.7ºC)

Step 3 – Identify and assess potential risks:

Climate-related risks which may be present across the proposed onshore and offshore locations associated with the Project will be identified based on industry best practice and guidance noted above. Similarly, where appropriate and feasible, the assessment will also identify any risks that may be exacerbated by climate change. As a part of this phase of the assessment, the planned adaptation measures of the Project, designed to enhance the resilience of the Project's assets or reduce the potential likely significant effects of physical climate-related risks on the Project, will also be considered.

8.1.7 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 potential likely significant effects that could result from the Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment table relating to the GHG assessment and CCRA?

8.1.8 References

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8.2 Socio-Economics

8.2.1 Introduction

This chapter of the Scoping Report provides an overview of the baseline environment for Socio-Economics, followed by a review of potential likely significant effects on relevant receptors from the construction, operation (including maintenance), and decommissioning phases of the Project.

8.2.2 Study Area

There are no recognised standards or legislative requirements for assessing Socio-economics; therefore, a combination of Environmental Impact Assessment (EIA) best practice, professional judgement and relevant legislation, policy and guidance has been used to form the approach to this assessment. Socio-economic Study Areas are defined at either a local, regional and national scale, to identify the different extents of Socio-economic opportunities at varying geographical scales. For the purposes of this assessment, local, regional, and national will be defined as:

- Local – Isle of Lewis;
- Regional – the Outer Hebrides ('Na H-Eileanan Siar');
- National – Scotland.

8.2.3 Baseline Environment

8.2.3.1 Data Sources

The data sources used to inform the Socio-economics Chapter of the Scoping Report are presented within **Table 8.2-1**. These data sources will be taken forward and used to inform the EIA, alongside any additional site-specific data that is collected for the Project including a project specific Social Impact Assessment.

Table 8.2-1 Summary of Key Publicly Available Datasets for Socio-Economics

Source	Spatial Coverage	Year	Summary
NOMIS Official Census and Labour Market Statistics	This information covers local, regional and national Socio-economic Study Areas.	2021	Used to identify baseline information surrounding population and labour statistics.
Scottish Index of Multiple Deprivation	This information covers local, regional and national Socio-economic Study Areas.	2020	Used to identify baseline information surrounding deprivation.

Source	Spatial Coverage	Year	Summary
Comhairle nan Eilean Siar Census Data	This information covers local and regional Socio-economic Study Areas.	2012	Used to identify baseline information surrounding population and labour statistics.

8.2.3.2 Overview of Baseline Environment

In 2011, the population of the Isle of Lewis was estimated at approximately 19,648 which accounted for 71% of the total population of the Outer Hebrides (27,684) in 2011 (Comhairle nan Eilean Siar Council, 2012). In 2021, the Outer Hebrides population decreased to an estimated population size of 26,640 (NOMIS Labour Market Statistics, 2022). In mid-2021, Scotland's population was estimated to be 5,479,900, showing that the Outer Hebrides accounted for 5% of the total Scottish population in 2021 (National Records of Scotland, 2022).

Approximately 61.8% of Lewis' population in 2011 were of working age; aged between the ages of 16-64. This is higher than the Outer Hebrides average (58.3%) but lower than the Scottish average (63.8%) in 2021. This is largely due to the aging population of both the Isle of Lewis and the Outer Hebrides, as one of only 5 council areas in Scotland with one fifth of the population aged 65 and over (21.3%). Of this working age population, 71% were economically active in 2011, which is lower than both the Outer Hebrides average (81.5%) and the Scottish, national, average (77.2%). The largest driver for economic inactivity in Lewis is retirement (61%), followed by being long-term sick or disabled (13%), being a student (12%), looking after home or family (10%) and for other reasons (4%).

In 2011, the largest employment sectors in Lewis were human health and social work activities (18.3%), closely followed by wholesale and retail trade, repair of motor vehicles and motorcycles (12.4%) and construction (11.8%). This was closely mirrored by the most popular industries of employment in the Outer

Hebrides and Scotland in 2021. For the Outer Hebrides these sectors were human health and social work activities (20.5%), public administration and defence (15.9%) and wholesale and retail trade, repair of motor vehicles and motorcycles (13.6%) and for Scotland these sectors were human health and social work activities (15.9%), wholesale and retail trade, repair of motor vehicles and motorcycles (14.4%) and education (8.7%).

The Scottish Index of Multiple Deprivation is used to identify areas of deprivation across Scotland. This is done by ranking relative measures of deprivation across 6,976 data zones, from most deprived (ranked '1') to least deprived (ranked '6,976'), across 7 different domains; income, employment, education, health, access to services, crime and housing. These data zones are then split into deciles, from the most deprived

10% (1), to the least deprived 10% (10). Lewis (south and northwest), has an overall decile of 5, meaning that the Isle of Lewis is neither in the most or least deprived area in Scotland.

The most deprived domain is access with a decile of 1, which indicates it is in most deprived 10% of Scotland for access, largely due to the remote, rural nature of the Isle of Lewis. The least deprived domain in Lewis is crime which has a decile of 10, which indicates it is the least deprived 10% areas in Scotland for crime (Scottish Government, 2020).

8.2.4 Embedded Mitigation

There is no embedded mitigation relevant to the Socio-economics assessment.

8.2.5 Summary of Key Receptors, Sensitivities and Potential Likely Significant Effects

8.2.5.1 Likely Significant Effects

Potential likely significant effects on Socio-economic receptors during the construction, operation and maintenance, and decommissioning phases of the Project have been identified. These impacts are outlined in **Table 8.2-2**.

Table 8.2-2 EIA Scoping Assessment for Socio-Economics

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
Construction and Decommissioning				
Economic outputs in the supply chain		In	This is a potential Likely Significant Effect so is scoped into the assessment.	An economic impact model will be developed to estimate direct, indirect, and induced Gross Value Added (GVA) impacts of the Project at Scottish, United Kingdom (UK) and non-UK level.
Employment in the supply chain		In	This is a potential Likely Significant Effect so is scoped into the assessment.	An economic impact model will be developed to estimate direct, indirect, and induced employment impacts of the Project at a Scottish, UK and non-UK level. There is also the potential for local job opportunities, and this will be estimated through the economic model noted above.
Operation and Maintenance				
Direct and indirect impacts on land use practices		In	This is a potential Likely Significant Effect so is scoped into the assessment.	An economic impact model will be developed to estimate direct, indirect, and induced GVA impacts of the

Potential likely significant effects	Relevant Embedded Mitigation	Scoping Result	Justification	Assessment Method
				Project at Scottish, UK and non-UK level.
Indirect impacts on accommodation providers		In	This is a potential Likely Significant Effect so is scoped into the assessment.	An economic impact model will be developed to estimate direct, indirect, and induced employment impacts of the Project at a Scottish, UK and non-UK level. There is also the potential for local job opportunities and this will be estimated through the economic model noted above.

8.2.6 Proposed Approach to EIA

8.2.6.1 Consultation

At this stage of the assessment, no consultation has been undertaken in relation to Socio-economics. It is anticipated that the following consultees listed below will be contacted to help identify any Socio-economic receptors which may be sensitive to the Project which were not identified during Scoping:

- Comhairle nan Eilean Siar;
- Community Councils.

8.2.6.2 Policy, Legislation and Guidance

The policy, legislation and guidance listed in **Table 8.2-3** has been used for the purposes of this assessment.

Table 8.2-3 Legislation, Policy and Guidance relevant to the Socio-Economics assessment

Relevent Legislation and Policy
Scottish Government (2023) National Planning Framework 4
Comhairle nan Eilean Siar Council (2018) Local Development Plan
Comhairle nan Eilean Siar Council (2021) Outer Hebrides Local Development Plan Supplementary Guidance for Wind Energy Development
BiGGAR Economics (2019) Economic Impacts of Beatrice Offshore Windfarm Limited

8.2.6.3 Assessment Methodology

There are no recognised standards or methodologies for assessing the Socio-economic effects of offshore wind farms;, although limited, some best practice guidance has been published, such as 'Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs)' (Vattenfall, 2020). The methodology will be informed by such guidance, as well as established EIA best practice, professional judgement and relevant legislation and policy. It will include:

- Consultation with relevant statutory and non-statutory bodies;
- Description of baseline Socio-economic conditions within the Socio-economic Study Area;
- An estimation of the Socio-economic baseline's sensitivity;
- The anticipated impact of the Project on Socio-economics;
- Identification of possible measures to avoid and mitigate against, any potential adverse effects resulting from the Project.

The methodology for assessment of effects will consider the sensitivity of receptors and the anticipated magnitude of impact. These will be combined to inform the significance of effect.

The sensitivity of receptors considers their ability to adapt to change. This will be assessed in line with best practice guidance, legislation and statutory designations. **Table 8.2-4** details the framework for determining the sensitivity of each receptor.

Table 8.2-4 Framework for Determining Sensitivity of Receptors for Socio-Economics

Sensitivity of Receptor	Definition
Very High	The asset is of very high Socio-economic value and has little or no capacity to absorb change without fundamentally altering its current value. For example, it significantly contributes to the UK economy.
High	The asset is of high Socio-economic value and has little capacity to absorb change without fundamentally altering its current value. For example, it significantly contributes to the Scottish economy.
Medium	The asset is of some Socio-economic value and has moderate capacity to absorb change without substantially altering its current value. For example, it significantly contributes to the regional economy.
Low	The asset is of low Socio-economic value and is tolerant to change without substantially altering its current value. For example, it significantly contributes to the local economy.
Negligible	The receptor is resistant to change and is of little environmental value.

The magnitude of potential effects will be identified through consideration of the Project, the degree of change to baseline conditions predicted as a result of the Project, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

The criteria for assessing the magnitude of an effect are presented in **Table 8.2-5**.

Table 8.2-5 Framework for Determining Magnitude of Impact for Socio-economics

Sensitivity of Receptor	Definition
High	Total loss or major alteration (positive or negative) of the Socio-economic receptors.
Medium	Loss of, or alteration to (positive or negative), 1 or more key elements of the Socio-economic value.
Low	Slight alteration (positive or negative) of the Socio-economic asset/receptors.
Negligible	Barely perceptible alteration (positive or negative) of the Socio-economic asset/receptors.

The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. **Table 8.2-6** summarises guideline criteria for assessing the significance of effects. **Table 8.2-7** provides a broad definition of effect significance categories.

Table 8.2-6 Significance of Effect Evaluation Matrix

		Magnitude of Impact			
Sensitivity of Receptor		**Negligible**	**Low**	**Medium**	**High**
	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

Table 8.2-7 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.

8.2.7 Scoping Questions for Consultees

Scoping questions for consultees in relation to Socio-economics include:

1. Do you agree that the data sources identified are sufficient to inform the Socio-economic baseline for the EIA (and therefore that no further baseline data collection is merited)?
2. Have all relevant consultees been identified that could help to inform the Socio-economic impact assessment?

8.2.8 References

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9 Proposed EIAR Structure

The following chapter sets out the proposed structure of the Environmental Impact Assessment Report (EIAR). Currently, it is proposed the onshore and offshore technical topics are presented within one EIAR. The EIAR will be supported by a number of technical appendices, such as modelling outputs, background reports and other supporting information.

9.1 EIAR Structure

The EIAR is proposed to be structured as follows:

- Non-Technical Summary
- Chapter 1: Introduction
- Chapter 2: Site Selection and Alternatives
- Chapter 3: Project Description
- Chapter 4: Policy and Legislation
- Chapter 5: EIA Methodology
- Chapter 6: Consultation
- Chapter 7: Offshore Chapters
    - Chapter 7.1: Physical and Coastal Processes
    - Chapter 7.2: Underwater Noise
    - Chapter 7.3: Marine Sediment and Water Quality
    - Chapter 7.4: Benthic and Intertidal Ecology
    - Chapter 7.5: Fish and Shellfish Ecology
    - Chapter 7.6: Marine Mammals and Other Megafauna
    - Chapter 7.7: Marine and Nearshore Ornithology
    - Chapter 7.8: Marine Archaeology and Cultural Heritage
    - Chapter 7.9: Commercial Fisheries
    - Chapter 7.10: Shipping and Navigation
    - Chapter 7.11: Military and Civil Aviation
    - Chapter 7.12: Offshore Infrastructure, Other Sea Users, Tourism and Recreation
    - Chapter 7.13: Seascape, Landscape and Visual Impact Assessment
- Chapter 8: Onshore Chapters
    - Chapter 8.1: Landscape and Visual Impact Assessment
    - Chapter 8.2: Onshore Ecology
    - Chapter 8.3: Onshore and Intertidal Ornithology
    - Chapter 8.4: Onshore Archaeology and Cultural Heritage

  - Chapter 8.5: Traffic and Access
  - Chapter 8.6: Peat, Geology, Soils and Contaminated Land
  - Chapter 8.7: Hydrology and Hydrogeology
  - Chapter 8.8: Airborne Noise and Vibration
  - Chapter 8.9: Land Use, Tourism and Recreation
  - Chapter 8.10: Air Quality and Human Health

- Chapter 9: Whole Project Chapters
  - Chapter 9.1: Climate
  - Chapter 9.2: Socio-Economics

- Chapter 10: Conclusion
  - Chapter 10.1: Summary of Impacts & Mitigation

- Technical Appendices

Acronyms

Term	Definition
1SD	1 Standard Deviation
1SW	1 Sea-Winter
AA	Appropriate Assessment (HRA Stage 2)
AADF	Annual Average Daily Flow
AADT	Annual Average Daily Traffic
AAI	Areas of Archaeological Interest
ADS	Archaeological Data Service
AEZ	Archaeological Exclusion Zones
AIL	Abnormal Indivisible Loads
AIP	Aeronautical Information Publications
AIS	Air Insulated Switchgear
AISy	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ALRA	Abnormal Load Route Assessment
AMP	Access Management Plan
ANS	Air Navigation Services
AON	Apparently Occupied Nests
AOS	Apparently Occupied Sites
AoS	Area of Search
APR	Annual Progress Report
AQMA	Air Quality Management Areas
AQMP	Air Quality Management Plan
AQO	Air Quality Objectives
ASCOBANS	Agreement on Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas
ASFB	Association of Salmon Fisheries Boards
ATC	Air Traffic Control
AtoN	Aid to Navigation

Term	Definition
AVR	Accurate Visual Representative
AWI	Ancient Woodland Inventory
BAC	Background Assessment Concentration
BAP	Biodiversity Action Plan
BBPP	Breeding Bird Protection Plan
BCT	Bat Conservation Trust
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Survey
BIIS	British–Irish Ice Sheet
BoCC	Birds of Conservation Concern
BPM	Best Practicable Means
BRUV	Baited Remote Underwater Video
BSH	Broad-Scale Habitats
BST	British Summer Time
BTO	British Trust for Ornithology
C	Carbon
CAA	Civil Aviation Authority
cal. a BP	Calibrated Years Before Present
CAP	Civil Aviation Publication
CAR	Water Environment (Controlled Activities) (Scotland) Regulations 2011
CBA	Cost Benefit Analysis
CBRA	Cable Burial Risk Assessment
CCA	Coastal Character Area
CCCl	Clyde Cruising Club
CCC	Climate Change Committee
CCRA	Climate Change Risk Assessment
CCS	Carbon Capture and Storage
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science

Term	Definition
CEMP	Construction Environmental Management Plan
CES	Crown Estate Scotland
CFE	Controlled Flow Excavator
CFLO	Company Fisheries Liaison Officer
CHSA	Core Hydrological Study Area
CIEEM	Chartered Institute for Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CJBs	Cable Joint Bays
cm	Centimetre
CNS	Communication, Navigation and Surveillance
CO_2	Carbon Dioxide
CoFu	Coastal Futures
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
CoPA	Control of Pollution Act
COVID-19	Coronavirus Disease 2019
CPA	Coast Protection Act
CRM	Collision Risk Modelling
CRTN	Calculation of Road Traffic Noise
CSA	Core Study Area
cSSSI	candidate Site of Special Scientific Interest
CSV	Construction Support Vessels
CTA	Control Area
CTMP	Construction Traffic Management Plan
CTV	Crew Transfer Vessels
DAS	Digital Aerial Survey
dB	decibels
DBA	Desk-Based Assessment
DBT	Department for Business and Trade
DDV	Drop Down Video

Term	Definition
DE&S	Defence Equipment and Support
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy, Security and Net Zero
DGC	Defence Geographic Centre
DIO	Defence Infrastructure Organisation
DMRB	Design Manual for Roads and Bridges
DSFB	District Salmon Fisheries Board
DSIT	Department for Science, Innovation and Technology
DTM	Digital Terrain Model
DWR	Deep Water Route
EAC	Environmental Assessment Criteria
EC	European Commission
ECC	Export Cable Corridor
EcIA	Ecological Impact Assessment
ECU	Energy Consents Unit
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ELC	European Landscape Convention
EMF	Electromagnetic field
EMODnet	European Marine Observation and Data Network
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EPS	European Protected Species
ES	Environmental Statement
ESA	European Space Agency
ESAS	European Seabirds at Sea
ESCA	European Subsea Cables Association

Term	Definition
EU	European Union
EUNIS	European Nature Information System
FAME	Future of the Atlantic Marine Environment
FEPA	Food and Environmental Protection Act
FIR	Fishing Industry Representative
FLO	Fisheries Liaison Officer
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
ft	Foot
FTE	Full-time Equivalent
GAAC	General Aviation Awareness Council
GBNNSS	Great British Non-Native Species Secretariat
GBS	Gravity Base Structures
GCR	Geological Conservation Review
GDL	Gardens and Designed Landscapes
GEBCO	General Bathymetric Chart of the Oceans
GeMS	Geodatabase of Marine features adjacent to Scotland
GES	Good Environmental Status
GHG	Greenhouse Gas
GIS	Geographic Information System
GLVIA3	Guidelines for Landscape and Visual Impact Assessment 3
GPG	Good Practice Guide
GPP	Guidance for Pollution Prevention
GT	Gross Tonnes
GVA	Gross Value Added
GW	Gigawatts
GWDTE	Groundwater Dependent Terrestrial Ecosystems
Ha	Hectare
HabMoS	Habitat Map of Scotland
HDD	Horizontal Directional Drilling

Term	Definition
HDV	Heavy Duty Vehicles
HEPS	Historic Environment Policy for Scotland
HER	Historic Environment Record
HES	Historic Environment Scotland
HGV	Heavy Goods Vehicles
HIAL	Highlands and Islands Airports Ltd
HMCG	HM Coastguard
HMP	Habitat Management Plan
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitat Regulation Appraisal
Hs	Significant Wave Height
HVDC	High Voltage Direct Current
IAIP	Integrated Aeronautical Information Package
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 Seas
ICOMOS	International Council on Monuments and Sites
IEF	Important Ecological Receptor
IEMA	Institute of Environmental Management and Assessment
IFP	Instrument Flight Procedure
IHLS	International Herring Larvae Survey
IMO	International Maritime Organization
INNS	Invasive Non-Native Species
IOF	Important Ornithological Feature
IPC	infra planning committee
IROPI	Imperative Reasons of Overriding Public Interest
IUCN	International Union for the Conservation of Nature

Term	Definition
JNCC	Joint Nature Conservation Committee
ka BP	Thousand Calendar Years Before Present
kg	Kilogram
KIS-ORCA	Kingfisher Information Service – Offshore Renewable Cable Awareness
km	Kilometre
LAQM	Local Air Quality Management
LCT	Landscape Character Type
LDP	Local Development Plan
LGM	Last Glacial Maximum
LNR	Local Nature Reserve
LOA	Length Overall
LoS	Line of Sight
LPA	Local Planning Authority
LSR	Likely Significant Risk
LTA	Lewis Tidal Array
LVIA	Landscape, and Visual Impact Assessment
m	Metre
MAIB	Marine Accident Investigation Branch
MarLIN	Marine Information Network
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act
MCPC	Marine Pollution Contingency Plan
MCZ	Marine Conservation Zone
MD-LOT	Marine Directorate Licensing and Operations Team
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
Mil AIP	Military Aeronautical Information Publication
MLWS	Mean Low Water Springs
mm	Millimetre

Term	Definition
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MNNS	Marine Non-Native Species
MNWFA	Mallaig and Northwest Fishermen's Association
MoD	Ministry of Defence
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MS	Marine Scotland
MSFD	The Marine Strategy Framework Directive 2008/56/EC
MSL	Mean Sea Level
MS-LOT	Marine Scotland Licensing and Operations Team
MSW	Multi-Sea-Winter
MU	Management Units
MW	Megawatt
N	Nitrogen
NAO	North Atlantic Oscillation
NASA	National Aeronautics and Space Administration
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NCCT	National Coastal Character Types
NC-MPA	Nature Conservation Marine Protected Area
NE	Natural England
NEARC	Natural Environment and Rural Communities
NERL	National Air Traffic Services En Route Ltd
NHZ	Natural Heritage Zone
NLB	Northern Lighthouse Board
NM	Nautical Mile
NMP	National Marine Plan
NNR	National Nature Reserve
NO_2	Nitrogen Dioxide

Term	Definition
NPF	National Planning Framework
NPF4	National Planning Framework 4
NPS	National Policy Statement
NPS EN-3	National Policy Statement for Renewable Energy Infrastructure
NPS-EN1	National Policy Statement for Energy
NRA	Navigational Risk Assessment
NRW	National Resources Wales
NS	NatureScot
NSA	National Scenic Area
NSR	Noise Sensitive Receptors
NSTA	North Sea Transition Authority
NtF	Notice to Fishermen
NtM	Notices to Mariners
NTU	Nephelometric Turbidity Unit
NVC	National Vegetation Classification
O&M	Operations and Maintenance
OAA	Option Agreement Area
ODN	Ordnance Datum Newlyn
OEM	original equipment manufacturer
OFLO	Offshore Fisheries Liaison Officer
OHFZ	Outer Hebrides Fault Zone
OIA	Ornithological Impact Assessment
OREI	offshore renewable energy installations
OS	Ordnance Survey
OSP	Offshore Substation Platform
OSPAR	Oslo-Paris convention
OTMP	Operational Traffic Management Plan
OWF	Offshore Wind Farm
P	Phosphorous
PAC	Pre-Application Consultation

Term	Definition
PAD	Protocol of Archaeological Discoveries
PAH	Polycyclic Aromatic Hydrocarbons
PAM	Passive Acoustic Monitoring
PAN	Planning Advice Note
PAN 75	Planning Advice Note 75
PBRA	Preliminary Bat Roost Assessment
PCB	Polychlorinated Biphenyls
PDE	Project Design Envelope
PEMP	Project Environmental Monitoring Plan
PEXA	Practice and Exercise Area
PLGR	Pre-Lay Grapnel Runs
PLHRA	Peat Landslide Hazard Risk Assessment
PMF	Priority Marine Features
PMP	Peat Management Plan
PoC	point of connection
PoE	Port of Entry
POs	Plan Options
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidance
PRF	Potential Roost Feature
PRoW	Public Rights of Way
PTS	Permanent Threshold Shift
PVA	Population Viability Analysis
PWS	Private Water Supply
Ramsar	Wetland of International Importance
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathway
RCS	Radar Cross Section
REZ	Renewable Energy Zone
RIFG	Outer Hebrides Regional Inshore Fisheries Group

Term	Definition
RIGS	Regionally Important Geological/geomorphological Sites
RMS	Root Mean Square
RNLI	Royal National Lifeboat Institution
ROV	Remotely Operated Vehicle
ROVSVs	remote operated vehicle support vessels
RSG	Raptor Study Group
RSLR	Relative Sea Level Rise
RSPB	Royal Society for the Protection of Birds
Rx	Receiver
RYA	Royal Yachting Association
SAC	Special Areas of Conservation
SAR	Search and Rescue
SAS	Surfers Against Sewage
SBL	Scottish Biodiversity List
SCANS	Small Cetaceans in European Atlantic waters and the North Sea
ScARF	Scottish Archaeological Research Framework
SCC	Scottish Coastal Current
ScotWays	Scottish Rights of Way Access Society
sCRM	Stochastic Collision Risk Modeling
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SEIA	Socio-Economic Impact Assessments
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen’s Federation
SFO	Scottish Fishermen's Organisation
SGN	Supplementary Guidance Note
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMP	Seabird Monitoring Programme
SMR	Sites and Monument Record
SMU	Seal Management Unit

Term	Definition
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SOVs	Service Operated Vessels
SOWEC	Scottish Offshore Wind Energy Council
SPA	Special Protection Areas
SPFA	Scottish Pelagic Fishermen's Association Ltd
SPM	Suspended Particulate Matter
SPP	Scottish Planning Policy
S-P-R	Source-Pathway-Receptor
SRTM	Shuttle Radar Topography Mission
SSA	Scottish Seafood Association
SSC	Suspended Sediment Concentration
SSEN	Scottish and Southern Electricity Networks
SSP	Shared Socio-Economic Pathway
SSS	Sea Surface Salinity
SSSI	Sites of Special Scientific Interest
SST	Sea Surface Temperature
STAR	Seabird Tracking and Research
SUDSWP	Sustainable Urban Drainage Scottish Working Party
SWFPA	Scottish White Fish Producers Association Ltd
SWT	Scottish Wildlife Trust
TA	Transport Assessment
TCE	The Crown Estate
TEZ	Temporary Exclusion Zones
TJB	Transition Joint Bays
TOC	Total Organic Carbon
TTS	Temporary Threshold Shift
Tx	Transmitter

Term	Definition
UAV	Unmanned Aerial Vehicle
UK	United Kingdom
UK BAP	UK Biodiversity Action Plan
UKCP	UK Climate Projections
UKHO	United Kingdom Hydrographic Office
UN	United Nations
UN IPCC	United Nations Intergovernmental Panel for Climate Change
UN IPCC AR6	UN IPCC Sixth Assessment Report
UNCLOS	United Nations Convention of the Law of the Sea
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UXO	Unexploded Ordinance
VMS	Vessel Monitoring System
VP	Vantage Point
WADAG	Water Assessment and Drainage Guide
WBCSD	World Business Council for Sustainable Development
WCEMP	Water Construction Environmental Management Plans
WeBS	Wetland Bird Survey
WFD	Water Framework Directive
WIDSFB	Western Isles District Salmon Fisheries Board
WIFA	Western Isles Fishermen’s Association
WLA	Wild Land Area
WoS	West of Scotland Spawning Grounds
WRI	World Resource Institute
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator
WWII	World War Two
ZTV	Zone of Theoretical Visibility