MachairWind Offshore Windfarm

Windfarm Development Area Scoping Report

ScottishPower Renewables | MachairWind Offshore Windfarm

SEPTEMBER 2024

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EXECUTIVE SUMMARY

Introduction

MachairWind Limited ('the Applicant') is progressing with the development of the MachairWind Offshore Windfarm ('the Project') with a view to submitting a Section 36 and marine licence(s) application which, if granted, would be followed by pre-construction detailed surveys and studies, and thereafter construction. The Project's Windfarm Development Area (WDA) is located within the Option Agreement Area that it successfully secured from Crown Estate Scotland in January 2022 through the ScotWind leasing process.

Consenting Strategy

The Project encompasses the offshore and onshore infrastructure that is required to transmit the electricity it generates to an onshore grid connection point which is expected to be located in South Ayrshire.

For the purposes of securing consent for the Project, separate consents will be sought for three Development Areas, as follows:

- The WDA;
- The Offshore Transmission Development Area (OfTDA); and
- The Onshore Transmission Development Area (OnTDA).

The decision to divide the Project into three separate Development Areas was principally driven by the uncertainty that relates to the Project's grid connection location, and design of the associated High Voltage Direct Current (HVDC) transmission infrastructure. Due to the outcomes that have arisen from the National Grid Electricity System Operator Holistic Network Design (HND) process, the exact grid connection location for the Project has yet to be confirmed. The current expectation is that the Project will connect to a new HVDC switching station to be built by the Transmission System Operator in South Ayrshire. Due to the novel HVDC technology that will be used to transmit power generated from the Project to the grid network, the configuration and design of this infrastructure is in the early stages of development and will require refinement informed by discussions with the relevant Transmission System Operators.

Consenting of the WDA will commence first. Once the location for the new HVDC switching station in South Ayrshire has been identified, the Applicant will progress separate consent applications for the OfTDA and OnTDA. Each consent application and associated assessments will take account of the wider Project.

This Environmental Impact Assessment (EIA) Scoping Report (hereafter referred to as this 'Scoping Report'), relates specifically to the WDA and accompanies a request for a formal Scoping Opinion from the Marine Directorate - Licensing Operations Team (MD-LOT) which administers applications on behalf of the Scottish Ministers. Scoping refers to an initial stage of the EIA process whereby the scope of the EIA and associated EIA Report (EIAR) are agreed.

Although consent applications for both the OfTDA and OnTDA will follow after submission of the WDA application, these Development Areas will be considered within the WDA EIA, commensurate with the level of detail that is available at the time of carrying out that assessment. Furthermore, the respective scoping and EIARs for the OfTDA and OnTDA will include the likely residual effects assessment outcomes of the WDA EIA.

Windfarm Development Area Overview

The WDA is located off the west coast of Scotland, to the northwest of Islay and west of Colonsay and will comprise the following infrastructure components:

- Up to 147 Wind Turbine Generators (WTGs) on fixed foundations;
- Inter-Array Cables (IACs);
- If required, scour protection for foundation structures supporting the WTGs; and
- If required, external cable protection for IACs.

Scoping

The Applicant will seek the following consents, licences, and permissions for the WDA:

- A Section 36 consent under the Electricity Act 1989; and
- A Marine Licence(s) under the under the Marine (Scotland) Act (2010) (applicable to the Scottish Marine Area between 0 and 12 nautical miles (nm) from shore).

Following receipt of a Scoping Opinion from MD-LOT, an EIAR will be prepared and submitted to support the required applications for offshore consents, licences, and permissions for the WDA. These will fulfil the requirements of the following regulations:

- In respect of a Section 36 consent application: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and
- In respect of a marine licence(s) application: The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

This Scoping Report includes a summary of the existing physical, biological, and human environment, based on known and accessible data sources, as well as an overview of any site-specific surveys undertaken to date. The potential scope of impacts associated with the construction, operation and maintenance, and decommissioning phases of the WDA, and the proposed methodology for assessing the significance of effect for the technical topics, are also presented. The following technical topics have been considered:

- **Offshore Physical Environment:**
  - Marine Physical Environment; and
  - Offshore Air Quality.
- **Offshore Biological Environment**
  - Benthic Ecology;
  - Fish (including Basking Shark) and Shellfish Ecology;
  - Marine Mammals; and
  - Offshore Ornithology.
- **Offshore Human Environment:**
  - Commercial Fisheries;
  - Shipping and Navigation;
  - Offshore Archaeology and Cultural Heritage;
  - Military and Civil Aviation;
  - Seascape, Landscape and Visual Impact;
  - Infrastructure and Other Marine Users;
  - Socio-Economics;
  - Climate Change; and
  - Major Accidents and Disasters.

The purpose of this Scoping Report is to support a request for a formal Scoping Opinion from MD-LOT, which will consult with a number of consultees and collate their views within the Scoping Opinion response. Each topic-specific section contains a list of questions for consultees to consider, in addition to the key impacts identified, the data sources used, and the EIA methodology proposed. Responses should be directed to:

marinescotland@gov.scot

OR

Marine Scotland
Mailpoint 11
1B South
Victoria Quay
Edinburgh
EH6 6QQ

Throughout the Project's development phase, information will be communicated via the Project website. General information about the Project and Project updates are provided via the Project website which can be accessed at the following link: MachairWind - ScottishPower Renewables. This Scoping Report is available to view and download online via the Document Library, which can be accessed at the following link: Document Library - ScottishPower Renewables.

Printed copies of the Scoping Report will be available to read at the community facilities listed below:

- Colonsay Customer Service Point, Scalasaig, Isle of Colonsay, PA61 7YW, Argyll, Scotland;
- Jura Customer Service Point, Jura, Isle of Jura, PA60 7XG, Argyll, Scotland;
- Islay Customer Service Point, Jamieson Street, Bowmore, Isle of Islay, PA43 7HP, Argyll, Scotland;
- South Islay Development, The Ramsay Hall, Port Ellen, Isle of Islay, PA42 7BY, Argyll, Scotland;
- Mull Customer Service Point, Breadalbane Street, Tobermory, Isle of Mull, PA75 6PX, Argyll, Scotland;
- Mull & Iona Community Trust, An Roth Community Enterprise Centre, Craignure, Isle of Mull, PA65 6AY, Argyll, Scotland; and
- Iona Village Hall, Isle of Iona, PA76 6SJ, Argyll, Scotland.

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GLOSSARY OF ACRONYMS

Term	Definition
ABRA	Argyll and Bute Renewables Alliance
AD	Air Defence
AIPs	Aeronautical Information Publications
AIS	Automatic Identification System
AL	Action Levels
ALARP	As Low As Reasonably Practicable
amsl	Above Mean Sea Level
ATC	Air Traffic Control
ATS	Air Traffic Service
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Survey
BSI	British Standards Institution
BWM	The International Convention for the Control and Management of Ships' Ballast Water and Sediments
CAA	Civil Aviation Authority
CalMac	Caledonian MacBrayne
CAP	Civil Aviation Publication
CBRA	Cable Burial Risk Assessment
CCDC	Colonsay Community Development Company
CCR	Climate Change Resilience
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CES	Crown Estate Scotland
CFA	Clyde Fishermen's Association
CGNS	Celtic Great North Sea
CIEEM	Chartered Institute for Ecology and Environmental Management
CIFA	Communities Inshore Fisheries Alliance
CRM	Collision Risk Modelling
DAERA	Department of Agriculture, Environment and Rural Affairs
DAS	Digital Aerial Survey
DDV	Drop-Down Video

Term	Definition
DESNZ	Department for Energy Security and Net Zero
ECC	Export Cable Corridor
eDNA	Environmental DNA
EEA	European Economic Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Electromagnetic Fields
EMODnet	European Marine Observation and Data Network
EPS	European Protected Species
ERCoP	Emergency Response and Cooperation Plan
ETG	Expert Topic Group
EU	European Union
EUNIS	European Nature Information System
FEPA	Food and Environmental Protection Act 1985
FIR	Flight Information Region
FL	Flight Level
FLO	Fisheries Liaison Officer
FMS	Fisheries Management Scotland
FSA	Formal Safety Assessment
GBS	Gravity Base Structure
GHG	Greenhouse Gas
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GVA	Gross Value Added
GW	Gigawatts
HES	Historic Environment Scotland
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitats Regulations Appraisal
HVDC	High Voltage Direct Current
HWDT	Hebridean Whale and Dolphin Trust
IAC	Inter-Array Cable
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAMMWG	Inter-Agency Marine Mammal Working Group
ICES	The International Council for the Exploration of the Sea
IEMA	Institute of Environmental Management and Assessment

Term	Definition
IET	Islay Energy Trust
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
INTOG	Innovation and Targeted Oil and Gas
IPCC	Intergovernmental Panel on Climate Change
IPR	Iterative Plan Review
IUCN	International Union for Conservation of Nature
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee
kJ	Kilojoules
km	Kilometres
LAT	Lowest Astronomical Tide
LCT	Landscape Character Types
LDP	Local Development Plan
LLA	Local Landscape Area
LMP	Lighting and Marking Plan
LSE	Likely Significant Effects
m	Metres
MAIB	Marine Accident Investigation Branch
MarESA	The Marine Evidence-Based Sensitivity Assessments
MarLIN	Marine Information Network
MARPOL	The International Convention for the Prevention of Pollution from Ships
MCA	Maritime Coastguard Agency
MCCIP	Marine Climate Change Impacts Partnership
MD	Marine Directorate
MD-LOT	Marine Directorate Licensing and Operations Team
MD-SEDD	Marine Directorate Science, Evidence, Digital and Data
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MICT	Mull and Iona Community Trust
MIFA	Mull and Iona Fishermen's Association
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation

Term	Definition
MoD	Ministry of Defence
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MU	Management Unit
MW	Megawatt
NATS	National Air Traffic Services
NCMPA	Nature Conservation Marine Protected Areas
NLB	Northern Lighthouse Board
nm	Nautical Miles
NMFS	National Marine Fisheries Service
NMP	National Marine Plan
NMPi	National Marine Plan Interactive
NO_x	Nitrogen Oxides
NPF4	National Planning Framework 4
NRA	Navigational Risk Assessment
NRS	National Records of Scotland
NSA	National Scenic Area
O&M	Operation and Maintenance
OAA	Option Agreement Area
OfTDA	Offshore Transmission Development Area
ONS	Office for National Statistics
OnTDA	Onshore Transmission Development Area
OPEMP	Outline Project Environmental Management Plan
ORCA	Organisation Cetacea
OREI	Offshore Renewable Energy Installations
OSP	Offshore Substation Platform
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OW	Oceanic Waters
OWF	Offshore Windfarm
PAC	Pre-Application Consultation
PAM	Passive Acoustic Monitoring
PDE	Project Design Envelope
PEMP	Project Environmental Management Plan
PEXA	Practice and Exercise Areas

Term	Definition
PMF	Priority Marine Features
PO	Plan Options
POA	Plan Option Area
PSRs	Primary Surveillance Radars
PTS	Permanent Threshold Shift
PVA	Population Viability Analysis
QSR	Quality Status Reports
REZ	Renewable Energy Zone
RIAA	Report to Inform Appropriate Assessment
RLoS	Radar Line of Sight
RNLI	Royal National Lifeboat Institution
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Areas of Conservation
SAR	Search and Rescue
SBL	Scottish Biodiversity List
SCDS	Supply Chain Development Statement
SCOS	Special Committee on Seals
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SLVIA	Seascape Landscape and Visual Impact Assessment
SMP	Sectoral Marine Plan
SNH	Scottish National Heritage
SOWEC	Scottish Offshore Wind Energy Council
SPA	Special Protection Area
SPFA	Scottish Pelagic Fishermen's Association
SPR	ScottishPower Renewables
SQs	Special Qualities
SSCs	Suspended Sediment Concentrations
SSR	Secondary Surveillance Radar
SSSI	Site of Special Scientific Interest
STEM	Science, Technology, Engineering, Maths
SWFPA	Scottish White Fish Producers Association

Term	Definition
TTS	Temporary Threshold Shift
UK	United Kingdom
UKCP	United Kingdom Climate Projections
UKHO	United Kingdom Hydrographic Office
UNFCCC	United Nations Framework Convention on Climate Change
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
VMS	Vessel Monitoring System
WDA	Windfarm Development Area
WDC	Whale and Dolphin Conservation
WFD	Water Framework Directive
WLA	Wild Land Areas
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

GLOSSARY OF TERMS

Term	Definition
Allision	The act of striking or collision of a moving vessel against a stationary object.
The Applicant	The legal entity submitting consent applications for the MachairWind Offshore Windfarm, namely MachairWind Limited.
Bathymetry	Topography of the seabed.
Bedload	Sediment particles that travel near or on the seabed.
Breeding season	Furness (2015) defines breeding season as the period from modal return to the colony through to modal departure from the colony at the end of breeding, for birds at UK colonies.
Cable protection	Protective measure to minimise the effects of scour and hazards along the inter-array cables and/or offshore substation platform link cables (e.g. cable exposure or snagging), as well as for protecting inter-array cables and/or offshore substation platform link cables at infrastructure crossing points.
Collision	The act or process of two moving objects colliding.
Controlled airspace	Defined airspace within which pilots must follow Air Traffic Control instructions implicitly. In the UK, Classes A, C, D, and E are areas of controlled airspace.
Creel	Creel is typically a Scottish term for a pot or trap deployed by an inshore vessel. These are generally rigid structures which fish or shellfish are guided or enticed into through funnels that make entry easy but escape difficult. There are many designs which are created to suit the behaviour of its target species.
Climate Variable	Climate variable is defined as a measurable, monitorable aspect of the weather or climate such as temperature or wind speed.
Climate Hazard	Climate Hazard is defined as a weather or climate-related event or trend in climate variable, such as storms or heatwaves, which has potential to do harm to receptors.
Climate Change Impact	Climate Change Impact is defined as an impact from a climate hazard, such as asset damage or failure, which affects the ability of the receptor to maintain its function or purpose.
Demersal	Living on or near the seabed.
Development Area	Application boundary for consenting purposes which, for the Project, consists of a Windfarm Development Area, Offshore Transmission Development Area, and Onshore Transmission Development Area.
Environmental DNA (eDNA)	Environmental DNA that is collected from the environment, such as in seawater, rather than directly from an individual organism.
Environmental Impact Assessment (EIA) Regulations	A collective term referring to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Embedded mitigation measure	Mitigation measures, including industry good practice measures, to avoid or reduce environmental effects that are directly incorporated into the design for the MachairWind Windfarm Development Area.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed development over and above the existing circumstances (or ‘baseline’).

Term	Definition
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. These include candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and are defined in the Habitats Regulations.
Fish Stock	Any natural population of fish made up of an isolated and self-perpetuating group of the same species.
Fishing ground	An area of water or seabed targeted by fishing activity.
Fleet	A physical group of vessels sharing similar characteristics (e.g., nationality).
Gear type	The method/equipment used for fishing.
Greenhouse gas	A greenhouse gas is a gas that traps heat in the atmosphere and causes the greenhouse effect, also known by the collective shorthand “carbon”.
Gross Value Added (GVA)	Measure of the value of goods and services produced in an area, industry, or sector of an economy.
Habitats Regulations	A collective term used to describe the Conservation of Habitats and Species Regulations 2017 and The Conservation (Natural Habitats, &c.) Regulations 1994.
Highest astronomical tide	The highest level that can be expected to occur under average meteorological conditions and under any combination of astronomical conditions.
International Council for the Exploration of the Seas (ICES) statistical rectangles	The International Council for the Exploration of the Seas (ICES) standardise the division of sea areas to enable statistical analysis of data. Each ICES statistical rectangle is ‘30 min latitude by 1 degree longitude’ in size (approximately 30 x 30 nautical miles). A number of rectangles are amalgamated to create ICES statistical areas.
Inter-array cables (IACs)	Armoured cable containing electrical and fibre optic cores which link the wind turbine generators to each other and to the offshore substation platform(s).
Landfall	The area from Mean Low Water Springs to a transition bay(s), where the offshore export cable(s) come ashore.
Landings	Quantitative description of the amount of fish returned to port for sale, in terms of value or weight.
Lowest Astronomical Tide (LAT)	The lowest level that can be expected to occur under average meteorological conditions and under any combination of astronomical conditions.
MachairWind Offshore Windfarm	An offshore windfarm capable of exporting around 2 GW of renewable energy to the National Electricity Transmission System. MachairWind Offshore Windfarm comprises three Development Areas. The Windfarm Development Area is located on the west coast of Scotland to the northwest of Islay and west of Colonsay and the working assumption is that the MachairWind Offshore Windfarm will connect to a location within South Ayrshire. Work is ongoing to define the Offshore Transmission Development Area and Onshore Transmission Development Area. Separate consent and licence applications will be submitted for each Development Area.
Management Units (MUs)	The MUs provide an indication of the spatial scales at which impacts of plans and projects alone, cumulatively and in-combination, need to be assessed for the marine mammal species in UK waters, with consistency across the UK.
Mean High Water Springs (MHWS)	The average, over a year, of the heights of two successive high waters during those periods of 24 hours (once every fortnight) when the range of the tide is greatest.
Mean Low Water Springs (MLWS)	The average, over a year, of the heights of two successive low waters during those periods of 24 hours (once every fortnight) when the range of the tide is greatest.

Term	Definition
Mean sea level	The average level of the sea taking account of all tidal effects but excluding surge events.
National Electricity Transmission System	The high-voltage electricity power transmission network serving Great Britain which receives electricity from generators (such as offshore windfarms) and transmits that electricity to anywhere on the National Electricity Transmission System to satisfy demand.
Non-breeding season	Furness (2015) defines non-breeding season as the remaining part of the year that is not a part of breeding season.
Offshore export cable	Armoured cable containing electrical and fibre optic cores between the offshore substation platform(s) and landfall.
Offshore export cable corridor	The boundary within which the offshore export cable route will be located. Separate consent and licence applications will be submitted for the Offshore Transmission Development Area.
Offshore Substation Platform (OSP)	An offshore platform with a fixed foundation located within the Offshore Transmission Development Area which houses electrical equipment such as transformers, switchgear, protection and control systems, and enables the windfarm's renewable electricity to be collected via inter-array cables and exported to the National Electricity Transmission System via offshore export cables.
Offshore Substation Platform (OSP) link cables	Electrical cables which link OSPs (if more than one OSP is required). These cables will include fibre optic cables.
Offshore Transmission Development Area (OfTDA)	The application boundary which extends seaward of Mean High Water Springs and within which the following will be consented (infrastructure includes but is not limited to): offshore export cable(s), OSP(s), OSP link cables (if required) and external cable protection. The OfTDA is subject to a Marine Licence(s) application under the Marine (Scotland) Act 2010.
Onshore Transmission Development Area (OnTDA)	The planning application boundary extending landward of Mean Low Water Springs and within which the following will be consented (infrastructure includes but is not limited to): landfall(s), onshore export cables, temporary construction compounds, and environmental mitigation areas. The OnTDA will be subject to a planning application under the Town and Country Planning (Scotland) Act 1997.
Operational life	The operational life is the expected length of time from final commissioning of the Windfarm Development Area until the cessation of commercial operations.
Option Agreement Area (OAA)	The seabed area awarded to ScottishPower Renewables in January 2022 through the Scotwind leasing round. Project-specific surveys have been based on either the OAA or Windfarm Development Area (WDA) boundary, with an appropriate buffer implemented in each case.
OSPAR	OSPAR started in 1972 with the Oslo Convention against dumping and was broadened to cover land-based sources of marine pollution and the offshore industry by the Paris Convention of 1974. These two conventions were unified, updated and extended by the 1992 OSPAR Convention. OSPAR is so named because of the original Oslo and Paris Conventions ("OS" for Oslo and "PAR" for Paris).
Otter trawl	A net with large rectangular boards (otter boards) which are used to keep the mouth of the trawl net open. Otter boards are made of timber or steel and are positioned in such a way that the hydrodynamic forces, acting on them when the net is towed along the seabed, pushes them outwards and prevents the mouth of the net from closing.
Pelagic	Of or relating to the open sea.
Pelagic trawl	A net used to target fish species in the mid water column.

Term	Definition
Permanent Threshold Shift (PTS)	A permanent total or partial loss of hearing sensitivity caused by acoustic trauma. PTS results in irreversible damage to the sensory hair cells of the ear, and thus a permanent reduction of hearing acuity.
Plan Option Area (POA)	A spatial plan area proposed through the Sectoral Marine Plan for offshore wind energy. As part of the ScotWind leasing round, offshore wind developers submitted bids for POAs which, following a successful bid, become OAAs.
Pre-construction works	Pre-construction works are activities undertaken prior to formal commencement of construction. Examples include survey works such as geotechnical and geophysical surveys and seabed preparation activities.
Rochdale Envelope	An approach to environmental assessment which aims to take account of the need for flexibility in the future evolution of the detailed project proposal. The approach is named after two court rulings concerning outline planning applications for a proposed business park in Rochdale.
Safety zones	An area of water around or adjacent to a wind turbine generator and substructure which is to be constructed, extended, operated or decommissioned, from which certain or all classes of vessels are excluded and within which activities can be regulated for the purpose of securing safety of the wind turbine generator, substructure or vessels in that vicinity, and individuals on both the wind turbine generator, substructure or vessel, in line with Section 95 of the Energy Act 2004.
Scottish Marine Area	The area of Scotland's territorial sea limit (up to 12 nautical miles from baseline) as defined in the Marine (Scotland) Act 2010.
ScotWind	A Crown Estate Scotland seabed leasing round for offshore wind projects in which the process enabled developers to apply for seabed rights to plan and build windfarms in Scottish waters.
Scour protection	Protective measures to avoid sediment being eroded away from the base of the wind turbine generator foundations as a result of the flow of water.
Swept Area Ratio	Swept Area Ratio (derived from Vessel Monitoring System data) indicates the number of times in an annual period that a fishing gear makes contact with (or sweeps) the seabed surface. Surface Swept Area Ratio provides a proxy for fishing intensity.
The Lighthouse	The Dubh Artach lighthouse.
The Project	MachairWind Offshore Windfarm.
Vessel Monitoring System (VMS)	A system used in commercial fishing to allow environmental and fisheries regulatory organisations to monitor, minimally, the position, time at a position, and course and speed of fishing vessels.
WDA infrastructure	The offshore generation infrastructure located within the WDA including but not limited to: WTGs, fixed foundations, IACs, and external cable and scour protection.
Wind Turbine Generator (WTG)	A wind turbine generator which converts wind energy into electrical energy. Each wind turbine generator is a complex system composed of a high number of components. Typically, the main components include the rotor assembly (composed of three blades and a hub); the nacelle (containing a generator, shaft and gearbox, power electronic converter and transformer); and the tower (containing lifting equipment and the switchgear).
Windfarm Development Area (WDA)	The application boundary within which consent will be sought for the WDA Infrastructure. The WDA is subject to a Section 36 consent and Marine Licence(s) application which is being applied for separately from the OfTDA and OnTDA.

Introductory Chapters

- Chapter 1: Introduction
- Chapter 2: Policy and Legislative Context
- Chapter 3: Project Description, Site Selection and Alternatives
- Chapter 4: Approach to Scoping and EIA
- Chapter 5: Consultation and Stakeholder Engagement

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1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

1. This document is the Environmental Impact Assessment (EIA) Scoping Report for the MachairWind Offshore Windfarm (OWF) ('the Project') Windfarm Development Area (WDA). Separate Scoping Reports will be produced for the transmission infrastructure at a later date however, each consenting application and associated assessments will take account of the wider Project.

2. This document is herein referred to as the 'Scoping Report' and its purpose is to request a formal EIA Scoping Opinion from the Marine Directorate - Licensing Operations Team (MD-LOT). The Scoping Opinion will inform the content and structure of the WDA EIA Report (EIAR) that will be produced to accompany the associated Section 36 consent and Marine Licence(s) applications.

3. This Scoping Report outlines the receptors that will be considered in the EIA, alongside the data gathered and assessment methodologies that are proposed to characterise the existing environment; assess likely significant effects (LSE); and develop appropriate mitigation measures where necessary and appropriate. It is also acknowledged that the scope of the EIA may change as more information is collected and analysed.

4. Potential environmental impacts and LSE are also considered in this Scoping Report. Potential impacts have been scoped in or out, based on the understanding of the existing baseline environment within the WDA as well as the proposed Project description and indicative parameters (as set out in **Chapter 3 Project Description, Site Selection and Alternatives**). Lessons learned from previous scoping opinions for Scottish OWFs and those from the consenting, construction, and Operation and Maintenance of OWFs throughout the United Kingdom (UK) have also been considered.

5. This Scoping Report provides the opportunity for stakeholders to review the preliminary information presented and the key topics to be assessed in the corresponding EIAR. Feedback from stakeholders is being requested through the scoping process. The Applicant will take account of the comments received from MD-LOT and other stakeholders in determining the final scope of the EIA and the EIAR.

6. This Scoping Report has been prepared in accordance with the following EIA Regulations:

   - The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and
   - The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

7. Further information on the EIA Regulations is provided in **Chapter 2 Policy and Legislative Context** of this Scoping Report.

1.2 PROJECT BACKGROUND

8. In April 2022, as part of the ScotWind leasing round (see **Section 2.3**), MachairWind Limited ('the Applicant') entered into an Option to Lease Agreement with Crown Estate Scotland (CES) for the entire W1 Plan Option Area (POA). W1 is one of 15 POAs that the Scottish Government identified in its Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020) following comprehensive review and consultation. W1, hereinafter referred to as the Option Agreement Area (OAA), is located off the west coast of Scotland, northwest of Islay and west of Colonsay.

9. In order to identify the developable area within the OAA, the Applicant undertook a preliminary geophysical and environmental site investigation survey campaign in 2023. Subsequent analysis of this and other datasets enabled the identification of a refined and optimised development area, referred to in this Scoping Report as the WDA. The OAA and WDA are presented in **Figure 1.1**. Further details of the process undertaken to define the WDA are provided in **Section 3.6**.

10. The Project's grid connection location has yet to be confirmed at the time of writing. These connection arrangements were included as part of the Holistic Network Design review undertaken by the National Grid Electricity System Operator (ESO). The results of the Holistic Network Design process were first published in 2022 (National Grid ESO, 2022) and subsequently updated in the ESO's Beyond 2030 (National Grid ESO, 2024). The design that is currently proposed features a High Voltage Direct Current (HVDC) connection from the Project to a switching station with a T-point in South Ayrshire, which further connects separate cables to north Ayrshire and south to England or Wales.

11. When operational, the WDA is anticipated to have a capacity of around 2 Gigawatts (GW) generated by up to 147 Wind Turbine Generators (WTG). This will have the potential to generate renewable electricity for up to two million UK homes, contributing to the UK's transition to Net Zero and the UK's energy security in line with Government policy.

Windfarm Development Area

Option Agreement Area

Dubh Artach Lighthouse

N

0 5 10 20 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	06/08/2024	JH	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000034		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 1.1: Option Agreement Area and Windfarm Development Area

NOT TO BE USED FOR NAVIGATION

Royal HaskoningDHV
Enhancing Society Together

ScottishPower Renewables

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1.3 CONSENTS STRATEGY

12. For consenting purposes, the Project has been split between three Development Areas as described in **Table 1.1** and illustrated in **Figure 1.2**.[1]

Table 1.1 Key infrastructure within each Development Area

Development Area	Location	Key Infrastructure
Windfarm Development Area	Within the Option Agreement Area.	• Wind Turbine Generators, associated fixed foundations and scour protection; and • Inter-Array Cables and associated cable protection.
Offshore Transmission Development Area	Offshore Transmission Development Area (OfTDA): area yet to be defined, that will extend from the Offshore Substation Platforms (OSPs) to Mean High Water Springs.	• OSPs; • OSP link cables (if required) including any associated cable protection; and • Offshore export cables to landfall including any associated cable protection.
Onshore Transmission Development Area	Onshore Transmission Development Area (OnTDA): area yet to be defined that will extend from mean low water springs up to, but not including, the high voltage direct current switching station which the transmission operator will be responsible for consenting along with the onward connection to the National Electricity Transmission System.	• Landfall(s); • Onshore export cable(s) including associated onshore infrastructure; and • Temporary construction compound(s).

[1] Note that **Figure 1.2** is for illustrative purposes only and the infrastructure is not to scale.

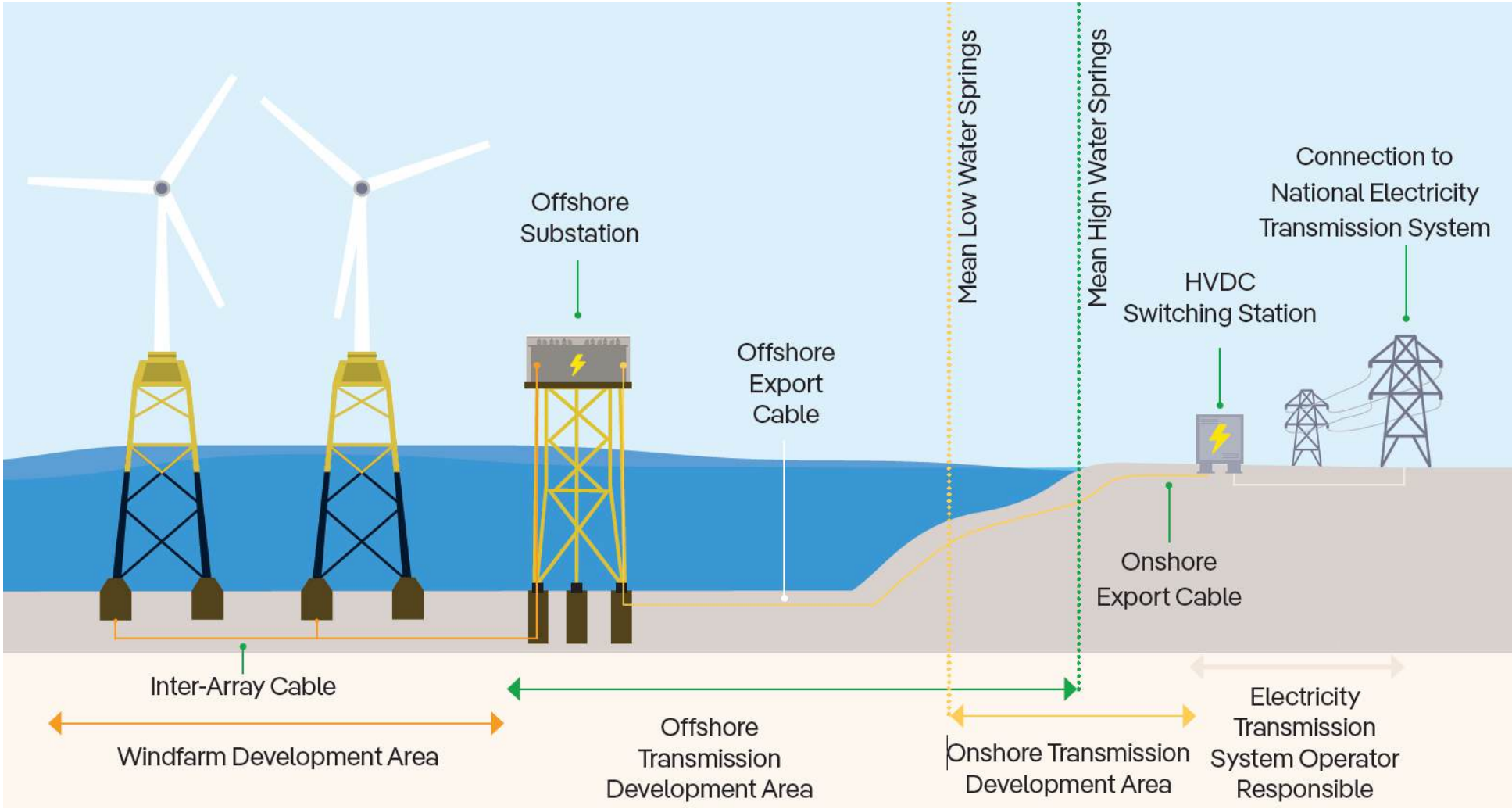

Figure 1.2 Overview of the MachairWind Development Areas

13. The entirety of the WDA is located within the Scottish Marine Area / territorial waters, which extends to 12 nm from shore. All consents and licences associated with the WDA will therefore be submitted to the Scottish Ministers through MD-LOT, which is responsible for administering applications on behalf of the Scottish Ministers.

14. The following consents and licences will be required to authorise the proposed works and licensable activities within the WDA:

- Section 36 consent under the Electricity Act 1989; and
- A Marine Licence(s) under the Marine (Scotland) Act 2010.

15. Separate consents and licences will be sought for the Offshore Transmission Development Area (OfTDA) and Onshore Transmission Development Area (OnTDA) and each will be subject to its own individual EIA process in accordance with the relevant EIA Regulations, as presented in **Table 1.2**. The Applicant will submit a separate Marine Licence application for the OfTDA once a location for the new HVDC switching station in South Ayrshire has been identified, and once the configuration and design of the Project's HVDC transmission infrastructure has been further developed and refined with input from the relevant Transmission System Operators. Similarly, a separate planning application under the Town and Country Planning (Scotland) Act 1997 will be submitted once the arrangements for the onshore infrastructure and connection to the National Electricity Transmission System have been defined.

16. The consent and licence requirements for each Development Area are summarised in **Table 1.2**.

Table 1.2 Consent and licence applications required for each Development Area

Development Area	Consent / Licence Required	Supporting Environmental Impact Assessment (EIA)
Windfarm Development Area	Section 36 consent under the Electricity Act 1989; and Marine Licence(s) under the Marine (Scotland) Act 2010.	Windfarm Development Area (WDA) EIA Report.
Offshore Transmission Development Area	Marine Licence(s) under the Marine (Scotland) Act 2010.	Offshore Transmission Development Area (OfTDA) EIA Report.
Onshore Transmission Development Area	Planning application under the Town and Country Planning (Scotland) Act 1997.	Onshore Transmission Development Area (OnTDA) EIA.

17. The proposed OfTDA and OnTDA will be considered within the WDA EIAR (commensurate with the level of detail that is available at the time of carrying out that assessment). This approach will ensure a whole Project appraisal is undertaken and further details are presented in **Chapter 4 Approach to Scoping and EIA**.

18. Further information on the consents and licences required for the WDA is provided in **Chapter 2 Policy and Legislative Context** of this Scoping Report.

1.4 THE APPLICANT

19. The Applicant is a wholly owned subsidiary of ScottishPower Renewables (SPR), a leading renewables developer and operator of both offshore and onshore wind assets throughout the UK. SPR is part of the Iberdrola Group, one of the world's largest utilities and leading wind energy producer. SPR is responsible for progressing Iberdrola's renewable energy projects in the UK, including managing the development, construction, and operation of OWFs.

20. Iberdrola Group is a global energy company and world leader in wind energy production, with a renewable power installation capacity of over 57 GW, of which 37% are onshore wind developments and 3% are offshore wind developments.

21. SPR has been actively developing renewable projects in the UK for over 30 years and currently has over 40 operational windfarm sites generating more than 3 GW of renewable energy.

22. SPR's offshore wind portfolio includes the 714 Megawatt (MW) East Anglia ONE project which supported approximately 3,500 jobs at the peak of construction and now supports 100 long term skilled jobs in the operational phase. SPR has created a pathway of development in the East Anglia region with a pipeline of three further projects, consisting of East Anglia ONE North, East Anglia TWO and East Anglia THREE, known collectively as the East Anglia Hub.

23. SPR has a large onshore wind portfolio in the UK comprising of 39 projects in operation, 26 projects in development, three consented, and five under construction. Five of these operational projects are located within Argyll and Bute, namely Clachan Flats, Cruach Mhor and Beinn an Tuirc 1, 2 and 3.

24. MachairWind Offshore Windfarm builds on SPR's long-standing presence and positive track record as a responsible onshore wind developer and good neighbour across Argyll and Bute where it has been working with, and investing in, people, communities, and businesses for more than 20 years to realise the benefits of renewable energy.

1.5 CONSULTANT TEAM

25. Royal HaskoningDHV has been appointed by the Applicant as the Lead EIA and Habitats Regulations Appraisal (HRA) consultant for the whole Project and will be providing EIA, HRA, and consenting services to support the Project as it progresses through the development phase. The Royal HaskoningDHV team is supported in production of the Scoping Reports, HRA Screening Reports, EIARs and Reports to Inform Appropriate Assessment by several technical specialists as outlined in **Figure 1.3**.

26. Royal HaskoningDHV is registered with the Institute of Environmental Management and Assessment's (IEMA) EIA Quality Mark scheme. The scheme allows companies that lead the co-ordination of EIAs to make a commitment to excellence in their EIA activities and have this commitment independently reviewed to ensure quality. Further, Royal HaskoningDHV has been significantly involved in the consenting of over 18 GW of offshore wind projects across the UK.

27. In addition to the Lead EIA team, the Applicant has engaged Brown and May Marine as the Fisheries Liaison Officer (FLO) to liaise with commercial fishery stakeholders.

Figure 1.3 Consultant team organogram

1.6 SCOPING REPORT STRUCTURE

28. **Table 1.3** outlines this Scoping Report's structure and the technical specialists responsible for each chapter or supporting appendix.

29. The Project's approach to circularity and waste management will be considered as part of the ongoing development process and will be addressed within the Project Description chapter of the EIAR or technical assessments and implementation plans, whichever is deemed most appropriate.

Table 1.3 Scoping Report structure

Scoping Report Chapter	Responsible Author
Introductory Chapters	
Chapter 1 Introduction	Royal HaskoningDHV
Chapter 2 Policy and Legislative Context	Royal HaskoningDHV
Chapter 3 Project Description, Site Selection and Alternatives	The Applicant and Royal HaskoningDHV
Chapter 4 Approach to Scoping and Environmental Impact Assessment	Royal HaskoningDHV
Chapter 5 Consultation and Stakeholder Engagement	The Applicant & Royal HaskoningDHV
Physical Environment	
Chapter 6 Marine Physical Environment	Royal HaskoningDHV
Chapter 7 Offshore Air Quality	Royal HaskoningDHV
Biological Environment	
Chapter 8 Benthic Ecology	Royal HaskoningDHV
Chapter 9 Fish (Including Basking Shark) and Shellfish Ecology	Royal HaskoningDHV
Chapter 10 Marine Mammals	Royal HaskoningDHV
Chapter 11 Offshore Ornithology	MacArthur Green
Human Environment	
Chapter 12 Commercial Fisheries	Nima Consultants
Chapter 13 Shipping and Navigation	Anatec
Chapter 14 Offshore Archaeology and Cultural Heritage	Royal HaskoningDHV
Chapter 15 Military and Civil Aviation	Cyrrus
Chapter 16 Seascape, Landscape and Visual Impacts	Land Use Consultants
Chapter 17 Infrastructure and Other Marine Users	Royal HaskoningDHV
Chapter 18 Socio-economics	Biggar Economics
Chapter 19 Climate Change	Royal HaskoningDHV
Chapter 20 Major Accidents and Disasters	Royal HaskoningDHV
Summary	
Chapter 21 Summary of Scoping Report	Royal HaskoningDHV
Appendices	
Appendix A Mitigation Register	Royal HaskoningDHV

Scoping Report Chapter	Responsible Author
Appendix B Third-Party Benthic Subtidal Survey Interpretative Report	Briggs Marine
Appendix C Contaminants Survey Report	Fugro
Appendix D MachairWind 2023 Benthic Characterisation Report	Fugro
Appendix E Environmental DNA Survey Interpretative Report	Fugro
Appendix F Marine Mammals and Turtles Baseline	Royal HaskoningDHV
Appendix G Marine Mammals and Turtles Approach to Assessment	Royal HaskoningDHV
Appendix H Nature Conservation Marine Protected Area Screening	Royal HaskoningDHV
Appendix I Offshore Ornithology Methods Statement	MacArthur Green
Appendix J Ornithology Design-Based Analyses Results	MacArthur Green
Appendix K Economic and Social Scenarios Opportunities and Impacts	Biggar Economics
Appendix L Windfarm Development Area Stakeholder Engagement Plan	The Applicant
Appendix M Stakeholder Engagement Log	The Applicant

30. A Habitats Regulations Appraisal (HRA) Screening Report is also being submitted for the WDA alongside this Scoping Report (Royal HaskoningDHV and MacArthur Green, 2024).

1.7 REFERENCES

National Grid ESO (2022). Pathway to 2030: Holistic Network Design. National Grid Electricity System Operator (ESO) Report published in July 2022. Available at: https://www.nationalgrideso.com/document/262681/download. [Accessed 21/09/2024]

National Grid ESO (2024). Beyond 2030: A National Blueprint for a Decarbonised Electricity System in Great Britain. ESO Report published in March 2024. Available at: https://www.nationalgrideso.com/document/315516/download. [Accessed 21/09/2024]

Royal HaskoningDHV and MacArthur Green (2024). MachairWind Offshore Development: Windfarm Development Area Habitats Regulations Appraisal Screening Report.

Scottish Government (2020). 'Sectoral marine plan for offshore wind energy'. Available at: https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy/. [Accessed 21/09/2024]

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2 POLICY AND LEGISLATIVE CONTEXT

2.1 INTRODUCTION

31. This chapter provides an overview of the Policy and Legislative Context for the Windfarm Development Area (WDA) as applicable to the Environmental Impact Assessment (EIA) and consenting application process. The Applicant intends to implement a policy-led approach to the EIA and consenting application process. This includes considering the applicable legislative and policy framework to inform the EIA which will be presented in the EIA Report (EIAR).

32. The EIA will be progressed taking account of applicable legislation, policy, guidance, and good practice. At this stage, relevant legislative and policy frameworks will guide the scope of the EIA and help to inform the types of receptors, likely significant effects (LSE) and environmental issues that will be included.

33. This chapter outlines the legislative and policy context applicable to the EIA, including identifying relevant policy documents. Each technical chapter of the Scoping Report then identifies policy and legislation of specific relevance. Any relevant updates to legislation, policy and guidance during the undertaking of this EIA and the preparation of associated consenting applications will also be taken account of and presented in the EIAR.

2.2 BACKGROUND

34. The United Kingdom (UK) requires a range of electricity generation infrastructure to fulfil a secure and affordable electricity supply whilst also achieving the binding commitments to address climate change. The integration of renewable technologies, such as offshore wind, will contribute to a significant proportion of the national energy generation mix. Offshore wind offers Scotland a wide range of benefits contributing to the reduction in Greenhouse Gas (GHG) emissions, supporting economic growth, and improving energy security.

35. The emissions of GHGs have been identified as a significant source of anthropogenic climate change (Intergovernmental Panel on Climate Change (IPCC), 2018). The burning of fossil fuels such as coal and gas for electricity generation has been established as a significant GHG emission source. Development of renewable energy for electricity production is presented as a solution to reducing carbon dioxide emissions and the resulting anthropogenic climate change. To enable the development of renewable energy for electricity production, numerous climate change protocols and agreements and renewable energy policies and legislation have been implemented which include:

- The Kyoto Protocol, 1997;
- The Paris Agreement, 2015;
- The Climate Change (Scotland) Act 2009, amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019; and
- The North Sea Transition Deal, 2021.

36. The Scottish Government, along with many other governments across the world, declared a climate emergency in 2019, outlining the need for swift and decisive action to limit the warming of the planet by 1.5 degrees Celsius compared to 1990 levels. In Scotland, the net zero target is to be achieved by 2045 (Scottish Government, 2020a). This ambitious 2045 target reflects the Scottish Government's acknowledgement of the need to respond to the climate change emergency.

37. Acknowledging the available wind resource and offshore wind development opportunity, the Scottish and UK Governments have committed to ensuring that offshore wind is a leading contributing source of renewable electricity to the National Electricity Transmission System.

38. In 2022, the UK Government published the British Energy Security Strategy (UK Government, 2022) which increased the UK target for offshore wind deployment to 50 Gigawatts (GW) by 2030 and recognised the need for further deployment beyond this to contribute to the UK's net zero ambition.

39. The UK is one of the few countries with emissions targets in line with the long-term temperature goal of the Paris Agreement. The Climate Change Committee's most recent progress report (Climate Change Committee, 2024) presents provisional estimates indicating that emissions in 2023 were 4% lower than 2022, reducing 49.5% since 1990. The report also tracks progress and highlights risks to the delivery of the UK Net Zero Strategy, highlighting that installed operational offshore wind capacity will need to at least triple by 2030.

40. The Project will contribute towards meeting Scottish and UK renewable energy targets and has the potential to supply enough renewable electricity to power up to two million homes and avoid the production of millions of tonnes of carbon dioxide each year from the equivalent generation of electricity from fossil fuels. The continued development of offshore wind within Scotland is therefore critical to ensuring that Scotland and the UK can meet their binding energy and climate change targets.

2.3 SCOTWIND OFFSHORE WIND LEASING

41. The ScotWind offshore wind leasing round led by Crown Estate Scotland (CES) is a major milestone in Scotland's journey towards Net Zero. ScotWind's objective was to help Scotland achieve its net-zero emissions target by 2045, by granting property rights for the seabed in Scottish waters for new commercial scale offshore wind projects in a way that was fair and transparent. In doing so, ScotWind facilitates and encourages development of the low-carbon energy generation needed to meet the world-leading targets committed to in The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

42. CES announced 17 ScotWind projects in January 2022 and entered seabed option agreements with these projects by the end of April 2022. In August 2022, the ScotWind clearing process led to a further three projects being offered option agreements. In total, there are now 20 ScotWind projects confirmed with a total capacity of up to 27.6 GW and committing £28.8 billion expenditure in Scotland's supply chain, which will help create thousands of jobs and transform the Scottish economy (CES, 2023). Additional projects as part of the Innovation and Targeted Oil and Gas (INTOG) leasing round will potentially contribute additional renewable energy capacity (Scottish Government. 2023a).

43. CES will offer a full seabed lease to ScotWind projects once developers have met the conditions to serve an Option Notice. The ScotWind process is 'plan-led', therefore all projects are sited in areas defined within the Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020b), which was subject to plan-level Strategic Environmental Assessment (SEA) (Scottish Government, 2019a), Habitats Regulations Appraisal (HRA) (Scottish Government, 2019b) and socio-economic assessment (Scottish Government, 2019c) throughout its preparation.

2.4 PLANNING, CLIMATE CHANGE AND RENEWABLE ENERGY POLICY

44. Applicable legislation, policy and guidance at Scottish, UK, European and international level of relevance to the Project with respect to climate change and energy needs are set out in **Table 2.1** to **Table 2.3**. These generally follow a nested hierarchy, with higher-level legislation and policies informing those at lower spatial scales as illustrated in **Figure 2.1**.

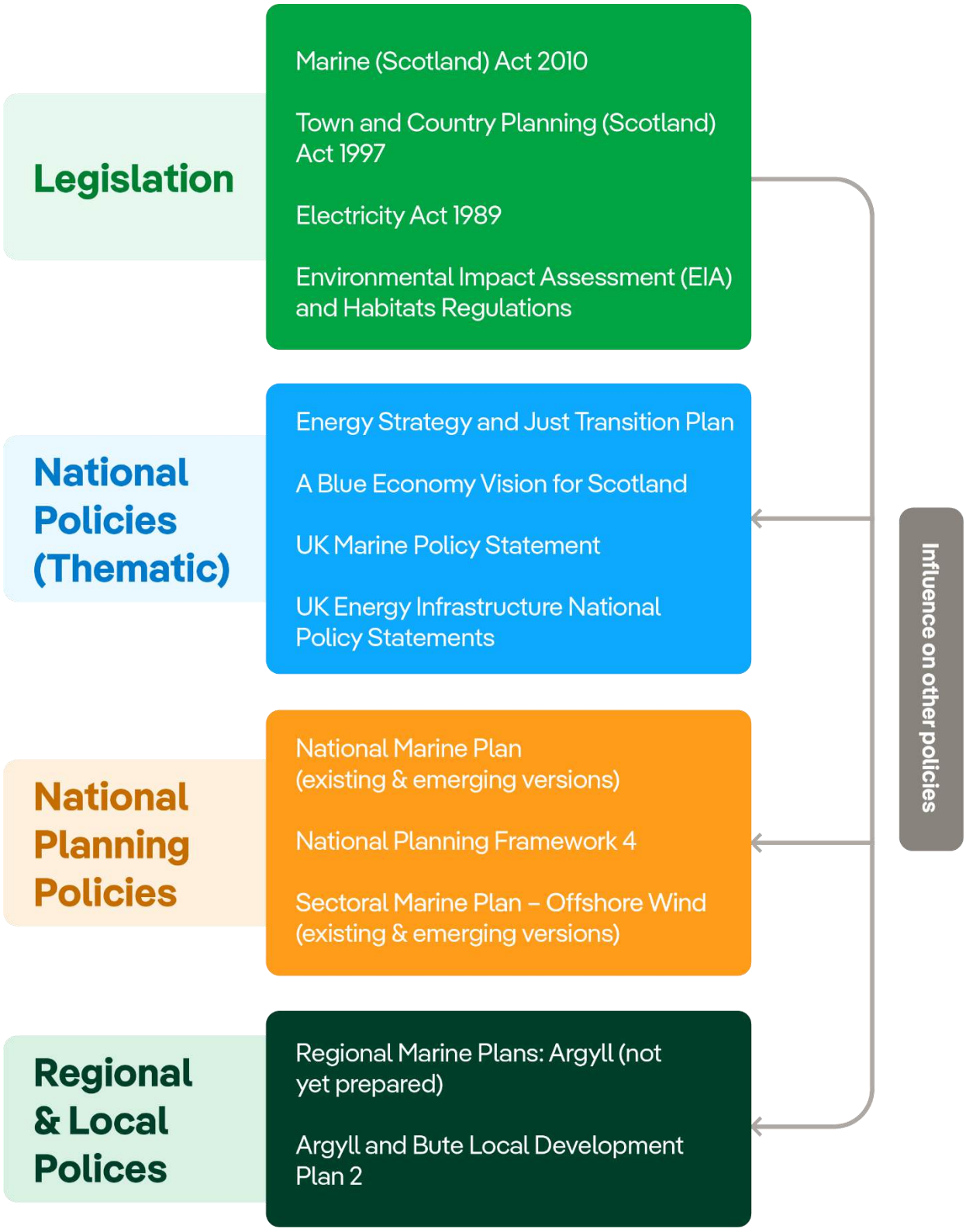

Figure 2.1 Legislation and policy hierarchy

45. It should be noted that **Figure 2.1** only shows the most relevant policy documents but as detailed in this chapter, other legislation and policies are also applicable.

46. The key Scottish legislation and policy documents are detailed in **Table 2.1**, with specific policies of relevance to informing the scope of assessments noted within relevant technical chapters of this Scoping Report.

Table 2.1 Scottish planning, climate change and energy legislation and policy

Legislation and Policy	Summary
National Planning Framework 4, 2023	The National Planning Framework 4 (NPF4) sets out Scotland's spatial principles, regional priorities, national developments and national planning policy (Scottish Government, 2023b). NPF4 presents Sustainable Places, Liveable Places and Productive Places to achieve national outcomes including benefits to the environment, communities, and health. NPF4 contains a notable focus on tackling both the climate and nature crises. There is a strong preference for developments which meet the Scottish Government's aims for net zero emissions by 2045, and halting biodiversity loss by 2030/restoring and regenerating biodiversity by 2045. Projects which evidence low and zero-carbon design and expansion of renewable energy generation will therefore be encouraged. NPF4 designates certain types of projects as National Developments on the basis that they are needed to implement the national spatial strategy. This establishes the needs case for such projects. All 50 Megawatt (MW)+ onshore and offshore renewable electricity generating projects and associated grid connections are designated as National Developments. Policies and provisions within NPF4 of specific relevance to assessment topics are considered within relevant technical chapters of this Scoping Report.
Draft Energy Strategy and Just Transition Plan, 2023	The Draft Energy Strategy and Just Transition Plan sets out policy positions and key ambitions for Scotland's energy future, including potential additional renewable energy capacity from offshore wind projects in construction and the wider project pipeline (Scottish Government, 2023a). The Plan contains a route map of actions to deliver a net zero energy system to supply affordable, resilient and clean energy to Scotland by 2045 and benefit employment. The Plan aims to transform and expand the energy generation sector in Scotland by working with the United Kingdom (UK) Government. For offshore wind, the draft strategy identifies a potential of 27.6 Gigawatts (GW) of capacity from the ScotWind leasing rounds. At the time of writing, the final version of the Energy Strategy and Just Transition Plan is understood to have been completed and is expected to be published by early Autumn 2024.
Scotland's Offshore Wind Policy Statement, 2020	The Offshore Wind Policy Statement confirmed the Scottish Government's intent to see offshore wind play a key role in decarbonisation and Scotland's net zero commitment and suggests as much as 11 GW of offshore wind could be delivered by 2030 in Scottish waters alone (Scottish Government, 2020c).

Legislation and Policy	Summary
Sectoral Marine Plan for Offshore Wind Energy, 2020	The Sectoral Marine Plan (SMP) for Offshore Wind Energy identifies sustainable areas for the future development of commercial scale offshore wind energy in Scotland, including a spatial strategy to inform the seabed leasing process for the purposes of offshore wind energy (Scottish Government, 2020b). This built on the first SMP which was adopted in 2011, and the draft wind, wave and tidal plan in 2013, and was developed in accordance with the Scottish National Marine Plan. The WDA is located in Plan Option Area (POA) W1, as identified in the SMP for Offshore Wind. Plan Options including W1 were subject to testing, refinement and area reduction through Strategic Environmental Assessment (SEA), Habitats Regulations Appraisal (HRA) and plan development processes. The SMP and associated impact assessment identified relevant characteristics of POA W1 and key risks to be addressed in project-level assessments and associated consenting applications. The SMP is undergoing an Iterative Plan Review (IPR) to reflect the outcomes of the ScotWind and INTOG leasing rounds, with a Draft Updated SMP for Offshore Wind expected to be published for consultation in Autumn 2024. The final Updated SMP for offshore Wind is then expected to be published in Spring 2025.
Climate Change (Scotland) Act 2009, amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019	The Climate Change (Scotland) Act 2009 was implemented to reduce the Greenhouse Gas (GHG) emissions in Scotland. The Climate Change (Scotland) Act 2009 and The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 (Sections 1-3) include Scotland's commitments to reducing GHG emissions (Scottish Government, 2019d).
Scottish Energy Strategy, 2017	In 2017, the Scottish Government published Scotland's Energy Strategy: The Future of Energy in Scotland, which set a vision for how the energy system in Scotland would look in 2050 (Scottish Government, 2017). Since the publication, the Scottish Government has committed to achieving net zero GHG emissions by 2045.

47. The relevant UK climate change and energy legislation and policy for the Project is detailed in **Table 2.2**.

Table 2.2 UK climate change and energy legislation and policy

Legislation and Policy	Summary
British Energy Security Strategy 2022	The British Energy Security Strategy (UK Government, 2022) outlines a plan for creating a resilient energy system in response to rising global energy prices partly attributed to geopolitical events such as the war in Ukraine. The statement outlined the UK Government's ambition to deliver up to 50 Gigawatts (GW) of offshore wind by 2030, including five GW of floating wind technology.
Energy Act 2023	The Energy Act aims to transform the United Kingdom's (UK's) energy system by strengthening energy security, supporting the delivery of net zero and ensuring household bills are affordable in the long-term. The Act includes the provision to adopt strategic compensation for adverse environmental effects from offshore windfarms.
UK Climate Change Strategy 2021 – 2024	The UK Climate Change Strategy will support UK exporters and suppliers through the transition to net zero by increasing support to clean growth and climate adaptation, reducing Greenhouse Gas (GHG) emissions and understanding and mitigating climate related financial risks. The Strategy highlights the importance of transforming the financial system to boost innovation and transition away from high carbon sectors.
Offshore Wind Sector Deal, Updated 2020	The Offshore Wind Sector Deal will drive the transformation of offshore wind generation, making it part of a low-cost, low-carbon, flexible grid system (UK Government, 2020).

Legislation and Policy	Summary
Energy White Paper: Powering our Net Zero Future, 2020	The Energy White Paper addresses the transformation of the energy system to promote clean, resilient economic growth and deliver net-zero emissions by 2050. The Energy White Paper puts in place a strategy for the wider energy system that transforms energy for a cleaner greener future, supports a green recovery, grows the economy, and creates a fair deal for consumers. Many provisions are implemented by the Energy Act 2023.
Climate Change Act 2008 (as amended)	The Climate Change Act 2008 sets legally binding targets for the UK to reduce carbon dioxide emissions by at least 80% by 2050, from 1990 levels. This was amended by the Climate Change Act 2008 (2050 Target Amendment) Order 2019 which introduced a target for at least 100% reduction in GHG emissions (compared to 1990 levels) in the UK by 2050.
Energy Act, 2004	The Energy Act 2004 established a Renewable Energy Zone (REZ) adjacent to the UK's territorial waters to enable the creation of designated leasing areas for developers to bid for the development of renewable energy. The Act also implemented statutory decommissioning requirements for Offshore Renewable Energy Installations (OREI) and associated transmission infrastructure and a Safety Zone scheme.

48. The relevant international climate change agreements relevant to the Project are detailed in **Table 2.3**.

Table 2.3 International climate change agreements

Legislation, Policy and Directives	Summary
Paris Agreement (Conference of Parties 21), 2015	The Paris Agreement had an overarching goal to hold the increase in the global average temperature to below 2°C above pre-industrial levels, and binds all parties to prepare, communicate and maintain a Nationally Determined Contribution to this effect (UNFCCC, 2023a). From 2023 and every five years thereafter, a global stock-take will assess collective progress. The commitment to the Paris Agreement was reaffirmed at the Glasgow Climate Change Conference in 2021 (Conference of Parties (COP26) and at Sharm el-Sheikh Climate Change Conference (COP27) in 2022.
Kyoto Protocol, 1997	The Kyoto Protocol requires signatory countries to limit and reduce Greenhouse Gases (GHGs) in accordance with agreed individual targets. The Kyoto Protocol was formally adopted on 11 December 1997, first entering into force on 16 February 2005 (UNFCCC, 2023b). The UK Government adopted the commitments outlined in the Kyoto Protocol through the Climate Change Act 2008 and Climate Change (Scotland) Act 2009.
United Nations Framework Convention on Climate Change, 1992	The United Nations Framework Convention on Climate Change (UNFCCC) aims to stabilise GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, and is the foundation for later landmark agreements, including the Kyoto Protocol and Paris Agreement (UNFCCC, 2023a and 2023b).

49. A climate change assessment will be provided as part of the WDA EIAR, setting out the contribution the Project will make to the aims and targets set out in the policy documents above. See **Chapter 19 Climate Change** for more details on the approach to the climate change assessment.

2.5 MARINE PLANNING POLICY

50. In Scotland, marine planning policy is used to inform decisions made under the relevant consenting legislation, e.g. for the purposes of obtaining an offshore Section 36 consent and a Marine Licence.

In addition to the SMP for Offshore Wind Energy outlined in **Table 2.1**, a summary of marine planning policy relevant to the WDA EIA is presented in **Table 2.4**.

Table 2.4 Summary of marine planning policy

Policy	Summary
A Blue Economy Vision for Scotland, 2022	Scotland's Blue Economy Vision (Scottish Government, 2022a) sets out a long-term ambition for shared stewardship of Scotland's marine and freshwater environment and wider blue economy to 2045. This document identifies six Blue Economy outcomes including those related to natural capital and climate change which are of direct relevance to the EIA process for the WDA.
Scotland's National Marine Plan, 2015	The purpose of the National Marine Plan (NMP) is to set out policies for the sustainable development of Scotland's marine resources out to 200 nautical miles (nm). It also provides a strategic framework for marine licensing and other offshore consenting decisions. The NMP outlines objectives relating to offshore wind and marine renewable energy which intend to maximise the sustainable development of offshore wind by creating economic benefits through increasing a domestically competitive supply chain whilst contributing to decarbonisation targets. The original NMP (NMP1) published in 2015 is currently being updated to reflect changes in baseline conditions, new evidence and demands on marine space. In August 2024 the Scottish Government published an updated NMP2 Engagement Strategy (Scottish Government, 2024) including the following estimated milestones: • NMP2 Position Statement: Winter 2024; • Draft NMP2: Winter 2025; • NMP2 Explanatory Report: Autumn 2026; • Updated Draft NMP2 Parliamentary Scrutiny: Summer 2027; and • NMP2 Adoption: Summer 2027. Once published, the NMP2 Position Statement will be reviewed, and relevant provisions will be addressed within the consent submissions. Policies and provisions within NMP1 of specific relevance to assessment topics are considered within relevant technical chapters of this Scoping Report.
Regional Marine Plans	11 Scottish Marine Regions have been created under the Scottish Marine Regions Order 2015 which cover sea areas extending out to 12 nm. Regional Marine Plans for each Marine Region will be developed by Marine Planning Partnerships to allow more local ownership and decision making. The Marine Planning Partnership relevant to the Project is Argyll. A Regional Marine Plan for Argyll has not been developed to date. Work has been undertaken to develop a Regional Marine Protected Area (MPA) Plan for the Argyll marine region as part of the MarPAMM project that completed in 2022.
United Kingdom Marine Policy Statement, 2011	In March 2011, the United Kingdom (UK) Marine Policy Statement was published for the purposes of section 44 of the Marine and Coastal Access Act 2009 (UK Government, 2011). The Marine Policy Statement was established to partially facilitate and support the formulation of Marine Plans in accordance with the marine objectives (UK Government, 2011), including to promote sustainable economic development; enable the UK's move towards a low carbon economy, to mitigate the causes of climate change and ocean acidification and adapt to their effects; ensure a sustainable marine environment which promotes healthy, functioning marine ecosystems and protects marine habitats, species and heritage assets; and contribute to the societal benefits of the marine area, including the sustainable use of marine resources to address local social and economic issues.

Policy	Summary
Marine Strategy Framework Directive	The European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC) was established to protect the marine environment by seeking to achieve Good Environmental Status in Europe's seas by 2020. This Directive was transposed into UK law by the Marine Strategy Regulations 2010 and remains applicable after EU Exit, under the Marine Environment (Amendment) (EU Exit) Regulations 2018.

2.6 CONSENTING LEGISLATION

51. In order to construct and operate the WDA infrastructure, the Applicant is required to obtain consent under Section 36 of the Electricity Act 1989 as well as marine licence(s) under the Marine (Scotland) Act 2010 (see **Section 1.3** for further details). The Applicant will also seek any additional licences for pre-construction development activities within the WDA from the relevant authorities. Further information on Section 36 consent and marine licensing is provided below.

52. As discussed in **Section 1.3** the Applicant will submit separate consent and licence applications for the Offshore Transmission Development Area (OfTDA) and Onshore Transmission Development Area (OnTDA).

2.6.1 Section 36 Consent

53. As the WDA infrastructure represents an offshore generating station greater than 1 Megawatt (MW) within the Scottish Marine Area, there is a requirement for consent under Section 36 of the Electricity Act 1989. Section 36 consent will authorise the installation and operation and maintenance (O&M) of the Wind Turbine Generators (WTGs), and Inter-Array Cables (IACs) within the WDA.

2.6.2 Marine Licence

54. In relation to Scotland and published in 2010, the Marine (Scotland) Act 2010 (Scottish Government, 2010) provides the Scottish Government legislative and management jurisdiction for the Scottish Marine Area from 0 to 12 nautical miles (nm) from shore. The Applicant will apply for Marine Licences in accordance with the Act as the entirety of the WDA is situated within the 12 nm boundary.

2.7 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

55. The following relevant legislation applies to EIA in respect of the WDA:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, which requires an EIA to support relevant Section 36 consent applications; and
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017, which requires an EIA to support relevant Marine Licence applications.

56. Following the departure of the UK from the EU, existing Scottish EIA regulations associated with the EIA Directive have been assimilated into Scottish law through the transposing Regulations identified above. The approach to Scoping and EIA for the WDA is set out in detail in **Chapter 4 Approach to Scoping and EIA**.

2.7.1 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

57. Under the Electricity Works (EIA) (Scotland) Regulations 2017, an EIA is required to support electricity generation projects which must apply for consent under Section 36 of the Electricity Act 1989. These regulations set out the statutory process and minimum requirements for EIA.

58. Schedule 2 of these Regulations sets out a list of development types for which an EIA may be required, including 'generating stations', which the WDA falls under. Where Schedule 2 developments are likely to have a significant effect on the environment due to factors such as its

nature, size or location, an EIAR is required to be prepared and submitted to support such applications.

59. Schedule 2 developments may apply for a screening opinion from Scottish Ministers to determine whether any development is, or is not, an EIA development. The Applicant has chosen to prepare and submit an EIAR for the WDA without prior screening, recognising that EIA will be required for the Project.

60. Regulation 12 of these 2017 Regulations also provide capacity for the Scottish Ministers (facilitated by Marine Directorate - Licensing and Operations Team (MD-LOT)) to provide a Scoping Opinion if a written request for this is submitted by the Applicant. This Scoping Report and supporting information form the basis of a request to Scottish Ministers to adopt a Scoping Opinion.

2.7.2 The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017

61. Under Schedule 2 of the Marine Works (EIA) (Scotland) Regulations 2017 (which applies in Scottish offshore waters up to 12 nm), an EIA is required for windfarms (installations for the harnessing of wind power for energy production) if the project in question is likely, because of its size, nature or location to have significant effects on the environment. The Applicant acknowledges the potential for significant environmental effects and will therefore prepare an EIAR in accordance with these regulations.

62. Similar to the Electricity Works (EIA) (Scotland) Regulations 2017, these Regulations make provision for a written request for a Scoping Opinion to be provided by Scottish Ministers via MD-LOT. The Scoping Opinion will be applicable to both of the EIA regulations identified (**Section 2.7.1**), collectively referred to as the EIA Regulations.

2.8 NATURE CONSERVATION LEGISLATION AND POLICY

2.8.1 Habitats Regulations Appraisal

63. In 1992, the EU Directive 92/43/EEC, known as the ‘Habitats Directive’, was adopted to enable EU member states to meet obligations set out under the Bern Convention. The purpose of the Habitats Directive is to maintain or restore natural habitats and wild species listed in the Annexes (I and II) at Favourable Conservation Status. Protection to meet Favourable Conservation Status is given through designation of European Sites (Special Areas of Conservation (SAC)).

64. In addition, the EU Directive 2009/147/EC, known as the ‘Birds Directive’, was implemented to provide a framework for conservation and management of wild birds in the EU. Annex I of the Birds Directive provides a list of rare, vulnerable and migratory species, which are protected through the designation of Special Protected Areas (SPAs).

65. The Habitats Regulations have been implemented through The Conservation of Habitats and Species Regulations 2017 and The Conservation (Natural Habitats, &c.) Regulations 1994. Changes to earlier requirements were enacted by the Conservation of Habitats and Species Amendment (EU) Exit) Regulations 2019 (the ‘EU Exit Regulations’). The Habitats Regulations require the HRA process to be followed where a project could affect a designated site (SPAs, SACs, proposed or candidate SPAs and SACs or Ramsar Sites), either individually or in-combination with other plans or projects, in view of the site’s conservation objectives.

66. In accordance with the above-mentioned Habitats Regulations, the Applicant is undertaking the relevant assessments to inform an Appropriate Assessment undertaken by MD-LOT. A standalone HRA Screening Report (Stage 1 of the HRA) for the WDA has been prepared and submitted for consideration alongside this Scoping Report, and a Report to Inform Appropriate Assessment will be submitted alongside the EIAR and application documentation.

2.8.2 Nature Conservation Marine Protected Area Assessment

67. Scotland designates Nature Conservation Marine Protected Areas (NCMPAs) in inshore waters between 0 and 12 nm from shore under the Marine (Scotland) Act 2010. Marine Protected Areas (MPAs) are designated to protect biodiversity and heritage, with specific focus on protected features (species, habitats, large scale features or geomorphological features).

68. Under the Marine (Scotland) Act 2010, provisions are made for the relevant public authority (in this instance, MD-LOT) to consider whether a licensable activity is capable of affecting (other than insignificantly) a protected feature in a NCMPA or any ecological or geomorphological process on which the conservation of any protected feature in a NCMPA is dependant.

69. To assess whether there is any significant risk of the licensable activity hindering the achievement of the conservation objectives of a given NCMPA, a NCMPA Assessment should be completed.

70. **Appendix H Nature Conservation Marine Protected Area Screening**, covering Stage 1 is provided with this Scoping Report. The NCMPA Screening Report has been prepared in line with the guidance provided in the Marine Scotland Nature Conservation Marine Protected Areas: Draft Management Handbook (2013).

2.8.3 European Protected Species

71. Annex IV of the Habitats Directive sets out a list of animals and plants that are considered European Protected Species (EPS) and protected under the Habitats Regulations. Under these Regulations, it is unlawful to:

- Deliberately capture, injure or kill an EPS;
- Deliberately disturb an EPS; and
- Damage or destroy a breeding site or resting place of an EPS.

72. However, it may be lawful to carry out certain activities which are likely to cause disturbance or injury to EPS, if an EPS licence is sought.

73. As part of early project development, the Applicant provided EPS Risk Assessments to MD-LOT in relation to EPS licence applications to undertake surveys within the Option Agreement Area (OAA) and WDA. The Applicant will apply for further EPS licences as appropriate should these be required.

2.8.4 Priority Marine Features

74. Since 2014, 81 species and habitats present in the seas around Scotland have been identified as Priority Marine Features (PMFs). The list, which was developed by Marine Scotland[2], the Joint Nature Conservation Committee (JNCC) and Scottish Natural Heritage[3] covers species and habitats that are a priority for conservation in Scotland, including intertidal and continental shelf habitats, deep sea habitats, mammals, fish, shellfish and other invertebrates.

75. Basking sharks (*Cetorhinus maximus*) are a PMF in Scotland's seas and are protected under Schedule 5 of the Wildlife and Countryside Act 1981 and under Part 3 and Schedule 6 of the Nature Conservation (Scotland) Act 2004. Under these protections, it is prohibited to kill, injure, or take by any method basking sharks and any other species listed in Schedule 5, or to intentionally or recklessly disturb these species.

76. For commercial survey activities in the WDA, such as geophysical surveys, a licence to disturb basking sharks is required due to the location on the west coast of Scotland where basking sharks

[2] Marine Scotland became Marine Directorate in 2023.
[3] Scottish Natural Heritage became NatureScot in 2019.

are known to be present. The Applicant will apply for a basking shark licence where these are required, with MD-LOT as the relevant licensing authority. Further information on basking sharks is provided in **Chapter 9 Fish (Including Basking Shark) and Shellfish Ecology**.

2.9 OTHER CONSENTING REQUIREMENTS

2.9.1 Decommissioning

77. Sections 105 to 114 of the Energy Act 2004 set out statutory requirements in relation to the decommissioning of Offshore Renewable Energy Installations (OREI) and associated electrical lines. The Scottish Ministers may require a costed decommissioning programme for OREIs in Scottish waters to be submitted. Scottish Ministers further have the power to determine specific approaches to decommissioning, including stipulating the form, timing and size of financial securities required.

78. The document 'Decommissioning of Offshore Renewable Energy Installations in Scottish Waters or in the Scottish part of the REZ under The Energy Act 2004: Guidance Notes for Industry (in Scotland)' was published by Marine Scotland in July 2022 (Scottish Government, 2022b). This guidance document sets out the policy and legislative framework; decommissioning requirements in Scotland; requirements for Decommissioning Programmes; environmental and safety considerations; and financial considerations. Decommissioning Programmes are expected to contain information on decommissioning standards, financial security, residual liability and industrial cooperation and collaboration.

79. Section 5 of the Guidance Note (Scottish Government, 2022) states that "*an indication of the decommissioning proposals should be included as part of the statutory consenting or licensing process so that the feasibility of removing the infrastructure can be assessed as part of the application process*".

2.9.2 Safety Zone Applications

80. Section 36A of the Electricity Act 1989 and Section 95 of the Energy Act 2004 sets out that Safety Zones could be established for any phase of an offshore renewable energy project in designated areas, where it is appropriate for safety reasons. Safety Zones are intended to ensure the safety of the renewable energy installation or other installations in the vicinity during construction, operation, extension or decommissioning.

81. Safety Zones may exclude non-Project vessels from navigating through a designated area for a specific period. The EIAR will include an assessment of the proposed approach to Safety Zones at the point of application. The total number of Safety Zones to be established at the same time has not been yet defined. It is anticipated that the following applications to MD-LOT will be made:

- An application will be made post-consent for Safety Zones including up to 500 metres (m) around each WTG and substructure during its construction;
- An application will be made post-consent for Safety Zones including up to 50 m around each installed WTG and substructure during its pre-commissioning;
- An application will be made post-consent for Safety Zones including up to 500 m around each WTG and substructure during major maintenance during operation; and
- An application will be made prior to commencement of decommissioning for Safety Zones including up to 500 m around each WTG and substructure during its decommissioning.

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3 PROJECT DESCRIPTION, SITE SELECTION AND ALTERNATIVES

3.1 INTRODUCTION

82. This chapter provides a description of the Windfarm Development Area (WDA) components which underpin the scoping assessments provided in **Chapters 6 to 20**. Given that the WDA is at an early stage of development, an indicative set of parameters using a design envelope approach will be used in the Environmental Impact Assessment (EIA) and reported on in the EIA Report (EIAR). The design information provided utilises ScottishPower Renewables' experience of developing and operating Offshore Windfarms (OWFs) in the United Kingdom (UK) and globally.

83. A description of the following WDA components is provided in the sections referenced below:

- Wind Turbine Generators (WTGs) (**Section 3.4.1**);
- WTG foundations (**Section 3.4.2**);
- Scour protection (**Section 3.4.2.4**); and
- Inter-Array Cables (IACs) (**Section 3.4.4**).

84. An overview of the proposed construction, operation and maintenance (O&M), and decommissioning phases of the WDA is also provided in this chapter.

3.2 DESIGN ENVELOPE APPROACH

85. The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) will be adopted for the EIA. This approach will be implemented in accordance with current good practice, as described in Marine Scotland (2018) and related guidance outlined by the Marine Directorate (MD) and the Energy Consents Unit (Scottish Government, 2022). The main requirements of the Scottish Government (2022) guidance are to develop an *"informed and credible"* design envelope and to justify the parameters selected in relation to likely environmental effects.

86. The PDE will specify the realistic worst-case design and activity parameters where appropriate. These will feed into the EIA to ensure the worst-case scenario can be quantified and assessed. A description of the WDA infrastructure and activities is provided in this chapter and will be developed and refined prior to assessment in the EIAR. The consent would be granted on the basis of a range of parameters to allow flexibility in the final detailed design of the WDA.

3.3 PROJECT DESCRIPTION SUMMARY

87. The key characteristics of the WDA are summarised in **Table 3.1**.

Table 3.1 Windfarm Development Area indicative parameters summary

Indicative Parameters	Values
Windfarm Development Area (km^2)	510
Windfarm Development Area closest distance to shore (km)	12
Water depth (metres below Lowest Astronomical Tide (m LAT))	28.6 - 89.6
Average water depth (m LAT)	55
Indicative operational life (years)	35

88. The WDA is expected to comprise the following infrastructure components:

- Up to 147 WTGs on fixed foundations;
- IACs linking the WTGs together and to the Offshore Substation Platform (OSP)(s);[4]
- Scour protection for foundation structures supporting the WTGs (if required); and
- External cable protection for IACs (if required).

89. **Figure 1.2** illustrates how the various infrastructure components link together.

3.4 PROPOSED WINDFARM DEVELOPMENT AREA INFRASTRUCTURE

3.4.1 Wind Turbine Generators

90. The WTGs will convert wind energy into electrical energy which will then be exported through the offshore and onshore transmission infrastructure to the National Electricity Transmission System (**Figure 1.2**). WTGs typically incorporate tapered tubular towers and three blades attached to a nacelle housing mechanical and electrical generating equipment.

91. The overall layout of the WTGs within the WDA will be informed by offshore site investigation works, wind resource modelling and stakeholder engagement. It will comply with relevant good practice for OWFs in relation to shipping and navigation (i.e. Marine Guidance Note (MGN) 654), fishing interests, offshore health and safety, and any relevant aviation interests.

92. Based on the likely WTGs available at the time the Project enters construction, a PDE has been established at this stage which includes both (i) 147 of the smallest WTGs under consideration as well as (ii) 88 of the largest WTGs under consideration. This ensures that the impact assessment is undertaken on a range of WTGs which could reasonably be expected to be deployed. The final selection of WTGs will be made once further surveys, technical development and engagement with the supply chain have been undertaken with the final decision being made post-consent.

93. **Table 3.2** provides indicative design parameters for the WTGs. A schematic is provided in **Figure 3.1**. Further design details of the WTGs will be provided in the Project Description chapter of the EIAR.

Table 3.2 Indicative design envelope parameters: Wind Turbine Generators

Indicative Parameters	Wind Turbine Generator (WTG) Parameters	
	Smallest	Largest
Maximum number of WTGs	147	88
Maximum rotor diameter (m)	236	316
Maximum rotor swept area per WTG (m^2)	43,774	78,427
Maximum blade tip height (m Lowest Astronomical Tide (LAT))	260	340
Maximum blade tip height (m Mean Sea Level (MSL))	258	338
Minimum blade clearance (Air Gap) (m Highest Astronomical Tide (HAT))	22.45	22.45

[4] Note that OSPs will be consented separately to the WDA infrastructure as described in **Section 1.3**.

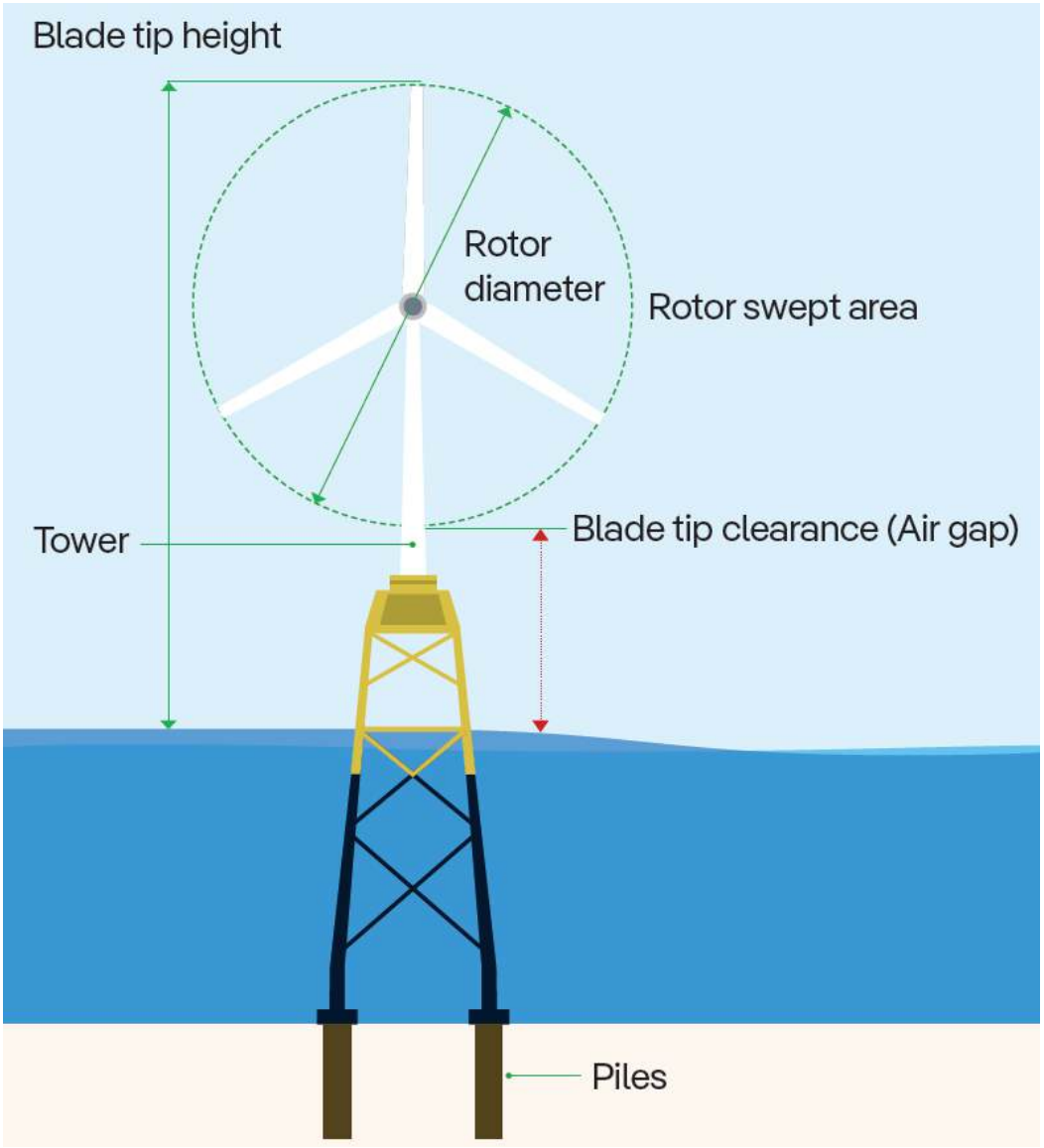

Figure 3.1 Wind Turbine Generator indicative schematic

3.4.2 Wind Turbine Generator Foundations

94. WTGs will be installed on fixed foundations. The PDE does not include options for floating WTGs. Foundation designs will be informed by environmental characteristics such as ground conditions, water depths and metocean conditions, technoeconomic parameters including the size of WTG selected, and supply chain constraints (including, but not limited to, installation vessel supply challenges and/or port limitations). It is possible that more than one type of foundation could be used across the WDA. The following foundation design options are currently being considered for WTGs (**Figure 3.2**):[5]

- Monopiles;
- Jackets on pin piles;
- Jackets on suction buckets; and
- Gravity Base Structures (GBS).

[5] Note that foundation graphics are for illustrative purposes only and are not to scale.

95. It should be noted that pre-installation works will be required prior to installation of WTG foundations and could include the following activities:

- Preconstruction surveys (**Section 3.5.2**);
- Unexploded Ordnance (UXO), marine debris and boulder clearance;
- Removal of existing out of service cables;
- Pre-lay grapnel run; and
- Pre-sweeping and sand wave levelling.

3.4.2.1 Monopile Foundation

96. Monopile foundations comprise a cylindrical steel pile with a diameter sufficient to transfer loading from the WTG to the seabed. A schematic is provided in **Figure 3.2**. The monopile foundations are usually installed using piling hammer installation techniques. The hammer energy required for monopile installation is dependent on the monopile size and seabed conditions encountered in the WDA.

97. **Table 3.3** provides indicative design parameters for a monopile foundation.

Table 3.3 Indicative design envelope parameters: monopile foundation

Indicative Parameter	Maximum Design Envelope
Maximum monopile diameter (metres (m))	15
Maximum seabed footprint excluding scour protection (m^2)	177
Worst-case maximum hammer energy (kilojoule (kJ))	6,600
Most likely maximum hammer energy (kJ)	4,500

3.4.2.2 Jacket Foundation (Pin Piles)

98. Jacket foundations, with pin piles, comprise a steel lattice structure with tubular sections and have an integrated transition piece. A schematic is provided in **Figure 3.2**. The jacket foundation is secured to the seabed by driven or drilled pin piles.

99. **Table 3.4** provides indicative design parameters for a jacket foundation with pin piles.

Table 3.4 Indicative design envelope parameters: jacket foundation (pin piles)

Indicative Parameter	Maximum Design Envelope
Maximum number of legs per jacket	4
Maximum jacket leg diameter (metres (m))	4
Maximum number of pin piles per leg	1
Maximum diameter of pin piles (m)	5
Maximum seabed footprint excluding scour protection (m^2)	2,500
Maximum jacket leg spacing at seabed (m)	50
Worst-case maximum hammer energy (kilojoule (kJ))	4,400
Most likely maximum hammer energy	3,000

3.4.2.3 Jacket Foundation (Suction Buckets)

100. Jacket foundations, with suction buckets, comprise a steel lattice structure with tubular sections and have an integrated transition piece. The jacket foundation is secured to the seabed by suction buckets positioned below each leg of the jacket. A schematic is provided in **Figure 3.2**. The suction buckets are hollow steel cylinders which are capped at the top. This foundation design does not require a hammer or drill installation technique. The foundation installation technique instead relies on water being pumped out of each suction bucket while being compressed downwards into the seabed by the weight of the jacket. This creates a pressure differential which enables the embedment of the suction buckets.

101. **Table 3.5** provides indicative design parameters for a jacket foundation with suction buckets.

Table 3.5 Indicative design envelope parameters: jacket foundation (suction buckets)

Indicative Parameter	Maximum Design Envelope
Maximum number of legs per jacket	4
Maximum jacket leg diameter (m)	4
Maximum suction bucket diameter (m)	15
Maximum suction bucket penetration depth (m)	30
Maximum seabed footprint excluding scour protection (m^2)	2,500
Maximum jacket leg spacing at seabed (m)	50

3.4.2.4 Gravity Base Structure Foundation

102. GBS foundations comprise reinforced concrete or hybrid reinforced concrete and steel structure with a ballast fill. A schematic is provided in **Figure 3.2**. This foundation design does not require a hammer or drill installation technique, instead it involves lowering the foundation onto appropriately prepared seabed whereby it supports the WTG through its self-weight.

103. **Table 3.6** provides indicative design parameters for GBS foundations.

Table 3.6 Indicative design envelope parameters: Gravity Base Structure Foundation

Indicative Parameter	Maximum Design Envelope
Maximum column diameter at sea surface (m)	15
Maximum diameter of GBS shaft at the seabed (m)	60
Maximum diameter of GBS base plate on seabed (m)	70
Maximum GBS penetration depth (m)	8
Maximum seabed footprint excluding scour protection (m^2)	3,848

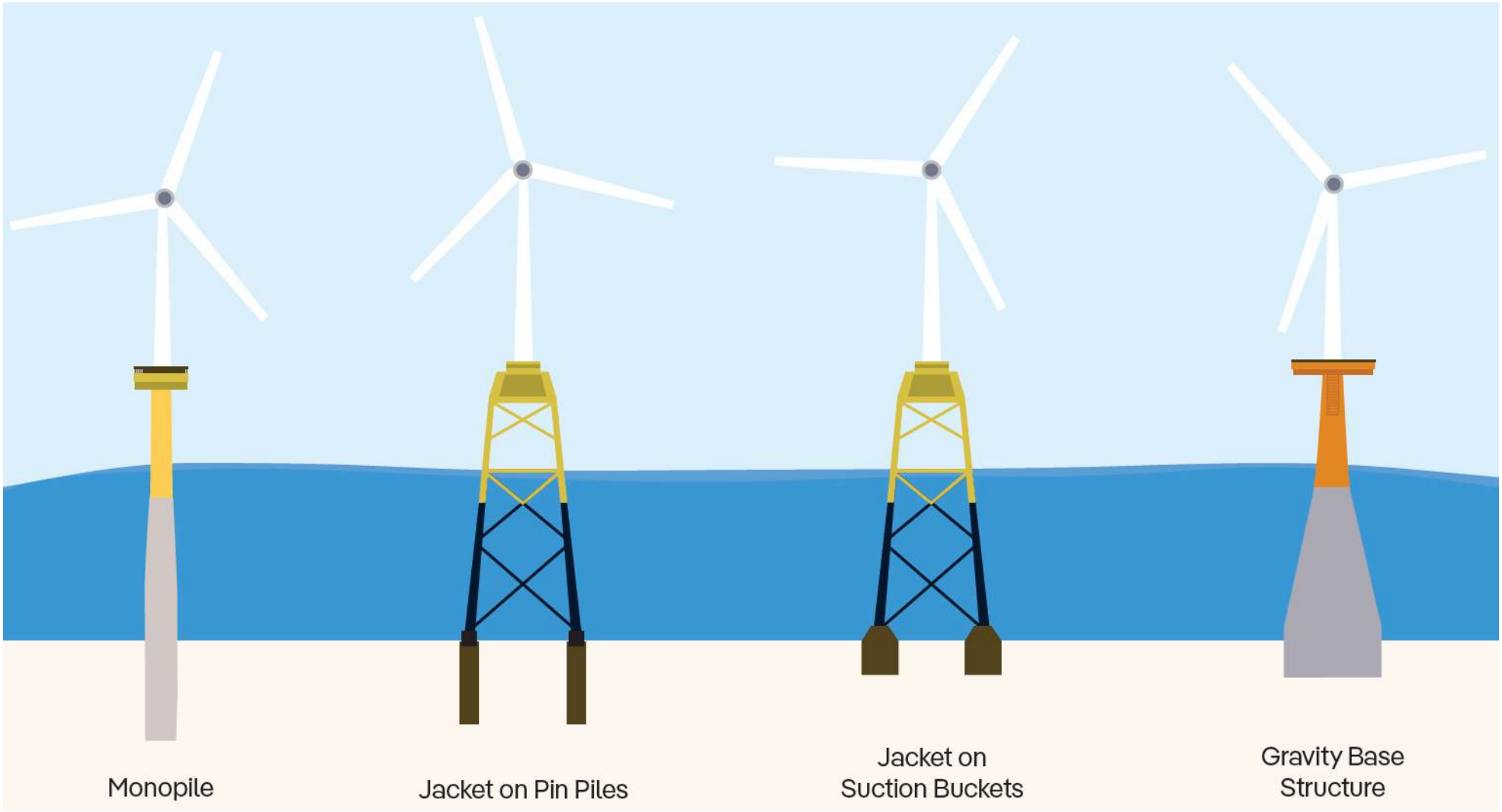

Figure 3.2 Wind turbine generator foundation option schematics

3.4.3 Scour Protection

104. Scour material may be required to protect the structural integrity of the fixed WTG foundations from natural hydrodynamic processes. The selection of any required scour protection material will be undertaken following the selection of the fixed WTG foundation and hydrodynamic analysis of the WDA. The potential to incorporate nature inclusive design solutions will also be considered, as appropriate. Further information on the scour protection material to be used, if required, will be presented in the EIAR.

3.4.4 Inter-Array Cables

105. The IACs will transmit the electricity generated by the WTGs to the OSP(s) (**Figure 1.2**). The WTGs will be linked by IACs in cable circuits (strings), with each string being connected to an OSP. It is likely that IACs will be buried in the seabed from the cable seabed touchdown point at the base of the WTG foundation. A Cable Burial Risk Assessment (CBRA) that aligns with industry good practice will be undertaken in the pre-construction phase to inform cable burial requirements (Carbon Trust, 2015). Cable protection may be used at the IAC seabed touchdown point at the base of the WTG foundation, at cable or pipeline crossings, or where an adequate degree of protection has not been achieved from the burial process (e.g. due to hard substrate precluding the target burial depth being achieved).

106. **Table 3.7** provides indicative design parameters for the IACs. As above for WTG foundations, pre-lay works will be required prior to installation of IACs and could include the following activities:

- Preconstruction surveys (**Section 3.5.2**);
- UXO, marine debris and boulder clearance;
- Removal of existing out of service cables;
- Pre-lay grapnel run; and
- Pre-sweeping and sand wave levelling.

Table 3.7 Indicative design envelope parameters: Inter-Array Cables

Indicative Parameter	Design Envelope
Number of turbines per string	4-8
Voltage (Kilovolt)	66-132
Maximum total cable length (km)	~450
Cable installation methodology	• Hybrid cable trenching tool; • Cable plough; • Chain trenching machine or similar; • Jetting; and • Mass / controlled flow excavator.
Cable protection material	Concrete mattresses, rock berm placement, rock bags, or nature inclusive design solutions.
Maximum width of cable trench (metres (m))	5
Target burial depth (m)	0.5

3.5 PROJECT PHASES

3.5.1 Overview

107. The offshore construction stages of the WDA are expected to be as follows:

- Pre-construction site investigation surveys (geophysical, geotechnical, UXO, environmental);
- Site preparation and clearance (UXO clearance, out of service cable clearance, boulder relocation or clearance and marine debris clearance);
- WTG foundation installation;
- Inter-array cabling installation; and
- WTG installation (including tower, nacelle, and blades).

3.5.2 Pre-Construction Phase

108. Preliminary and detailed surveys will be undertaken to inform the engineering design of the WDA. Geophysical, geotechnical, magnetometer and environmental surveys will inform detailed design and provide information on *inter-alia;* bathymetry, ground conditions, archaeological features of interest, sensitive benthic features, UXO locations, out of service cables, boulder locations, bathymetry and marine debris.

3.5.3 Construction Phase

109. The construction phase will be supported by a selection of offshore construction vessels. These may include jack up vessels, heavy lift vessels, cable lay vessels, service operation vessels, tug vessels and crew transfer vessels. Additional equipment such as remotely operated vehicles will also be deployed to assist with the construction of the WDA.

110. The scour protection and foundation installation techniques and installation time will depend on the chosen foundation type which in turn depends on a number of environmental and engineering factors e.g. ground conditions and metocean conditions. Foundation options could be installed by pile driving or drilling, depending on the type of foundation used and the seabed conditions in the WDA. Suction bucket and GBS foundation designs would not require piling or drilling and instead are installed by lowering onto the seabed (see **Sections 3.4.2.3** and **3.4.2.4**).

111. The components of the WTG will be transported to the WDA and installed by a suitable installation vessel. The towers would be lowered into place on top of the preinstalled foundation or transition piece. Following this, the nacelle and WTG blades would be installed to complete the WTG installation process.

112. Due to the early stage of the Project, a construction base from where WDA construction activities will be coordinated has not yet been selected. A preliminary ports feasibility study has been undertaken which assessed the suitability of ports within a suitable geographic range of the WDA to identify a list of possible options for the Project to consider. A construction port facility will be selected at a later stage of development following further detailed review.

3.5.3.1 Enabling Works

113. Enabling works are activities undertaken prior to formal commencement of construction and typically include:

- Geophysical and visual surveys, which are typically carried out to inform on UXO, bedform and mapping of boulders, bathymetry and subsurface layers; and
- Seabed preparation, required prior to construction commencing to allow for the successful laying of infrastructure on the seabed. This is particularly important for cable laying works where sand wave and boulder clearance may need to be undertaken to provide a flat seabed free from obstructions and mobile sediments.

114. UXO on or in the seabed may exist because of previous conflict or munition dumping and, if present, poses a significant health and safety hazard. Therefore, UXO must be appropriately managed.

115. Detailed layout design works need to be undertaken prior to conducting a detailed UXO survey, to ensure the UXO survey is targeted in the areas where infrastructure is to be placed. Enabling works will be considered as appropriate within the technical chapters of the EIAR under construction phase impacts. While UXO clearance will be subject to a separate Marine Licence(s), an assessment of likely significant effects (LSE) will be included for relevant receptors (e.g. fish and shellfish ecology, and marine mammals).

116. The hierarchy of UXO clearance techniques, in order of preference, are:

- Avoid (through micro-siting of infrastructure);
- Move UXO without clearing it (where appropriate);
- Remove the UXO to an onshore facility without clearing it (where appropriate);
- Low-order deflagration if above options not practicable; and
- High-order clearance, if low-order deflagration not practicable, or in the unlikely event that low-order deflagration was unsuccessful.

3.5.4 Operation and Maintenance Phase

117. The O&M strategy will be implemented once the infrastructure component details are confirmed and an O&M base for the Project has been selected. This strategy will cover all O&M activities required for each infrastructure component. The strategy will provide information on the expected vessels usage and how these will be implemented throughout the operational lifetime of the Project.

118. A preliminary ports feasibility study has been undertaken which assessed the suitability of ports within a suitable geographic range of the WDA to identify a list of possible options for the Applicant to consider. An O&M port facility, where operations will be coordinated will be selected following further detailed review.

119. Any post-construction monitoring requirements in accordance with the relevant monitoring plans to be submitted post-consent will also be undertaken during the O&M phase.

3.5.5 Decommissioning Phase

120. Developers of offshore renewable installations are required to provide and implement a Decommissioning Programme as outlined in Section 105 of the Energy Act 2004 (as amended). After section 36 consent, or after a marine licence has been granted, and in discussion between the developer and the regulators, a Section 105 notice is issued which requests developers to submit the Decommissioning Programme outlining the proposed decommissioning plans for the Project.

121. Further information on decommissioning will be provided for consideration in the EIA and presented in the EIAR.

3.6 SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

122. This section provides an overview of the site selection process undertaken, and alternatives considered, by the Applicant to date in relation to the WDA.

123. As outlined in **Section 1.3**, uncertainty remains over the grid connection location for the Project with the result that the OfTDA and OnTDA will be consented separately once these Development Areas have been sufficiently defined.

124. The WDA EIAR will outline the stages of site selection and will set out any refinements to the project design envelope that have taken place through the EIA process and / or in response to consultation and stakeholder feedback. The main alternatives that have been considered as part of this process will also be presented.

3.6.1 Site Selection

3.6.1.1 Introduction

125. To date, the site selection process for the WDA has been predominantly influenced by the marine planning exercise led by the Scottish Government which resulted in the publication of the Sectoral Marine Plan for Offshore Wind in October 2020 (the SMP) which paved the way for Crown Estate Scotland's ScotWind leasing process. The WDA is located wholly within one of the 15 Plan Option Areas (POAs) identified within the SMP.

3.6.1.2 Sectoral Marine Plan for Offshore Wind and ScotWind Leasing

126. In November 2017, Crown Estate Scotland (CES) announced its intention to launch a leasing round for offshore wind projects in Scottish waters. To inform the spatial development of this leasing round, the Marine Directorate (MD) (formerly known as Marine Scotland),[6] initiated a planning exercise in June 2018 to identity Areas of Search for offshore wind development. This planning exercise considered both opportunities (such as average wind speed or likely suitable seabed geology) and constraints (such as fishing activity, shipping traffic and environmental sensitivities (e.g., potential impacts on seascape and offshore ornithology receptors)) within Scottish waters. The Areas of Search identified were reviewed for suitability through an opportunity and constraint analysis exercise. Additional consultation and stakeholder engagement was undertaken throughout the planning exercise to inform the selection of Areas of Search.

127. The outcome of the Marine Scotland planning exercise informed the draft SMP for Offshore Wind Energy. This plan was published for a consultation period that extended from December 2019 to March 2020. The draft SMP identified the 17 draft Plan Options considered to be the most suitable areas where offshore wind projects could be developed.

128. The ScotWind leasing process was subsequently launched by CES in June 2020, allowing developers to apply for the rights to develop and operate offshore wind farms in Scottish waters within 17 draft POAs in accordance with the draft SMP. The SMP was formally published in October 2020 presenting 15 POAs (Scottish Government, 2020).

3.6.1.3 Applicant Bid

129. The Applicant submitted a bid to CES in July 2021 to secure the rights to develop the entirety of the W1 POA. The Applicant elected to bid for the whole POA to maximise the opportunity to develop a 2 gigawatt (GW) project and to provide flexibility that could help avoid any key constraints identified during future site surveys and studies.

[6] Marine Scotland became Marine Directorate in 2023.

130. In preparation for the submission of a bid for the W1 POA, the Applicant undertook extensive preliminary desktop studies to analyse information it had acquired relating to the W1 POA and also commissioned specialist contractor, APEM, to undertake Digital Aerial Surveys (DAS) to collect marine mammal and ornithology data across the entirety of the W1 POA.

131. On 17 January 2022, the Applicant was announced as the successful bidder for W1 POA and entered an Option Agreement with CES in April 2022. W1, referred to as the Option Agreement Area (OAA) following the Applicant's confirmation as the successful bidder, comprises an area of 754 km^2.

3.6.1.4 Windfarm Development Area Selection

132. Since ScotWind award in January 2022, the Applicant has undertaken a further review of potential constraints within the OAA which has resulted in an initial reduction of the whole OAA, comprising 754 km^2, down to the WDA boundary comprising 510 km^2 which is the area being taken forward for scoping.

133. Further refinement of the WDA boundary is likely once additional data is collected following the completion of further WDA surveys and studies, and as part of the outcomes of the EIA process, including feedback from stakeholders. The key factors which have informed the selection of the reduced WDA boundary taken forward for scoping have included but are not limited to:

- Engineering constraints identified from data gathered during a site investigation campaign;
- Seascape, landscape and visual impacts; and
- The presence of the Dubh Artach lighthouse.

134. A site investigation survey campaign was undertaken across the OAA from August to November 2023, comprising geophysical and environmental survey techniques. The purpose of this survey campaign was to collect data on seabed geology, ground conditions, bathymetry, water depth, eDNA, contaminants and benthic habitats. This survey data was used to assess engineering feasibility and inform definition of the WDA, and also collect additional environmental information.

135. Areas throughout the northern extent of the OAA feature water depths which are likely to be beyond those economically feasible for WTGs installed on fixed foundations. Certain areas across the northern extent of the OAA have therefore been discounted when defining the WDA. A key engineering constraint relates to the presence of surface and shallow bedrock along a significant portion of the southern border of the OAA as identified by geophysical surveys undertaken in 2023 (**Section 6.5**). The presence of shallow bedrock will greatly limit foundation options, resulting in designs that are less economical, and which have a higher installation risk. Therefore, areas throughout the southern portion of the OAA were discounted when defining the WDA.

136. With respect to seascape, landscape and visual constraints, a minimum buffer of 12 km from the nearest islands (Islay and Colonsay) has been implemented to define the eastern and southern extents of the WDA boundary (further detail on seascape considerations is provided in **Chapter 16 Seascape, Landscape and Visual Impacts**).

137. Finally, the Dubh Artach lighthouse (a listed heritage asset) is located on a rocky outcrop within the northeast boundary of the OAA (**Figure 1.1**) and the shallow water depths in the immediate vicinity of the lighthouse, coupled with the deep-water areas to its north and east, have resulted in avoidance of this area during the definition of the WDA. Further information on the existing infrastructure identified within the WDA is provided in **Chapter 17 Infrastructure and Other Marine Users**.

138. Ongoing appraisal of the WDA boundary will take place as the Project moves through the EIA process and as further information comes to light and in response to stakeholder feedback.

3.6.2 Consideration of Alternatives

139. As referenced above, the WDA is located wholly within the W1 POA identified within the SMP as part of a strategic plan-led process undertaken by the Scottish Government (**Section 3.6.1.2**). The EIAR will set out the reasonable alternatives considered by the Applicant.

3.7 REFERENCES

Carbon Trust (2015). Sectoral Marine Plan for Offshore Wind Energy. Cable Burial Risk Assessment Methodology: Guidance for the Preparation of Cable Burial Depth of Lowering Specification.

Marine Scotland (2018). Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications. Available at: https://www.gov.scot/publications/marine-scotland-consenting-licensing-manual-offshore-wind-wave-tidal-energy-applications/documents/. [Accessed 16/07/2024]

Scottish Government (2020). Sectoral Marine Plan for Offshore Wind Energy. Published 28 October 2020.

Scottish Government (2022). Guidance for applicants on using the design envelope for applications under section 36 of the Electricity Act 1989. Scottish Government.

4 APPROACH TO SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

4.1 INTRODUCTION

140. This chapter describes the methodology that will be applied in the Environmental Impact Assessment (EIA). It outlines the methodologies for the identification, evaluation and assessment of likely significant environmental effects (as defined in the EIA Regulations – **Section 2.7**), presents the proposed methodology for the identification, evaluation and assessment of cumulative effects and inter-related effects and considers the likelihood of transboundary effects. A systematic and auditable evidence-based approach will be followed to evaluate and interpret likely significant effects (LSE) on physical, biological and human receptors.

141. The Windfarm Development Area (WDA) EIA Report (EIAR) will include a 2-step impact assessment of the LSE resulting from the Project. The following steps will be considered:

- **Windfarm Development Area (WDA) alone**: An assessment of the construction, operation and maintenance (O&M), and decommissioning of the WDA activities only; and
- **WDA, Offshore Transmission Development Area (OfTDA) and Onshore Transmission Development Area (OnTDA) combined appraisal**: An appraisal of the construction, O&M and decommissioning of the WDA activities, OfTDA and OnTDA activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure the whole Project is considered.

142. The EIA process is a systematic and ongoing process that continues throughout the development phase until consent award. The process requires a detailed understanding of the Project's design and activities, the receiving environment, and the significance of any effects on the identified receptors.

143. This chapter provides a general assessment methodology which will be applied except where deviations for individual topic receptors are required. Receptor specific methodologies are presented for:

- **Chapter 11 Offshore Ornithology**;
- **Chapter 12 Marine Mammals**;
- **Chapter 13 Shipping and Navigation**;
- **Chapter 16 Seascape, Landscape and Visual Impacts**;
- **Chapter 18 Socio-economics**;
- **Chapter 19 Climate Change**; and
- **Chapter 20 Major Accidents and Disasters**.

4.2 GUIDANCE AND BEST PRACTICE

144. Current best practice guidelines for methodologies to establish baseline conditions at Offshore Windfarm (OWF) sites have been developed from experience gained through various OWF developments throughout the United Kingdom (UK). Statutory bodies, conservation advisors, trade associations and Collaborative Offshore Wind Research into the Environment have all published a range of best practice and guidance documents and these have been used to facilitate the development of Scottish-specific best practice methodologies. Accordingly, NatureScot has held best practice and 'sharing good practice' seminars, involving stakeholders and OWF developers, with the aim to facilitate development of best practice within the Scottish Waters and review applicable lessons learnt from elsewhere.

145. The following guidance and best practice documents have been developed to assist the EIA process:

- Marine Scotland (2018). Marine Scotland Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications;
- Scottish Government (2013). Planning Advice Note (PAN) 1/2013 EIA Regulations;
- Scottish Government (2017). Planning Circular 1/2017: Environmental Impact Assessment Regulations;
- Scottish National Heritage (SNH) (2018). Handbook on Environmental Impact Assessment – Version 5;
- Marine Scotland (2022). Guidance for Applicants on using the Design Envelope for Applications under Section 36 of the Electricity Act 1989;
- Scottish Government (2023). National Planning Framework 4 (NPF4);
- Chartered Institute for Ecology and Environmental Management (CIEEM, 2018). Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine;
- Institute of Environmental Management and Assessment (IEMA) (2015). IEMA Environmental Impact Assessment Guide to Shaping Quality Development;
- Institute of Environmental Management and Assessment (IEMA, (2017). Delivering Proportionate EIA. A Collaborative Strategy for Enhancing UK EIA Practice;
- Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2004). Offshore Wind Farms: Guidance Note for EIA in Respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) Requirements;
- Cefas (2012). Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects;
- RenewableUK (2013). Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms;
- Oslo and Paris Conventions (OSPAR) Commission (Convention for the Protection of the Marine Environment of the North-East Atlantic) (2009). Assessment of the Environmental Impacts of Cables;
- European Commission (1999). Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions;
- European Commission (2017). EIA of Projects – Guidance on the preparation of the EIAR;
- Maclean et al. (2009). A Review of Assessment Methodologies for OWFs
- Planning Inspectorate (2019). Advice Note Seventeen: Cumulative Effects Assessment (CEA) relevant to nationally significant infrastructure projects; and
- The Cumulative Effects Framework, which is under development by Marine Directorate Licensing Operations Team (MD-LOT) and NatureScot will be considered for use in the EIA (for relevant receptors) when available.

4.3 THE EIA PROCESS

146. The EIA process can be broadly summarised as having the following stages:

- **Scoping:** the applicant requests a Scoping Opinion from the Scottish Ministers through the submission of a Scoping Report (this document) to confirm the EIA methodology and the LSE to be carried forward.
- **Consultation:** in line with Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013, the Applicant is undertaking Pre-application Consultation (PAC) to inform the design and assessment in line with good practice for EIA and consenting processes (see **Chapter 5 Consultation and Stakeholder Engagement**);
- **EIAR preparation and submission**: this constitutes the bulk of the EIA process and pulls together the outcomes of the assessment of LSE from the Project on the environment during the construction, O&M, and decommissioning stages whilst taking account of stakeholder feedback and guidance. The approach to this stage is detailed in **Section 4.4**.
- **Determination**: following submission, the competent authority will examine all the documentation provided during the application process and reach a reasoned conclusion on the LSE of the project on the environment. The environmental information, and the conclusions reached, alongside feedback received from stakeholders and the public, must be considered by the competent authority in deciding whether or not to give consent for the project. The competent authority must also consider whether any proposed mitigation and monitoring measures are appropriate.
- **Decision notice**: the decision reached by the competent authority during the determination process must be published, through the form of a 'decision notice' that is made available to the public and consultation bodies. The decision notice incorporates the competent authority's reasoned conclusions on the likely significance of effects of the project on the environment.

147. The stages of the licensing and consenting process in Scottish waters are illustrated in **Figure 4.1**.

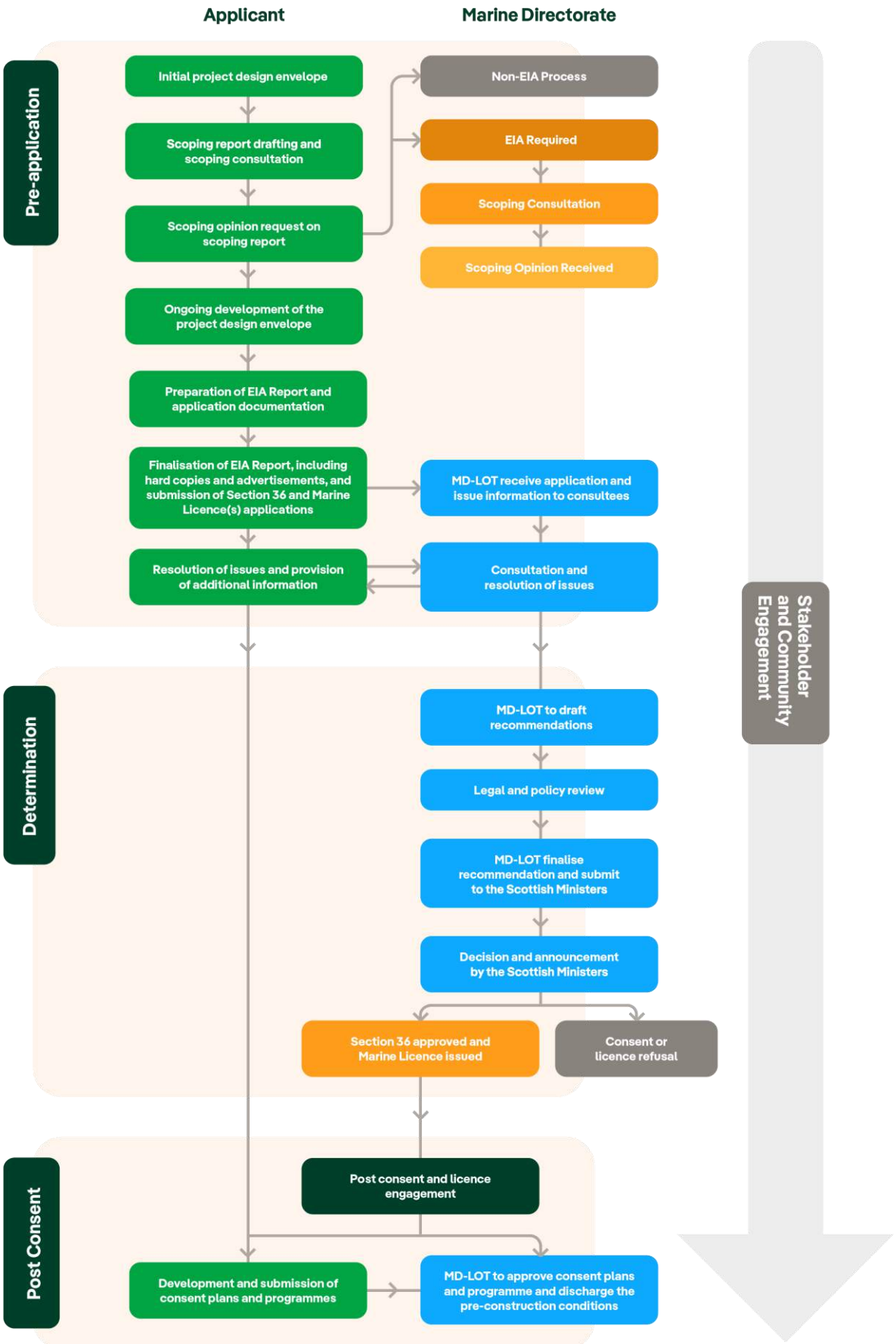

Figure 4.1 Stages of the licensing and consenting process in Scottish waters

4.4 ASSESSMENT METHODOLOGY

148. This section outlines the assessment methodology for identification, evaluation and assessment of LSE and cumulative effects. It also considers the methodology for inter-related effects across different receptor groups and any transboundary effects (i.e., effects on European Economic Area (EEA) states).

149. An overview of the approach to assessment methodology is illustrated in **Figure 4.2**.

150. Within the EIAR, the assessment of each receptor topic will be included in separate chapters. Within each of the topic chapters, the following matters will be considered:

- Consideration of applicable legislation, policy, and guidance context;
- Summary of consultation activity, including comments received in the Scoping Opinion and PAC;
- Identification of the Study Area and existing data sources;
- Description of the environmental baseline conditions, including future baseline;
- Assessment of LSE, which includes:
  - Identification of the maximum design envelope for each impact;
  - A description of the embedded mitigation measures adopted via Project design and good industry practice which avoid, reduce, or offset environmental effects; and
  - Identification of potential impacts and the assessment of the LSE.
- Identification of any additional mitigation measures required in respect of LSE, together with consideration of any residual effects;
- Identification of any future monitoring required;
- Assessment of any cumulative effects with other developments, including those that are proposed, consented and under construction (including, where applicable, those projects, plans or activities that are currently operational that were not operational when baseline data was collected); and
- Assessment of any transboundary effects.

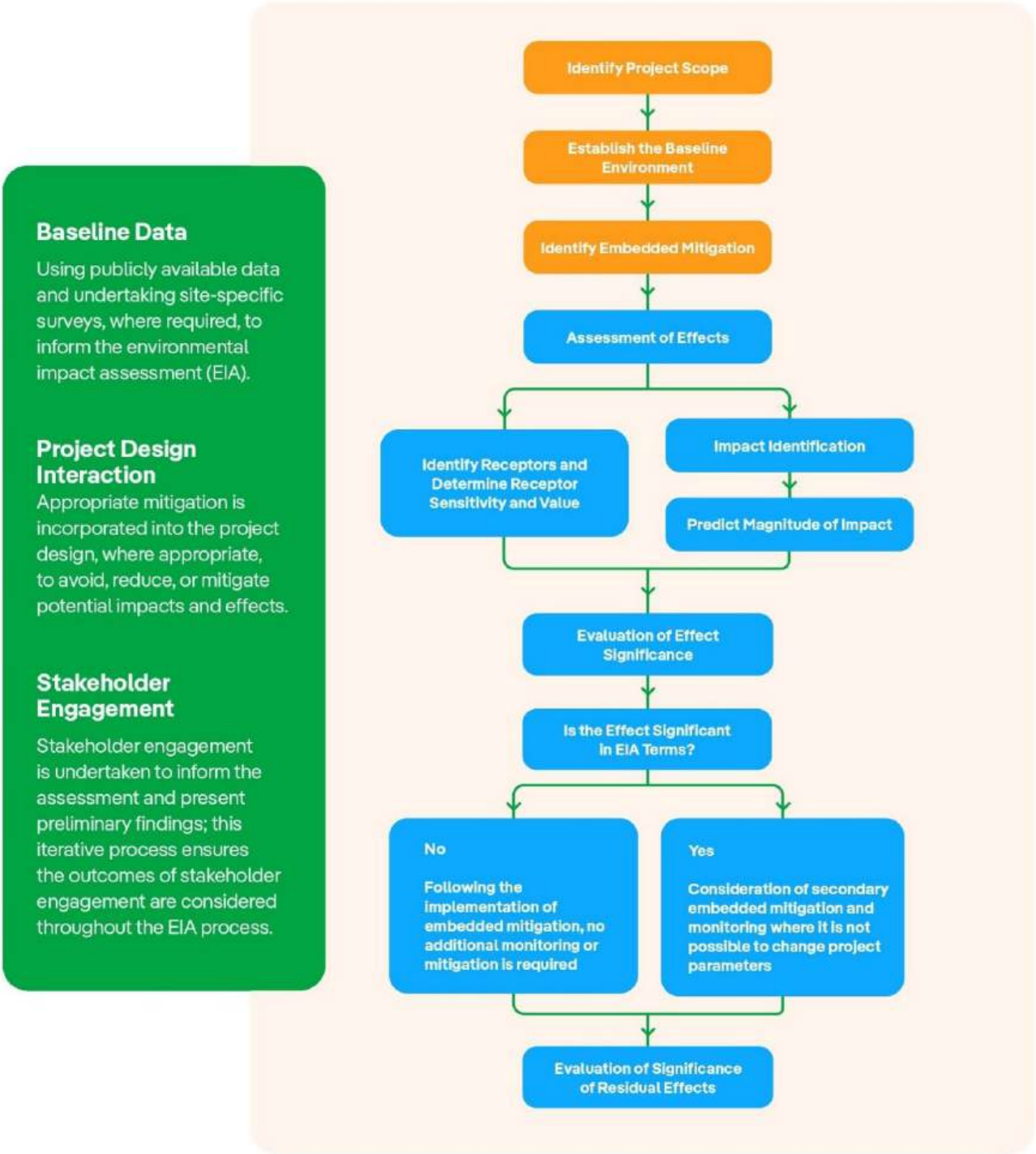

Figure 4.2 Overview of Environmental Impact Assessment Methodology

4.4.1 Baseline Environment

4.4.1.1 Study Area / Zone of Influence

151. Study areas/zone of influence will be defined for each topic at the relevant scale and are stated within the topic chapters. These will be determined by a number of factors such as the distribution of receptors, footprint of potential impact and administrative / management boundaries (e.g., territorial waters, International Council for the Exploration of the Seas (ICES) rectangles) and will be discussed with stakeholders.

4.4.1.2 Characterisation of the Existing Environment

152. To undertake an assessment of LSE, an understanding of the baseline is required for each topic in its corresponding study area.

153. Characterisation of the existing environment for each topic will follow the steps listed below:

- Desk-based review of existing data sources;
- Site-specific survey data gathering to supplement existing data, address any key data gaps and increase confidence levels of the assessment; and
- Identification of relevant topic-specific receptors.

154. The specific approach to establishing the characteristics of the existing environment will be presented in each technical chapter within the EIAR. The approach will consider feedback in the Scoping Opinion alongside consultation with a range of statutory and non-statutory stakeholders (see **Chapter 5 Consultation and Stakeholder Engagement**).

4.4.1.3 Evolution of the Baseline

155. The EIA Regulations require an outline of the expected evolution of the baseline, in the absence of the Project being developed (as far as this can be assessed 'with reasonable effort' based on available information and scientific knowledge). Each respective topic chapter will present the anticipated trend of the existing environment over the anticipated timescales of the Project's construction and operational lifespan. Such trends reflect natural changes in the baseline environment that may be expected to occur without development.

4.4.2 Assessment of Likely Significant Effects

156. Assessment of LSE during the construction, O&M and decommissioning phases of the Windfarm Development Area (WDA) will be undertaken by practitioners and technical specialists using existing and project specific datasets. To provide a consistent framework and system of common tools and terms, where appropriate, a matrix approach will be used to frame and present the judgements made.

157. For each receptor topic, the latest guidance and good practice will be used. Therefore, criteria for sensitivity of receptor (see **Section 4.4.2.3**) and magnitude of impact (see **Section 4.4.2.4**) will be tailored to suit each receptor. As required by the EIA Regulations, only effects that are likely to be significant (see **Section 4.4.2.5**) require detailed assessment. Impact assessment is conducted taking embedded mitigation into account (see **Section 4.4.2.8**).

158. Potential for impacts and LSE of the WDA, Offshore Transmission Development Area (OfTDA) and Onshore Transmission Development Area (OnTDA) will also be appraised, (commensurate with the level of detail that is available at the time of carrying out the assessment).

4.4.2.1 Impact Identification

159. Potential impacts may be classified as follows:

- **Direct impacts**: these may arise from impacts associated with the construction, O&M, or decommissioning of the Project;
- **Indirect impacts**: these may be experienced by a receptor that is removed (e.g., in space or time) from the direct impact (e.g., noise impacts upon fish which are a prey resource for fish or mammals);
- **Inter-relationships between impacts**: whereby the same receptor or receptor group is affected by multiple impacts acting together (see **Section 4.4.2.6**); or
- **Cumulative impacts**: these may occur as a result of the Project in conjunction with other existing or planned projects within the study area for each receptor (see **Section 4.4.3**).

4.4.2.2 Impact Pathway

160. The EIA will use the conceptual 'source-pathway-receptor' model. This model identifies potential impacts resulting from the proposed activities on the environment and sensitive receptors within it. This process provides an easy-to-follow assessment route between impact sources and potentially sensitive receptors ensuring a transparent impact assessment. The aspects of this model are defined as follows:

- **Source** – the origin of a potential impact (i.e. an activity such as piling and a resultant effect e.g. noise resulting from the piling works);
- **Pathway** – the means by which the effect of the activity could impact a receptor (e.g. for the example above, disturbance/injury to nearby species); and
- **Receptor** – the element of the receiving environment that is impacted (this could either be a component of the physical, ecological, or human environment, e.g. for the example above, species susceptible to noise impacts).

161. Where a different approach has been necessary to reflect the specific assessment requirements of a particular receptor, this is described in the relevant technical chapter of this Scoping Report.

162. As described in **Section 4.1**, the EIA will assess the LSE in two steps by considering the source, pathway and receptors for:

1. The WDA alone; and
2. The WDA, OfTDA and OnTDA combined appraisal.

163. This approach will enable potential interactions between each Development Area to be identified and appraised. For example, LSE may arise on offshore ornithology receptors as a result of the long-term presence of the WDA infrastructure in a WDA alone assessment but no interactions or additive LSE may arise as a result of the long-term presence of WDA, OfTDA and OnTDA infrastructure given the export cable will be buried (where possible) in the seabed and below ground onshore. The qualitative appraisal of both the OfTDA and OnTDA will be commensurate with the level of detail available at the time of writing.

164. The Applicant is awaiting greater certainty on the location for the new High Voltage Direct Current (HVDC) switching station in South Ayrshire and the onshore infrastructure requirements and as such, the OfTDA and OnTDA are undefined (**Section 1.3**). Therefore, each topic chapter in this Scoping Report only considers the WDA study area and WDA baseline environment.

165. It is anticipated that the HVDC switching station and grid connection location is likely to be confirmed in 2025 which will enable the presentation of a qualitative impact appraisal of the LSE of the WDA, OfTDA and OnTDA within the WDA EIAR. This impact appraisal will be based on a wide export cable corridor that will connect the WDA to a landfall location(s) in South Ayrshire. Offshore engineering and environmental surveys enabling OfTDA refinement are anticipated to take place after the WDA EIAR has been submitted to the consenting authorities.

166. When it is time to bring forward the OfTDA and OnTDA consenting strategies, their respective scoping and EIARs will include the LSE assessment outcomes of the WDA EIA.

4.4.2.3 Determining Receptor Sensitivity and Value

167. The sensitivity of a receptor is determined through its ability to accommodate change and to recover from that change if it is affected. Receptor sensitivity will be assigned based on species receptor-specific adaptability, tolerance, and recoverability, when exposed to a potential impact. This is achieved through applying known research and information on the status and sensitivity of the feature under consideration coupled with professional judgement and past experience. The following parameters will be considered:

- Timing of the impact: whether impacts overlap with critical periods of the receptor, e.g. life-stages or seasons for ecological receptors; and
- Probability of the receptor-effect interaction occurring (e.g. vulnerability).

168. Example definitions of the different sensitivity levels for a generic receptor are given in **Table 4.1**. It should be noted that the definitions of sensitivity are not constant across all topic areas, and specific reference to the definitions of sensitivity for the topic-relevant receptors are provided within each respective topic chapter.

Table 4.1 Example definition of different sensitivity levels for a generic receptor

Sensitivity	Definition
High	Individual receptor has very limited or no capacity to avoid, adapt to, accommodate, or recover from the anticipated impact.
Medium	Individual receptor has limited capacity to avoid, adapt to, accommodate, or recover from the anticipated impact.
Low	Individual receptor has some tolerance to accommodate, adapt or recover from the anticipated impact.
Negligible	Individual receptor is generally tolerant to and can accommodate or recover from the anticipated impact.

169. In addition, the 'value' of the receptor forms an important element within the assessment, for instance, if the receptor is a protected species or habitat, or has economic value.

170. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national, or international scale, and in the case of biological receptors whether the receptor has a key role in the ecosystem function. Example definitions of the value levels for a generic receptor are given in **Table 4.2**.

Table 4.2 Example definitions of the value levels for a generic receptor

Value	Definition
High	Internationally/nationally important (for example internationally or nationally protected site).
Medium	Regionally important/regionally protected site.
Low	Locally important/rare.
Negligible	Not considered to be important (for example common or widespread).

171. The terms 'high value' and 'high sensitivity' are not necessarily linked within a particular impact, and it is important not to inflate effect significance specifically because a feature is valued.

172. Expert judgement is particularly important when determining the sensitivity of receptors. For example, an Annex II species (under the Habitats Regulations) would have a high inherent value but may be tolerant to an impact or have high recoverability. In this case, sensitivity should reflect the ecological robustness of the species and not necessarily default to its protected status.

4.4.2.4 Predicting Magnitude of Impact

173. The magnitude of change affecting a receptor that would result from the WDA will be identified on a scale from minor alterations or change, up to major changes or the total or substantial loss of the receptor. For certain environmental effects, the magnitude of change would be related to guidance on levels of acceptability (for example, for air quality), and is therefore based on numerical parameters. For others it will be a matter of professional judgement to determine the magnitude of

change, using descriptive terminology. The relevant guidance for each receptor is discussed in the technical chapters of this Scoping Report.

174. The magnitude and probability of an impact occurring will be established through consideration of:

- Scale or spatial extent (small scale to large scale or a few individuals to most of the population);
- Duration (short term to long term);
- Likelihood of impact occurring;
- Frequency; and
- Nature of change relative to the baseline.

175. The categorisation of magnitude of impact will vary for specific pathways, receptors, and technical assessments. Example definitions of the magnitude levels for a generic receptor are given in **Table 4.3**.

Table 4.3 Example definitions of the magnitude levels for a generic receptor

Magnitude	Definition
High	Fundamental, permanent/irreversible changes, over the whole receptor, and/or fundamental alteration to key characteristics or features of the receptor's character or distinctiveness.
Medium	Considerable, permanent/irreversible changes, over the majority of the receptor, and/or discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness.
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and/or limited but discernible alteration to key characteristics or features of the receptor's character or distinctiveness.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the receptor's character or distinctiveness.

4.4.2.5 Evaluation of Effect Significance

176. The significance of potential effects will be defined by considering receptor sensitivity and the magnitude of a given impact. Where there is a lack of suitable data to quantitatively assess impacts for the species under consideration, the assessment will be informed by expert judgement.

177. Following establishment of receptor sensitivity and magnitude of impact, the significance of effect will be predicted by using quantitative or qualitative criteria, as appropriate to ensure a robust assessment. Where possible, a matrix such as the one presented in **Table 4.4** will be used to aid assessment of effect significance based on expert judgement, latest guidance, and any specific input from consultation. The matrix is seen as a framework to aid understanding of how a judgement has been reached from the narrative of each effect assessment and it is not a prescriptive formulaic method. To some extent, defining effect significance is qualitative and reliant on professional experience, interpretation and judgement.

178. A description of the approach to effect assessment and the interpretation of significance levels will be provided within each section of the EIAR. This approach will ensure that the definition of impacts and effects is transparent and relevant to each topic under consideration.

179. In general, effects which are of major or moderate significance are considered to be significant in EIA terms, although it is also possible that a conclusion of moderate effect significance may not be considered significant. In these cases, a justification and rationale will be provided in the EIAR. Whilst minor effects are not significant, these may contribute to significant effects cumulatively or through interactions.

Table 4.4 Matrix for evaluating the significance of an effect

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

180. Through use of this matrix, an assessment of the significance of an effect would be made in accordance with the definitions in **Table 4.5**.

Table 4.5 Definitions of effect significance

Effect Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a national, regional or district level because they contribute to achieving national objectives or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No impact or effect	No change in receptor condition; therefore, no effect.

4.4.2.6 Inter-Related Effects

181. The impact assessment will consider the inter-relationship of impacts on individual receptors. The objective will be to identify where the accumulation of residual impacts on a single receptor, and the relationship between those impacts, gives rise to a need for additional mitigation. When considering the potential for impacts to inter-relate it is assumed that any residual effect determined as having no impact will not result in a significant inter-relationship when combined with other effects on receptors. However, where a series of minor or greater residual impacts are identified, they will be considered further.

4.4.2.7 Confidence

182. Once an assessment of a potential impact has been made, it is necessary to assign a confidence value to the assessment to assist in the understanding of the judgment. A precautionary / worst case approach to assessment ensures consideration of maximum LSE. A simple scale of high-medium-low confidence scale is utilised where high confidence assessments are made based on robust evidence. Lower confidence assessments may be achieved, for example, through extrapolation and use of proxies. Addressing lower confidence assessments may be achieved through continued consultation with stakeholders and / or further survey efforts where appropriate and proportionate.

4.4.2.8 Mitigation and Monitoring

183. Embedded mitigation will be incorporated into the project design and listed where relevant for each topic. All embedded mitigation for each Scoping Report chapter is summarised in **Appendix A Mitigation Register**. Effects will be assessed with this mitigation in place. Where effects are

significant and additional mitigation is identified, impacts may be reassessed and the post-mitigation or 'residual effect' identified. If the impact and effect does not require mitigation (or none is practicable) the residual effect will remain the same.

184. Where an impact assessment identifies that an aspect of the WDA is likely to give rise to significant residual effects, mitigation measures will be considered where appropriate to avoid, reduce or offset effects.

185. Mitigation will take place in the following hierarchy. Where the first measure is not practicable due to constraints including engineering or technology, the next measure will be engaged.

1. The Project design will aim to avoid placing permanent infrastructure within protected sites, where practicable.
2. If avoidance of protected sites is not practicable, the Project will aim to avoid direct impact on the specified features of interest within protected sites via specific construction, O&M and decommissioning methods, where practicable.
3. Where the feature is not static, the design of the infrastructure of the Project must, where practicable, reduce impact on mobile species, therefore reducing the interaction and harm.
4. Where avoidance of features of interest is not practicable, mitigation measures will be developed for construction, O&M and decommissioning to reduce effects as far as practicable, such as work schedule, techniques and working areas, and reinstatement of temporary works.
5. Where impacts are not avoidable, the Project will aim to offset impacts where practicable and/or implement relevant enhancement measures.

186. It is important to note that the mitigation measures applied should be proportionate to the scale of the impact and effect predicted. Appropriate mitigation measures will be discussed with the relevant regulatory authorities and stakeholders.

187. In some cases, to ensure that the mitigation measures are successful or where there is significant uncertainty with respect to important receptors, monitoring may be appropriate. Monitoring programmes are most commonly required prior to, during and shortly after construction but can also be during O&M. The nature of any monitoring will be dependent on the effect or mitigation measure under inspection.

4.4.2.9 Combined Appraisal: Windfarm Development Area, Offshore Transmission Development Area and Onshore Transmission Development Area

188. This section presents how the Applicant proposes to present the combined impact appraisal of interactions between the WDA, OfTDA and OnTDA (i.e. considering impact interactions and additive effects to determine if any effects would be materially elevated from those assessed for the WDA alone assessment). This will be referred to as the combined appraisal.

189. In this context, interactions are considered where there may be spatial overlap of effects and additive effects are considered where there may be incremental effects on the same receptor, including increased temporal effects.

190. The combined appraisal will be set out in each technical topic of the WDA EIAR (commensurate with the level of detail available at the time of carrying out that assessment). This approach will ensure a whole Project assessment is undertaken.

191. As stated in **Section 4.4.2.2**, it is anticipated that the HVDC switching station and grid connection location will be confirmed in 2025. The impact appraisal will be based on a wide export cable corridor that will connect the WDA to a landfall location(s) in South Ayrshire. Offshore engineering and environmental surveys enabling OfTDA refinement are anticipated to take place after the WDA EIAR has been submitted to the consenting authorities.

192. When it is time to bring forward the OfTDA and OnTDA consenting strategies, their respective, scoping and EIARs will include the likely residual effects assessment outcomes of the WDA EIA.

193. Each topic specific chapter will include a qualitative discussion where potential interactions and additive effects between the WDA and the OfTDA and OnTDA will be considered with the aim of identifying whether effects could result in those of greater significance than assessed for the WDA alone assessment. To accompany the description, a combined appraisal summary table will be set out and **Table 4.6** presents an example of such a table. It is proposed that only residual effects are taken forward for consideration in the combined appraisal.

Table 4.6 Example Combined appraisal summary (topic specific tables to be set out in each topic chapter in the Windfarm Development Area Environmental Impact Assessment Report)

Receptor/Topic	WDA Residual Effect	OfTDA Appraisal of Effects	OnTDA Appraisal of Effects	Combined Appraisal
Marine Physical Environment				
C* Impact 1: Impacts on Suspended Sediment Concentrations (SSCs) and transport.	Not Significant (Negligible Adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely, despite some interaction expected between sediment plumes and additive effects.
Marine Mammals				
C Impact 1: Underwater noise associated with other construction and maintenance activities: auditory injury.	Not Significant (Minor adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely given the reduced number of construction and maintenance vessel requirements for the OfTDA compared to the WDA.
Offshore Ornithology				
C and D* Impact 1: Temporary disturbance and displacement.	Not Significant (Minor Adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely, despite some additive effects in relation to temporary disturbance during construction.
O&M* Impact 1: Barrier effects from the physical presence of the WDA infrastructure.	Not Significant (Negligible to Minor Adverse).	Not Significant (No change).	N/A – no pathway to receptors.	No significant residual effects likely, given the limited operational impact of the OfTDA.
Commercial Fisheries				
C, O&M and D Impact 1: Reduction in access to, or exclusion from established fishing grounds.	Not Significant (Minor adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely despite some additive effects across the region.

Receptor/Topic	WDA Residual Effect	OfTDA Appraisal of Effects	OnTDA Appraisal of Effects	Combined Appraisal
Marine Archaeology				
C, O&M and D Impact 1: Direct impacts to heritage assets.	Not Significant (Negligible to Minor Adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely, given the mitigations relevant for each Development Area.
Onshore and Intertidal Ornithology				
C, O&M and D Impact 1: Temporary disturbance and displacement.	N/A – no pathway to receptors.	Not Significant (Negligible Adverse).	Not Significant (Negligible to Minor Adverse).	No combined effects as no overlap in receptors.
Offshore Air Quality				
C, O&M and D Impact 1: Vessel emissions on onshore receptors.	Not Significant (Negligible Adverse).	Not Significant (Negligible Adverse).	Not Significant (Negligible Adverse).	No significant residual effects likely, despite potential for some additive effects at ports.
* C = Construction, O&M = Operation and Maintenance, D = Decommissioning				

4.4.3 Assessment of Cumulative Effects

194. The Cumulative Effects Assessment (CEA) will consider the impacts arising from the WDA, OfTDA and OnTDA cumulatively with other relevant plans, projects and activities on the same receptor or resource.

195. Schedule 4 of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and Schedule 4 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 require that cumulative effects of the development be described in the EIAR. Planning Circular 1/2017 (Scottish Government, 2017) and Planning Advice Note 1/2013 (Scottish Government, 2013) also sets out this requirement. Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications (Scottish Government, 2018), provides some guidance on the types and status of projects to be considered in the CEA. NatureScot guidance on assessing cumulative impacts on ornithology receptors will be followed as described in **Chapter 11 Offshore Ornithology**.

196. The CEA will have regard to the relevant guidance described in this chapter of the Scoping Report, specifically Planning Inspectorate (2019). This will be updated with relevant information from the Cumulative Effects Framework when this is made publicly available.

197. The CEA alongside other plans or projects will be considered in a staged process:

- Stage 1: Cumulative Effects Screening; and
- Stage 2: Cumulative Effects Assessment.

4.4.3.1 Stage 1: Cumulative Effects Screening

198. In accordance with guidance documents discussed in this chapter of the Scoping Report, other plans or projects that are deemed likely to go ahead or are going ahead, and for which sufficient information

is available, will be taken forward for consideration. For the purposes of the CEA, the criteria of other plans or projects that are proposed for consideration include those:

- Already constructed;
- Under construction;
- Permitted application(s), but not yet implemented;
- Submitted application(s) not yet determined; and
- Plans and projects which are 'reasonably foreseeable', including:
  - Projects in Scottish waters;
  - Projects in English, Welsh and Northern Irish waters, or other non-UK waters if considered to be relevant, have connectivity, or the potential for a cumulative effect;
  - Any potential project that had submitted a Scoping Report up to six months prior to submission of the WDA application date;
  - Offshore wind projects granted an option or Agreement for Lease; and
  - Non-wind projects.

199. The initial 'long list' of plans or projects will be developed based on the above criteria, and will be screened for each potential impact-receptor pathway using the following process:

- **Conceptual overlap**: an impact-receptor pathway describes an impact which has the potential to directly or indirectly affect the receptor(s) in question;
- **Physical overlap**: ability for impacts arising from the WDA, OfTDA and OnTDA to overlap with those from other plans or projects on a receptor basis. An overlap of the Zone of Influences (ZoIs) arising from the two (or more) projects/plans must be established for a cumulative effect to arise. There are exceptions to this for certain mobile receptors that are potentially subject to impacts from multiple plans or projects; and
- **Temporal overlap**: for a cumulative effect to arise from two or more plans or projects, a temporal overlap of impacts arising from each must be established. Some impacts are active only during certain phases of development phases of the WDA (e.g. piling noise during construction). However, the absence of a strict overlap may not necessarily mean there is no potential for cumulative effect, as receptors may become further affected by additional, non-temporally overlapping projects.

200. On completion of reviewing the long list, the remaining projects or plans are taken forward to the assessment stage. This refined list of projects will be presented to stakeholders and Scottish Ministers via MD-LOT as part of ongoing consultation in the post-Scoping phase.

4.4.3.2 Stage 2: Cumulative Effects Assessment

201. Information will be gathered at the assessment stage on plans or projects taken forward from the screening stage. Where the LSE for the WDA alone are assessed as negligible, or where an effect is predicted to be highly localised, these will not be considered within the CEA, as it is considered that there would be no potential for cumulative effects with other plans or projects.

202. A tiered approach will be used when undertaking the CEA. This will provide a framework for placing relative weight on the potential for each plan or project to be included in the CEA, based on the plans or project's current stage of maturity, certainty in the design or effects and overall availability of detail on which to carry out an assessment. Projects or plans that will be assessed in Stage 2 will use the following tiers:

- **Tier 1 assessment**: projects which are operational (but not part of the baseline), under construction, those with consent and submitted but not yet determined;
- **Tier 2 assessment**: all plans/projects assessed under Tier 1, plus those projects with a Scoping Report and/or Scoping Opinion; and

- **Tier 3 assessment**: all plans/projects assessed under Tier 1 and Tier 2, plus those projects likely to come forward where a Crown Estate Scotland (CES) Option to Lease Agreement or equivalent has been granted (i.e., ScotWind and INTOG projects).

203. The CEA methodology will follow the methodology described in this chapter of the Scoping Report, where appropriate, for consistency throughout the EIA. Where potential cumulative environmental impacts have been identified, these will be considered further in the EIA.

204. It is expected that the following activity types will be considered in the CEA based on maximum ZoIs identified from the relevant technical assessments detailed within this Scoping Report:

- Other OWFs;
- Aggregate extraction and dredging;
- Licenced disposal sites;
- Navigation and shipping associated with any particular plan or project, not considered to be part of the baseline;
- Commercial fisheries;
- Subsea cables and pipelines;
- Potential port and harbour development;
- Oil and gas activities;
- Carbon Capture and Storage; and
- Unexploded Ordnance (UXO) clearance.

205. The Applicant will seek agreement with MD-LOT on the list of projects and/or plans to be included in the CEA as part of ongoing post-Scoping consultation.

4.4.4 Transboundary Effects

206. Transboundary effects arise when impacts from a Project within one EEA state's[7] territory affects the environment of another EEA state(s). The EIA Directive, and thus the relevant EIA Regulations, requires the assessment of transboundary effects. The need to consider such transboundary effects has been embodied by the United Nations Economic Commission for Europe Convention on EIA in a Transboundary Context (commonly referred to as the 'Espoo Convention'). The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary effects. The Espoo Convention has been transposed into Scottish EIA law by way of Regulation 29 of the Electricity Works (EIA (Scotland) Regulations 2017, and Regulation 30 of the Marine Works (EIA) (Scotland) Regulations 2017). These Regulations set out the processes for consultation and notification. If a project is considered to cause significant transboundary effects, the EIA Regulations 2017 require Scottish Ministers to engage with the affected EEA State and invite them to participate in consultation.

207. The procedures involve providing information to the Member State and for the Scottish Ministers to consult with that State regarding the significant effects of the Project and the associated mitigation measures.

208. Transboundary effects, like cumulative effects, are assessed on a topic-by-topic basis for offshore topics. In terms of the WDA, OfTDA and OnTDA, transboundary impacts will relate primarily to projects that may affect mobile species, and to projects that are located close to the national boundaries, or to areas administered by other relevant authorities.

[7] Following the exit of the UK from the EU in December 2020, the UK is no longer an EEA state. However, for the purposes of assessing potential transboundary effects, the approach outlined above has been followed for the Project.

209. As detailed in the technical chapters, the following receptors may experience transboundary impacts from the WDA, OfTDA and OnTDA:

- **Chapter 10 Marine Mammals**;
- **Chapter 11 Offshore Ornithology**;
- **Chapter 12 Commercial Fisheries**;
- **Chapter 13 Shipping and Navigation**;
- **Chapter 18 Socio-economics**; and
- **Chapter 19 Climate Change**.

210. Where applicable, consideration of transboundary effects will follow the standard approach to EIA with regards to sensitivity, magnitude, and significance. The assessment will be presented within each technical chapter of the EIAR where relevant.

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5 CONSULTATION AND STAKEHOLDER ENGAGEMENT

5.1 OVERVIEW

211. Positive and productive stakeholder and community engagement is extremely important to the Applicant, as a responsible developer. The Applicant aims to be a good neighbour to the host communities for the lifetime of the Project. Effective communication ensures key messages are heard, understood, and remembered, and meaningful consultation ensures that local knowledge, specialist interests and technical expertise inform and shape the development of the Project.

212. Consultation enables regulators, interested parties, and the public to provide feedback which can then be incorporated into the planning process and influence decision making. Participation, and where possible, partnership working during the early engagement period and throughout the statutory consultation process is critical to the success of the Project.

213. The Applicant, with support from Royal HaskoningDHV, and Brown and May Marine, has sought to build effective working relationships with stakeholders, and is committed to maintaining and strengthening these relationships throughout the lifetime of the Project.

214. The Project's WDA Engagement Strategy (**Appendix L Windfarm Development Area Stakeholder Engagement Plan**) is a live document which the Applicant will update throughout the lifetime of the Project, noting the dynamic nature of stakeholder engagement to ensure that it reflects advice received from statutory and non-statutory consultees in relation to engagement methods and stakeholder mapping. The strategy draws upon engagement, planning and consenting guidance including, but not limited to:

- Planning Aid Scotland's Scottish Planning = Effective Engagement and Delivery (SP=EED) framework (PAS, 2011);
- Scottish Government Consultation Good Practice Guidance (Scottish Government, 2019);
- National Standards for Community Engagement (Scottish Community Development Centre, 2020); and
- Argyll and Bute Council Consultation Toolkit (Argyll and Bute Council, 2024).

215. In line with Scottish Government's Consultation Good Practice Guidance (2019), the phases of communication and consultation that will be followed throughout the lifetime of the Project are outlined in **Figure 5.1**.

Figure 5.1 Stakeholder Engagement Planning Process

216. This chapter of the Scoping Report provides an overview of the breadth and depth of stakeholder engagement undertaken at the time of writing and **Section 5.3** summarises the early engagement that has been undertaken to date. This chapter also presents the plan for future engagement and consultation activities with stakeholders in **Section 5.4.** This includes, but is not limited to, continued engagement with those stakeholders listed in **Table 5.1** and additional stakeholders that will be identified through stakeholder mapping, which is an iterative process.

217. Topic-specific consultation, and a summary of how the feedback received has been addressed, is detailed within the consultation section of each receptor topic chapter.

5.2 IDENTIFICATION OF STAKEHOLDERS

218. Stakeholders have been organised into broad stakeholder categories to help facilitate focused and targeted engagement based on stakeholders' shared interests, expectations, functions, and needs. These broad categories are listed below:

- Governmental, regulatory, and statutory;
- Environment, heritage and marine;
- Maritime;
- Commercial fisheries;
- Elected representatives;
- Communities;
- Supply chain, skills and STEM (Science, Technology, Engineering, Maths);
- Industry;
- Electricity networks; and
- Infrastructure and transport.

219. Categorising stakeholders in this way enables a gap analysis to be undertaken that will help to identify any underrepresentation of specific interests and allow the Project team to take the appropriate action to adjust the engagement approach if appropriate.

220. **Table 5.1** lists the stakeholders relevant to the Project that have been consulted with at the time of writing this Scoping Report. This list is not exhaustive as additional stakeholders will be identified and consulted with as the Project progresses.

Table 5.1 Stakeholder Map (non-exhaustive)

Stakeholder Category	Identified Stakeholders
Governmental, regulatory, and statutory	• Scottish Government (Offshore Wind Directorate) • Marine Directorate - Licensing and Operations Team (MD-LOT) • Marine Directorate - Science, Evidence, Digital and Data (MD-SEDD) • Crown Estate Scotland (CES) • Argyll and Bute Council • Argyll and Bute Renewables Alliance (ABRA) • Historic Environment Scotland (HES) • NatureScot • Joint Nature Conservation Committee (JNCC) • Maritime Coastguard Agency (MCA) • Northern Lighthouse Board (NLB) • Ministry of Defence (MoD) • Office of Gas and Electricity Markets (Ofgem) • National Islands Plan Delivery Group • Highlands and Islands Enterprise (HIE) • Scottish Enterprise
Environment, Heritage and Marine	• Hebridean Whale and Dolphin Trust (HWDT) • Royal Society for the Protection of Birds (RSPB) Scotland • Whale and Dolphin Conservation (WDC) • National Trust for Scotland (NTS) • Fisheries Management Scotland (FMS) • Clyde Marine Planning Partnership
Maritime	• Scottish Maritime Cluster (SMC) • Women's International Shipping & Trading Association UK (WISTA UK)
Commercial Fisheries	• Clyde Fishermen’s Association (CFA) • Mull and Iona Fishermen’s Association (MIFA) • Communities Inshore Fisheries Alliance (CIFA) • Scottish Fishermen’s Federation (SFF) • South West Coast Regional Inshore Fisheries Group (SWCRFG) • Scottish White Fish Producers Association (SWFPA) • Scottish Pelagic Fishermen’s Association (SPFA) • Mowi ASA • WDA Fishers
Elected Representatives	• Kintyre and the Islands councillors • Argyll and Bute MSP • Argyll and Bute MP
Communities	• Community councils – various • Community charities and companies – various • Seldom heard groups – various • Local media

Stakeholder Category	Identified Stakeholders
Supply chain, skills & Science, Technology, Engineering, Maths (STEM)	• Developing the Young Workforce (DYW) • Schools – various • Estate owners – various • Distilleries – various • Local suppliers – various
Industry	• Argyll Lomond & the Islands Energy Agency (ALIenergy) • DeepWind Offshore Wind Cluster • Scottish Offshore Wind Energy Council (SOWEC) • Offshore Wind Industry Council (OWIC) • Scottish Renewables • Renewable UK • Prosper • Offshore wind developers – various
Electricity Networks	• Scottish Hydro Electric Transmission PLC (SHET) • Scottish Hydro Electric Power Distribution (SHEPD)
Infrastructure and Transport	• Ports – various • Loganair • David MacBrayne Limited • Caledonian Maritime Assets Limited (CMAL) • Caledonian MacBrayne (CalMac) • Peel Ports Group Ltd. (Greenock Ocean Terminal) • Civil Aviation Authority (CAA) • National Air Traffic Safeguarding (NATS) • Highlands and Islands Airports Limited (HIAL)

5.3 CONSULTATION TO DATE

221. The Applicant understands the importance of nurturing relationships and maintaining trust with stakeholders throughout the lifetime of the Project, from development and consent through to operations and maintenance, and decommissioning. This section summarises the early engagement undertaken at the time of writing of this Scoping Report.

5.3.1 Pre-bid Engagement

222. The Applicant undertook stakeholder engagement prior to submitting the ScotWind bid. This engagement was with statutory and non-statutory consultees, including MD-LOT, MD-SEDD, NatureScot and RSPB Scotland, to better understand potential constraints, challenges, and opportunities presented in site selection.

5.3.2 Marine Activity Requests and Notifications

223. Prior to undertaking marine activities, such as offshore surveys and deployment and extension of marine equipment on site, the Applicant notifies relevant stakeholders (NLB, NatureScot, MoD and MCA) of the licence request submission to the Marine Directorate. The purpose of this notification is to outline the mitigation measures that avoid disturbance to marine wildlife, operations, and navigation, and to ensure the works and information provided are satisfactory to stakeholders.

224. Notice to Mariners are issued in advance of offshore survey works associated with vessels being used for the Project; these notices detail the location, timings and vessels involved. The notices are submitted to the Kingfisher website and are available to view and download from the Project's website.

5.3.3 Project Updates

225. From the point of option agreement award in January 2022, the Applicant launched engagement activities to introduce stakeholders to the Project and Project team at the earliest stage of development. This section summarises the early engagement that has been undertaken to date; the engagement activities are listed in full in **Appendix M Stakeholder Engagement Log.**

5.3.3.1 Governmental, Regulatory and Statutory Consultee Engagement

226. The Applicant has undertaken regular communication with governmental, regulatory, and statutory stakeholders throughout the Project's development, including but not limited to CES, MD-SEDD, MD-LOT, NatureScot, Argyll and Bute Council (including Rural Growth Deal), and HES. Early engagement with these stakeholders has enabled the Applicant to:

- Seek strategic industry advice and updates, such as changes to the consenting process and new active research projects;
- Present project updates, such as publications of reports and survey work progress; and
- Discuss the Environmental Impact Assessment (EIA), such as approaches to scoping and baseline data.

227. Since 2022, the Applicant has held quarterly update meetings with NatureScot and MD-LOT and separately with CES. The Applicant issues a report prior to each meeting covering development activities, stakeholder engagement, supply chain and project programme; these updates form the basis of the discussion during the quarterly update meetings.

228. The Applicant has attended the annual Argyll and Bute Renewables Alliance (ABRA) meetings since 2023. ABRA brings together public and private sector partners, including Argyll and Bute Council; during these meetings, the Applicant presents key project updates, and all parties discuss industry-wide constraints and opportunities to support renewable energy developments in the region.

229. To better understand the shared challenges and ambitions across island communities in Scotland, the Applicant has engaged with the Scottish Government Islands Team, who are helping to deliver on the National Islands Plan.

5.3.3.2 Environment, Heritage, and Marine Engagement

230. Since 2022, the Applicant has engaged with local, regional, and national environmental and marine organisations, including but not limited to Clyde Marine Planning Partnership, RSPB (both at a local and national level), Department of Agriculture, Environment and Rural Affairs (DAERA), and FMS. Through this engagement the Applicant has sought stakeholders' advice to support the EIA scoping process (such as feedback on data sources and guidance used), in addition to discussing stakeholders' priorities, areas of interest and expectations of developers (such as data gaps to fill and stakeholders to engage with).

231. Following engagement with stakeholders in 2022, the Applicant has contributed funding to the Scottish Marine Environmental Enhancement Fund (SMEEF); projects supported include the West Coast Tracking Project.

5.3.3.3 Expert Topic Groups

232. Since 2023, the Applicant has undertaken focused receptor topic engagement with stakeholders through expert topic groups (ETGs), which focus on partnership working between the Applicant and specialists, including NatureScot, DAERA, RSPB Scotland, and Islay Natural History Trust. The purpose of the ETGs has been to introduce the Project to consultees, present survey data collected to date on key topics, and to consult on the assessment methodologies to be undertaken for these key topics in the appropriate consenting documents. These meetings are part of the evidence plan

process, applicable to Nationally Significant Infrastructure Projects (NSIPs) in England and Wales, which the Applicant has adopted for the Project to inform the assessment of key topics and provide the opportunity for sharing of best practice and relevant guidance.

233. To date, two ETGs have been held on offshore ornithology and one ETG on marine mammals. Further information on the ETG meetings is provided in **Chapter 10 Marine Mammals** and **Chapter 11 Offshore Ornithology** of this Scoping Report. The Project intends to undertake further ETG meetings to inform other topics, such as seascape, landscape, and visual impact assessment.

5.3.3.4 Commercial Fishery Engagement

234. The Applicant has held numerous meetings with SFF, SPFA, CFA, CIFA, SWFPA, and SWCRFG to provide commercial fishery-related Project updates on Project parameters, surveys undertaken and refinement of the WDA. These meetings have also been used to gather information relating to commercial fishery activities in the area, including plotter data, and to seek their advice on matters, such as scoped out fishery impacts. Following these meetings, representatives share relevant information, such as Project engagement opportunities, to their members.

235. As Fishery Liaison Officers, Brown and May Marine have supported the Applicant in engaging with local fishers directly and on a regular basis to ensure any questions, concerns or areas of interests pertaining to commercial fisheries can be identified, understood, and responded to. In addition to email and phone correspondence, and sending invites to public information days, the Applicant offered and held one-to-one meetings with commercial fishers and associations (such as MIFA) on Islay, Jura, Mull, and Ireland in 2023 and on Islay again in 2024 to discuss the Project progress, respond to fishers' questions and better understand fishers' challenges, needs and feedback.

5.3.3.5 Elected Representatives

236. Since 2022, the Applicant has engaged with councillors for the Kintyre and the Islands through dedicated Project update meetings with representatives, in addition to attending community and stakeholder events where the representative(s) is present (such as community council meetings). The Applicant has also engaged with the Member of Scottish Parliament (MSP) for Argyll and Bute to provide Project updates and share engagement outcomes.

237. The Applicant notifies elected representatives in advance of public information days with a view to encourage participation, and issues reports pertaining to the Project to ensure representatives are well informed as the Project progresses.

238. Through this engagement, the Applicant has obtained a better understanding of local and regional priorities through the sharing information, including but not limited to obtaining advice on new community groups to contact, news relating to community and local authority emerging plans and policies, and updates relating to other developments in the region. With continued engagement, the Applicant strives to contribute towards addressing challenges and bringing lasting benefits for the region.

5.3.3.6 Supply Chain, Skills, and STEM Engagement

239. The Applicant hosted a 'Meet the Buyer' event in Oban on 06 July 2023 in partnership with DeepWind Cluster, Highlands and Islands Enterprise, and Argyll and Bute Council. The event, which was attended by over 100 representatives, introduced the Project and showcased the range of specialist products and services required in offshore wind development.

240. Following the initial supply chain event, the Applicant has continued to engage with businesses through in-person and online meetings, and having a presence at industry conferences, such as Scottish Renewables' Offshore Wind Conference and Scottish Maritime Cluster's Renewables and

Offshore Wind event. The Applicant is committed to continuing this engagement as the Project progresses to better understand businesses' existing market capability and ambitions for the future.

241. The Applicant has undertaken early engagement with local and regional educators (teachers and Developing the Young Workforce coordinators) to help bridge the gap between education and industry. The Applicant has participated in numerous educational engagement activities at local schools, such as career fayres, networking events, and interactive lessons, to support STEM-related interest and attainment for children and young people. As the Project progresses, the Applicant will continue to engage with educators to develop activities that reflect the learning needs and ambitions of the host communities and wider region.

5.3.3.7 Industry Engagement

242. Recognising the importance of collaborating with stakeholders across the industry, the Applicant has held regular meetings with Scottish Enterprise and Highlands and Islands Enterprise (HIE) since 2023. During these meetings the Applicant provides an update on relevant development activities (such as the Supply Chain Stimulus Fund and publication of socio-economic reports) and stakeholders provide updates and advice on industry matters, including but not limited to, skills gap analysis, supply chain events, and stakeholder mapping.

243. The Applicant has held meetings with the Electricity Supply Board (ESB) in relation to Malin Sea Wind offshore windfarm and with ESB and Northland Power in relation to Spiorad na Mara offshore windfarm to share project development characteristics and updates with a view to better understand, and learn from, neighbouring developments along the west coast of Scotland and to identify opportunities for collaboration and support, such as sharing planned community engagement timelines to mitigate engagement fatigue.

5.3.3.8 Electricity Network Engagement

244. The Applicant has engaged with Scottish Hydro Electric Power Distribution PLC (SHEPD) and Scottish Hydro Electric Transmission PLC (SHET), as the respective electricity distribution and transmission network providers for Islay, Jura, Colonsay, Mull and Iona. This engagement allows for the sharing of appropriate data, regulatory updates, and community engagement outcomes, with a view to inform works and studies relating to the network infrastructure on the islands. The Applicant intends to continue this engagement with SHEPD and SHET as the Project progresses.

5.3.3.9 Infrastructure and Transport Engagement

245. Since 2022, the Applicant has engaged with stakeholders in the infrastructure and transport sectors, as identified in **Table 5.1**. This ensures stakeholders are well informed about the Project scope, timescales, and activities to minimise impact on existing operations, and to ensure the Applicant fully understands future ambitions and plans, such as infrastructure upgrades and expansions, to inform related studies for the Project.

5.3.4 Community Engagement

246. Since the award of the Option Agreement Area (OAA) in 2022, the Applicant has undertaken a series of community council meetings, local development trust meetings and public information days on Islay, Jura, and Colonsay; as the Project has progressed, from March 2024, Mull and Iona have been incorporated into the community engagement process.

247. Since March 2023, the Applicant has employed a dedicated Community Engagement Manager, based on Jura, who is the first point of contact for people living on the islands, keeping local people engaged in the Project and supporting the Project through the planning and development processes.

248. The purpose of the community engagement undertaken to date is to introduce community organisations and the public to the Project and the Project team, with the recognition that relationship building takes time to develop and evolve. Through this community engagement, the Applicant has presented key Project information, including stakeholder mapping and programme of activities, with a view to offer transparency around the processes and timescales involved in the Project and to capture feedback and views to better understand communities' priorities, needs and expectations.

249. In order to maximise attendance at events, the Applicant advertises community engagement opportunities on the Project's website, in local media outlets, on posters in community facilitates, in printed and digitised Project newsletters, and via community organisations' social media pages and email distribution lists.

250. The community engagement activity timeline is outlined below:

- October 2022: the first engagement consisted of introductory meetings with Islay and Jura community councils and local development trusts in addition to one public information day on each island;
- April 2023: update meetings were arranged on Islay, Jura, and Colonsay with Argyll and Bute Council, Islay Energy Trust, local councillors, community councils, and local development trusts. Introductory meetings were held with some local businesses, namely distilleries and estates;
- August 2023: the first public information day was held on Colonsay, and the Applicant sponsored the Islay, Jura and Colonsay Agricultural Show, which involved hosting a stand at the event;
- October 2023: an engagement event focused on children and young people was held on Bowmore Beach, in partnership with marine survey company Fugro, to teach and practice building a small wind turbine using educational offshore wind toolkits;
- February and March 2024: update meetings were held with Islay, Jura and Colonsay community councils and local development trusts;
- May 2024: public information days were held on Jura (07 May), Colonsay (08 May), Bowmore, Islay (09 May) and Port Ellen, Islay (09 May). During this visit, the Applicant met with the Islay Energy Trust (IET) (09 May) to provide members with a Project update;
- June 2024: the first public information days were held on Mull and Iona on 12 June to introduce community members to the Project and team; further engagement is planned with these communities. The Applicant attended a meeting with Islay and Jura Senior Citizen Association to introduce the Project to members; and
- August 2024: the Applicant sponsored the annual Islay, Jura, and Colonsay Agricultural Show, which involved hosting a stand at the event for the second year.

251. Community engagement will continue into Autumn 2024 with community organisations and seldom heard groups, to discuss key Project updates, including but not limited to highlighting where a copy of this Scoping Report can be obtained both in person and online.

252. A list of the community groups and local organisations engaged with to date and a summary of the engagement is presented in **Table 5.2**.

Table 5.2 Summary of meetings with community groups and local organisations

Date	Locations	Community Groups and Local Organisations	Engagement Summary
October 2022	Islay and Jura	Islay Community Council Islay Energy Trust (IET) Jura Community Council Jura Development Trust	Through these introductory meetings, the Applicant gained a richer understanding of local priorities, including but not limited to community benefits, infrastructure constraints, fishery engagement, and supply chain opportunities. This engagement helped strengthen the Applicant's stakeholder mapping process by identifying additional local and regional stakeholders to engage with.
April 2023	Islay, Jura and Colonsay	Argyll and Bute Council Bruichladdich Distillery Bunnahabhain Distillery Colonsay Community Council Colonsay Community Development Company (CCDC) Elixir Distillers IET Islay Estates Islay Community Council Islay Development Initiative Jura Ardlussa Estate Jura Community Council Jura Development Trust Jura Distillery Jura Estate Kilchoman Distillery South Islay Development (SID)	
February 2024	Microsoft Teams	SID	A series of meetings were undertaken with community councils and local development trusts to provide Project updates, such as ongoing Project studies; to outline the engagement activities for 2024 and 2025, including promoting the summer public information days; and to ascertain appetite for a coordinated community group, which would input into community engagement process and plans. Discussions are ongoing with community organisations in relation to forming a coordinated group.
	Jura	Jura Community Council and Jura Development Trust (combined)	
	Microsoft Teams	Colonsay Community Council and CCDC (combined)	
March 2024	Microsoft Teams	Islay Community Council	
	Microsoft Teams	Mull and Iona Community Trust (MICT)	An introductory meeting to provide an overview of the key characteristics and development activities of the Project. Discussions were held to better understand MICT's areas of interest, such as community benefits and investment guidance. The Project intends to continue engaging with MICT and other community groups as the Project progresses.
May 2024	Islay	IET	A Project update meeting, with a focus on timelines, ongoing feasibility studies and the BiGGAR Economics Opportunities and Impacts report, in addition to discussing IET's priorities, including but not limited to the existing and future energy demand of Islay and related infrastructure constraints.

Date	Locations	Community Groups and Local Organisations	Engagement Summary
June 2024	Islay	Islay and Jura Senior Citizen Association	An introductory meeting to provide an overview of the Project and answer questions in person. The Applicant plans to continue engagement with this organisation and other local interest groups as the Project progresses.

253. A summary of the public information days that have been undertaken to date is presented in **Table 5.3**.

Table 5.3 Summary of public information days

Date and Time	Location	Number of Attendees	Description
25 October 2022, 12pm to 3pm	Jura Village Hall, Craighouse	Approximately 55 people attended these events.	Public information days were hosted at accessible community centres where members of the public could meet the team and ask questions relating to the Project. Through this engagement, the Project team gained insight into the key asks of the Applicant in relation to engagement, education, and skills, and supporting local initiatives, in addition to better understanding the different challenges between and within the island communities.
27 October 2022, 3pm to 6pm	Islay Gaelic Centre, Bowmore		
09 August 2023, 5pm to 7pm	Colonsay Village Hall, Scalasaig		
10 August 2023, 10am to 4pm	Islay, Jura and Colonsay Agricultural Show, Bridgend, Islay	Approximately 1,600 attended the Show, with 180 people attending the Project's stand.	The Project team attended the Islay, Jura, and Colonsay Agricultural Show, which involved hosting a stand to encourage event attendees to drop by and ask the team questions and/or collect information, such as printed copies of the Project's community newsletter. Due to the high footfall of this event, the Project team reached members of the community who may not have heard about the Project and/or would not typically attend public information day events.
07 May 2024, 3pm to 6.30pm	Jura Care Centre, Craighouse	Approximately 100 people attended these events.	The second round of public information days was focused on updating those familiar with the Project in terms of key developments, such as the refinement of the WDA and the publication of the BiGGAR Economics Opportunities and Impacts report. For those unfamiliar with the Project, the event comprised of information boards and printed maps and leaflets, which detailed the geographic, technical and temporal scope of the Project, in addition to showcasing the opportunities around community benefits, supply chain investment and Science, Technology, Engineering, Maths (STEM) learning.
08 May 2024, 2.30pm to 6.30pm	Colonsay Village Hall, Scalasaig		
09 May 2024, 1.30pm to 4.30pm	Islay Gaelic Centre, Bowmore		
09 May 2024, 6pm to 8.30pm	Ramsay Hall, Port Ellen		
12 June 2024, 2.30pm to 4pm	Iona Village Hall, Iona	Approximately 20 people attended these events.	Introductory public information days were hosted at community centres, where members of the public could meet the Project team and ask questions

Date and Time	Location	Number of Attendees	Description
12 June 2024, 5pm to 7.30pm	Creich Hall, Fionnphort, Mull		relating to the Project. Through this engagement, the Project team gained an initial insight into communities' interests, such as support for renewable energy, concerns around existing infrastructure constraints, and suggestions for future engagement and communications. The Project intends to continue engagement with these island communities as the Project progresses, to build strong working relationships and gain a richer understanding of their distinct priorities and needs.
08 August 2024, 10am to 4pm	Islay, Jura and Colonsay Agricultural Show, Bridgend, Islay	Approximately 1,000 people attended the Show, with approximately 300 people attending the Project's stand.	The Project team hosted a stand for the second time at the annual Islay, Jura, and Colonsay Agricultural Show. The stand comprised of information boards, printed maps, feedback surveys, in addition to interactive activities for community members, specifically children and young people.

5.3.5 Scoping Workshops

254. A Scoping Workshop was held on 01 May 2024 on Microsoft Teams with a range of technical stakeholders. This was arranged, following advice from MD-LOT, to capture and address stakeholder feedback and advice on key environmental topics prior to the submission of this Scoping Report. The Scoping Workshop enabled the Applicant to present:

- Project updates and anticipated submission timelines;
- Overview of WDA location and indicative design;
- Presentation of the proposed approach to Scoping and EIA topic-specific breakout sessions for:
  - Marine Physical Environment;
  - Benthic Ecology;
  - Fish (Including Basking Shark) and Shellfish Ecology;
  - Marine Mammals;
  - Offshore Ornithology;
  - Offshore Archaeology and Cultural Heritage; and
  - Seascape Landscape and Visual Impact Assessment (SLVIA).

255. Initial identification of appropriate stakeholders for each key topic area was undertaken and workshop materials shared in advance (notice of 10 working days).

256. The Applicant also held a separate Microsoft Teams meeting on 14 May 2024 with MD-SEDD, which focused on the Marine Physical Environment; the slides and questions for consultees relating to this topic were presented during this meeting.

257. A further dedicated Scoping Workshop was undertaken on 03 June 2024 on Microsoft Teams to cover Commercial Fisheries. The scoping workshop enabled the Applicant to present:

- Project updates and anticipated submission timelines;
- Overview of WDA location and indicative design; and
- Presentation of the proposed approach to Scoping and EIA for commercial fisheries.

258. Initial identification of appropriate stakeholders for each key topic area was undertaken and workshop materials shared in advance (notice of seven working days).

259. Prior to all scoping workshop meetings, a briefing pack was issued to stakeholders which included information relating to topic-specific baseline data sources and existing environment information, the EIA scoping methodology (including potential impacts proposed to be scoped in/out), and the proposed approach to EIA. The pack also contained questions for consultees for each receptor topic; these questions guided the discussions during the meetings and stakeholders' written feedback obtained following the scoping workshop. The questions posed to stakeholders are outlined at the end of each topic chapter in this report under 'scoping questions to consultees'.

260. For all scoping workshop meetings, records of the scoping workshop meeting discussions were provided in meeting minutes and circulated to the stakeholder attendees following the meeting. Stakeholders were encouraged to provide written feedback on the workshop minutes, slides, and questions for consultees via email.

261. A summary of general matters discussed during and following the scoping workshop meetings is provided in **Table 5.4**. Topic-specific matters are included in each respective topic chapter; these topics are listed above.

Table 5.4 Summary of general scoping workshop comments

Stakeholder	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	01 May 2024 / Scoping Workshop	Consideration to be given to potential cumulative effects resulting from activities associated with construction activities related to the Export Cable Corridor(s) (ECCs), landfall and onshore connection.	**Section 4.4.2.9** describes the proposed approach to consideration of the Offshore Transmission Development Area (OfTDA) and Onshore Transmission Development Area (OnTDA) in the Windfarm Development Area (WDA) Environmental Impact Assessment (EIA). A combined impact appraisal of interactions between the WDA, OfTDA and OnTDA will be presented. This approach will consider impact interactions and additive effects to determine if any effects would be materially elevated from those assessed for the WDA alone assessment.
Argyll and Bute Council	13 May 2024: Scoping Workshop - Written feedback	The Project will need to conform to all relevant National Planning Framework 4 (NPF4) policies, National Marine Plan (NMP) policies, and all relevant and general policies of the Local Development Plan 2 (LDP2).	As appropriate, consideration of NPF4, NMP and LDP2 policies is provided in relevant receptor topic chapters. Further information on these policies is provided in **Chapter 2 Policy and Legislative Context**.
		The Project are advised to locate the operation maintenance and services within Argyll (Campbeltown / Machrihanish) due to the associated economic benefits for the region.	The Applicant understands the Council's ambition to locate the Project services and operations in the Argyll and Bute region. The location(s) for a construction base and operation and maintenance (O&M) base will be determined through numerous evidence-led studies, including but not limited to a port feasibility study and a full socio-economic impact assessment, in addition to ongoing

Stakeholder	Date / Engagement Activity	Stakeholder Comment	Applicant Response
			engagement with the supply chain across the west coast of Scotland.
		Shore-based infrastructure for servicing developments, cable landing points, substations and connections to the national grid could potentially have significant environmental effects and will therefore need an individual project level Strategic Environmental Assessment SEA/EIA/HRA.	The Project's OfTDA and OnTDA will be subject to separate consents and licensing processes, which will include EIA and HRA. However, see the Applicant's response in the first row of this table which explains how the OnTDA will be considered in the WDA EIA. A similar approach will be applied to HRA. SEA is a systematic process for evaluating the environmental implications of a proposed policy, plan or programme rather than individual projects. The onshore infrastructure will be informed by work being undertaken by the transmission operator to identify the most suitable location for the onshore switching station and to confirm how the Project will connect to the surrounding grid network.
		The Applicant is advised to liaise with Caledonian MacBrayne (CalMac), the Northern Lighthouse Board (NLB), the West Coast Regional Inshore Fishermen's Association, and the Royal Yachting Association (RYA), to ensure that a detailed impact assessment is undertaken at the Project level stage, as the Project progresses.	The Applicant has and will continue to engage with CalMac, NLB, and west coast and national fishery organisations and will engage with RYA and other recreational marine stakeholders as the Project progresses.
		At individual plan and Project level, an EIAR will be required, which should include specific mitigation measures to reduce significant adverse effects on the local environment.	**Appendix A Mitigation Register** sets out the proposed mitigation relevant to the WDA.
		It is expected that the Applicant will undertake the majority of environmental monitoring for pre-construction, construction, and post construction as part of the planning and licensing process.	The specific details of the environmental monitoring will be agreed with MD-LOT in consultation with NatureScot as the Project develops.

5.4 FUTURE CONSULTATION

262. The Applicant will continue to adhere to statutory consultation requirements, with best practice guidance informing the approach taken to stakeholder communication and consultation. The Applicant will engage with stakeholders and the public throughout the lifetime of the Project (pre-application submission, application submission and review, pre-construction, construction and commissioning, operations and maintenance, and decommissioning).

5.4.1 Pre-Application Consultation Events

263. The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 apply to activities that have the potential to have significant impacts upon the environment, local communities and other legitimate uses of the sea applicable in the Scottish Inshore Region, from Mean High Water Springs to 12 nautical miles (nm).

264. The Applicant will hold public consultation events prior to the submission of the EIAR and will follow the principles of the Pre-application Consultation (PAC) Regulations, which include holding one public event with at least six weeks advance notification. The Applicant intends to exceed the minimum PAC requirements by holding a series of in person and online consultation events and issuing a PAC report. The Applicant will advertise these events widely and will ensure the events are held in suitably accessible venues.

265. The consultation throughout the EIA process will include discussions on the most appropriate information sources, assessment methods, interim results, and EIA outputs, in addition to continued updates relating to the project activities and opportunities.

266. Upon application acceptance, the public will have the opportunity to make formal representations to Argyll and Bute Council and the Scottish Government; the timescales and procedure for this will be outlined in the application process.

5.4.2 Post-Application Consultation

267. The Applicant will continue to engage with stakeholders and communities following submission of the application for Section 36 consent and the marine licences to address any comments raised during the application determination stage. This will be implemented through regular stakeholder meetings, including but not limited to the continuation of quarterly stakeholder meetings, community public information days, and ETGs. The same communication procedure will be implemented for post-application consultation events as for the PAC events, to enable local communities to continue providing feedback on the WDA and wider Project as it progresses to future stages.

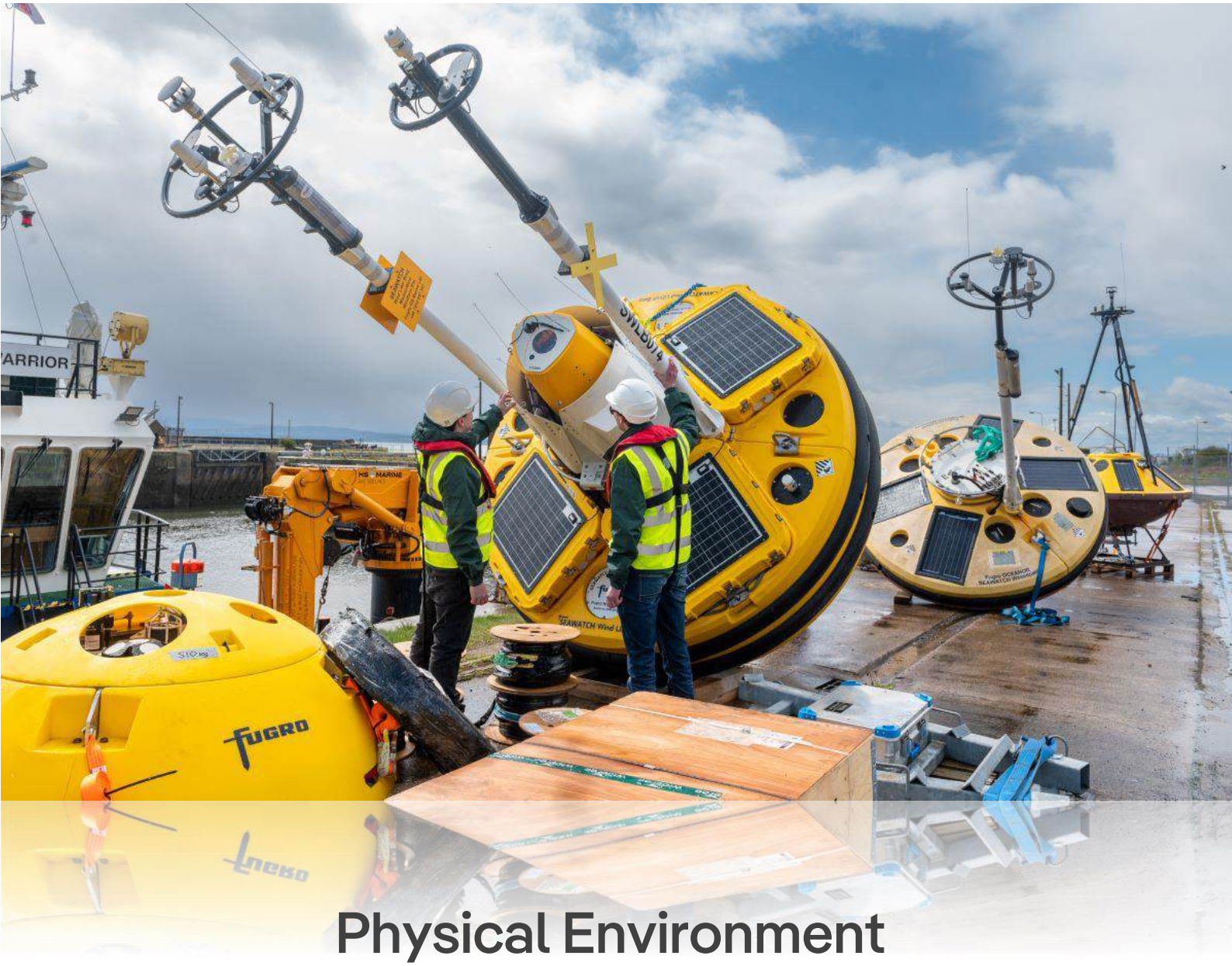
5.5 REFERENCES

Argyll and Bute Council (2024). Argyll and Bute Council Consultation Toolkit. Available at: Consultation toolkit (argyll-bute.gov.uk). [Accessed 21/09/2024]

PAS (2011). Planning Aid Scotland's Scottish Planning = Effective Engagement and Delivery (SP=EED) framework.

Scottish Community Development Centre (2020). National Standards for Community Engagement.

Scottish Government (2019). Scottish Government Consultation Good Practice Guidance.



Physical Environment

- Chapter 6: Marine Physical Environment
- Chapter 7: Offshore Air Quality

ScottishPower Renewables | MachairWind Offshore Windfarm

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6 MARINE PHYSICAL ENVIRONMENT

6.1 INTRODUCTION

268. This chapter considers the scope of potential impacts and likely significant effects (LSE) on the marine physical environment that may arise from the construction, operation and maintenance (O&M), and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

269. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on the marine physical environment (including physical processes and sediment and water quality) in the Environmental Impact Assessment (EIA).

270. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 8 Benthic Ecology** – provides a detailed account of benthic habitats. The Marine Physical Environment chapter describes the shallow geology and bedload sediment transport surrounding these habitats;
- **Chapter 9 Fish (including Basking Shark) and Shellfish Ecology** – provides a detailed account of biological conditions and organisms present. The Marine Physical Environment chapter describes the physical processes and environment surrounding these organisms;
- **Chapter 12 Commercial Fisheries** – provides detailed consideration of commercial impacts associated with active fishing. The Marine Physical Environment chapter describes the physical processes and environment surrounding fishing activity;
- **Chapter 14 Offshore Archaeology and Cultural Heritage** – provides detailed consideration of archaeological and cultural heritage assets. The Marine Physical Environment chapter describes the physical processes and environment surrounding heritage assets.

271. Key inter-relationships between this chapter and those listed above will be considered where relevant in the EIA.

6.2 LEGISLATION, POLICY AND GUIDANCE

272. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 6.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for the marine physical environment.

Table 6.1 Summary of relevant policy and guidance for marine physical environment

Relevant Policy or Guidance	Relevance to the Assessment
Legislation	
The International Convention for the Prevention of Marine Pollution by Ships 73/78	The International Convention for the Prevention of Pollution from Ships (MARPOL), to which the United Kingdom (UK) is a signatory, seeks to prevent and minimise marine pollution from ships arising from operational and accidental events.
Water Environment and Water Services (Scotland) Act 2003 (Water Environment and Water Services Act) (as amended)	The Act transposed the Water Framework Directive (WFD) to Scotland. It commits Scotland to achieve good qualitative and quantitative status of all water bodies by 2015 with the final deadline for meeting objectives being 2027. River basins comprise all transitional waters (estuaries) and coastal waters extending to 3 nautical miles (nm) seaward from the territorial baseline. Any proposed development within 3 nm must have regard to the requirements of the WFD to ensure that all transitional and coastal water bodies achieve 'Good Ecological Status' and that there is no deterioration in status.
Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)	The Controlled Activities Regulations 2011 (and its amendments in 2013 and 2017) apply regulatory controls over activities which may affect Scotland's water environment. The regulations cover rivers, lochs, transitional waters (estuaries), coastal waters, groundwater and groundwater dependent wetlands.
The Marine Strategy Regulations 2010 (as amended)	The Marine Strategy Framework Directive 2008 (Directive 2008/56/EC) was transposed into UK law in 2010 through the Marine Strategy Regulations 2010. This establishes a framework for community action in the field of marine environmental policy and aims to achieve Good Environmental Status in UK marine waters by 2020.
Bathing Waters (Scotland) Amendment Regulations 2008 (as amended)	Under the Bathing Water (Scotland) Regulations 2008, Scottish Ministers designate bathing waters where they expect a large number of people to bathe.
The Environment (European Union Exit) (Scotland) (Amendment etc.) Regulations 2019	These regulations address failures of retained European Union (EU) law to operate effectively and other deficiencies arising from the withdrawal of the UK from the EU. This Act amends the Water Environment and Water Services (Scotland) Act 2003. The Controlled Activities Regulations 2011 and the Bathing Waters Regulations, as well as making amendments to legislation in the fields of environmental protection, water industry and waste.
The Marine Environment (Amendment) (European Union Exit) Regulations 2018	These regulations address failures of retained EU law to operate effectively and other deficiencies arising from the withdrawal of the UK from the EU. The Regulations amend primary and subordinate domestic legislation (Marine and Coastal Access Act 2010 The Marine Strategy Regulations 2010) and directly applicable EU legislation (Commission Decision (EU) 2017/848) that form part of domestic law after the UK's exit from the EU.

Relevant Policy or Guidance	Relevance to the Assessment
Policy	
The Marine Policy Statement (UK Government, 2011)	**The key references are:** **Section 2.6.4.1:** *"Developments and other activities at the coast and at sea can have adverse effects on transitional waters, coastal waters and marine waters. During the construction, operation and decommissioning phases of developments, there can be increased demand for water, discharges to water and adverse ecological effects resulting from physical modifications to the water environment. There may also be an increased risk of spills and leaks of pollutants into the water environment and the likelihood of transmission of invasive non-native species, for example through construction equipment, and their impacts on ecological water quality need to be considered."* **Section 2.6.8.6:** *"Marine plan authorities should not consider development which may affect areas at high risk and probability of coastal change unless the impacts upon it can be managed. Marine plan authorities should seek to minimise and mitigate any geomorphological changes that an activity or development will have on coastal processes, including sediment movement."*
Scotland's National Marine Plan (Scottish Government, 2015)	**The key references are:** **Policy GEN 8 Coastal process and flooding:** *"Developments and activities in the marine environment should be resilient to coastal change and flooding, and not have unacceptable adverse impact on coastal processes or contribute to coastal flooding."* **Paragraph 4.36:** *"Marine planners and decision makers should also be satisfied that activities and developments will be resilient to risks from coastal change and flooding over their lifetime and will not have an unacceptable impact on coastal change. They should seek to ensure that any geomorphological changes that an activity or development bring about in coastal processes, including sediment movement and wave patterns, are minimised, and mitigated, bearing in mind the potential impact on commercial interests such as fisheries and conservation of the natural environment and key coastal heritage sites. Developments which may affect areas at high risk and increase the probability of coastal change should not be permitted unless the impacts upon the area can be managed effectively."* **GEN 12 Water quality and resource**: *"Developments and activities should not result in a deterioration of the quality of waters to which the WFD, Marine Strategy Framework Directive or other related Directives (as transposed into UK legislation)."* **Paragraph 4.67:** *"The Marine Strategy Framework Directive introduces requirements for targets on contamination and eutrophication for marine waters out to 200 nautical miles."* When published, Scotland's National Marine Plan (NMP)2 will also be considered and is assumed to supersede the existing NMP.
International Convention for Prevention of Marine Pollution by Ships	MARPOL is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments through the years. The Convention covers all the technical aspects of pollution from ships, except the disposal of waste into the sea by dumping, and applies to ships of all types, although it does not apply to pollution arising out of the exploration and exploitation of sea-bed mineral resources.

Relevant Policy or Guidance	Relevance to the Assessment
Argyll and Bute Local Development Plan 2 (2024)	**The relevant policies are:** **Policy 4**: **Sustainable Development** – *"In preparing new development proposals, developers should seek to demonstrate the following sustainable development principles, which the planning authority will also use in deciding whether or not to grant planning permission…"* **Policy 28: Supporting Sustainable Aquatic and Coastal Development** – *"Proposals for marine and freshwater aquaculture, marine and coastal developments will be supported where it can be demonstrated that there will be no significant adverse effects, directly, indirectly or cumulatively on: The landscape/coastal character, seascape or visual amenity (including Isolated Coast, Wild Land and National Scenic Areas) …"*
Guidance	
Centre for Environment Fisheries and Aquaculture Science (Cefas) (2004)	Offshore Wind Farms: Guidance Note for Environmental Impact Assessment (EIA) in respect of Food and Environmental Protection Act and Coast Protection Act requirements: Version 2.
(Department for Business, Enterprise and Regulatory Reform (BERR), 2008)	Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry.
Lambkin et al. (2009)	Coastal Process Modelling for Offshore Windfarm (OWF) EIA.
Centre for Environment Fisheries and Aquaculture Science (2011)	Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects.
Pre-disposal Sampling Guidance (Marine Scotland, 2017)	Sampling and Analysis Relating to Sea Disposal of Dredged Material – the guidance includes Action Levels for contaminants to assist in assessing risk to the water environment.
Institute of Marine Engineering, Science and Technology (2024)	Metocean Procedures Guide for Offshore Renewables.
Brooks *et al.* (2018)	Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform EIA of Major Development Projects, published for Natural Resources Wales.
Pye *et al.* (2017)	Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessment, published for Natural Resources Wales.

6.3 CONSULTATION

273. This marine physical environment chapter has been informed by engagement with stakeholders, including those listed below:

- Argyll and Bute Council;
- Marine Directorate Licensing Operations Team;
- Marine Directorate Science Evidence, Data and Digital; and
- NatureScot.

274. As part of the consultation process, the Applicant presented the approach to assessment to stakeholders in order to offer transparency around the scoping methodology and rationale, capture stakeholder advice and guidance, and incorporate stakeholder feedback, where appropriate. A summary of the approach to stakeholder communication and consultation is outlined in **Chapter 5 Consultation and Stakeholder Engagement** with each engagement activity being listed within **Appendix L Stakeholder Engagement Log**.

275. The consultation outcomes in relation to the marine physical environment are outlined in **Table 6.2**, which summarises stakeholder feedback, outlines how the Applicant has responded to the feedback received, and details how it has been considered within this chapter and/or will be used to inform the EIA and preparation of the EIAR.

276. In addition to the engagement outlined in **Table 6.2**, the points of agreement between the Applicant and NatureScot are listed below:

- Agreement on the baseline data sources identified at this stage; and
- The potential impacts proposed to be scoped in and out.

277. Consultation with regard to this topic will be ongoing throughout the EIA process. The Applicant welcomes the opportunity to work with stakeholders to deliver a proportionate and robust EIA.

Table 6.2 Summary of consultation relevant to marine physical environment

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	03 June 2024: Marine Physical Environment Scoping Workshop - Written Feedback	NatureScot noted that in addition to Annex 1 Reef, additional marine physical environment receptors should be included, namely: • Coastal Geomorphology feature (saltmarsh) of Gruinart Flats Site of Special Scientific Interest (SSSI); and • Dalradian feature (bedrock cliffs) of Glac na Criche SSSI and Gruinart Flats SSSI.	The Applicant has scoped in these receptors, which will now be considered as part of the EIA.
		For assessments of changes to tidal currents, waves, and sediment transport, NatureScot agree that numerical modelling may be 'disproportionate to the potential effect', however consider that the proposed 'Source-Pathway-Receptor Conceptual Model approach' is not an assessment method. Instead, the assessment would need to use specific reference to relevant assessments of other similar offshore windfarm proposals that have used numerical modelling and / or use spreadsheet-based / standard equation calculations.	The Applicant has determined that for assessments of changes to tidal currents, waves, and sediment transport in the offshore area and at the coast, numerical modelling will be completed, including hydrodynamic modelling, wave (regional and local scale) modelling, and sediment dispersion modelling. As advised by NatureScot, other offshore windfarm projects' numerical modelling may also be referred to, where appropriate. Whilst it's acknowledged that previous applicants have used Source-Pathway-Receptor Conceptual Model on previous offshore windfarms, as advised by NatureScot, the Applicant will use the results of numerical modelling for this Project.
Marine Directorate - Science Evidence, Data and Digital	14 May 2024: Marine Physical Environment Scoping Meeting	Marine Directorate - Science Evidence, Data and Digital advised quantitative analysis of sediment plumes and 3D model outputs be used to inform the baseline data and advised using hydrodynamic models (such as Scottish Shelf Model).	The Applicant will use quantitative analysis of sediment plumes from existing model outputs for a range of offshore windfarms to inform the assessment. The outputs from the Scottish Shelf Model will also be used to characterise hydrodynamic regime.
		MD-SEDD confirmed they were in agreement with the scoped in and out impacts with the exception of mixing and stratification.	Changes to ocean stratification has been scoped into the EIA.
	17 June 2024: Marine Physical Environment - Written Feedback	In relation to the summary of key datasets and information sources, MD-SEDD advised that the Scottish Shelf Waters Reanalysis Service be used (1993-2019).	The Applicant has added the Scottish Shelf Waters Reanalysis Service (1993-2019) to the list of key datasets and information (**Table 6.3**).

6.4 EXISTING DATA SOURCES

278. **Table 6.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA.

Table 6.3 Summary of key datasets and information sources

Dataset	Description	Citation
Digital Bathymetry	Bathymetry of Europe's sea basins.	European Marine Observation and Data Network (EMODnet), 2022
Seabed Sediments 250k	Seabed sediments of the United Kingdom (UK) Continental Shelf.	British Geological Survey (BGS), 2023a
Offshore Bedrock 250k	Offshore bedrock of the UK Continental Shelf.	BGS, 2023b
Quaternary Deposits Summary Lithologies	Quaternary deposits of the UK Continental Shelf.	BGS, 2023c
Geological Factor Maps, Quaternary Deposits Thickness	Thickness of Quaternary deposits on the UK Continental Shelf.	BGS, 2023d
Atlas of UK Marine Renewable Energy Resources, Spring Peak Flow	Spring peak current flows for the UK Continental Shelf.	ABP Marine Environmental Research (ABPmer), 2008a
Atlas of UK Marine Renewable Energy Resources, Annual Wave Height	Annual average wave heights for the UK Continental Shelf.	ABPmer, 2008b
Shelf-wide Regions of Dominant Stratification and Mixing Regimes	Dominant stratification and mixing regimes for the UK Continental Shelf, from 1996 to 2010.	van Leeuwen et al. 2015
Suspended Sediment Climatologies around the UK	Suspended Sediment Concentrations (SSCs) for the UK Continental Shelf, from 1996 to 2010.	Centre for Environment Fisheries and Aquaculture Science (Cefas), 2016
Quality Status Reports Region III – Celtic Sea	Concentrations of contaminants in sediments/ overall pollution status of each region.	Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), 2023a, 2023b
Scottish Shelf Waters Reanalysis Service	3D model output from a 27 year reanalysis of the Scottish Shelf Model, from 1993 to 2019.	Barton et al, 2022

6.5 SITE-SPECIFIC SURVEY DATA

279. In addition to the existing data sources identified in (**Section 6.4**), the Project has undertaken site specific surveys to inform the EIA (**Table 6.4**).

Table 6.4 Site-specific survey data

Dataset	Year(s)	Description
Third-party benthic survey	2021	A Benthic survey was undertaken by a third-party which overlaps with the Option Agreement Area (OAA). The benthic survey was undertaken by Briggs Marine and comprised the following: • 60 benthic sediment grab samples for contaminant, faunal, biomass and particle size distribution analysis; and • 20 transects of Drop-Down Video (DDV) This data has been acquired by the Applicant to supplement the Project's site investigation survey data which together has been used to characterise the Windfarm Development Area (WDA). See **Appendix B Third-Party Benthic Subtidal Survey Interpretative Report**.

Project's site investigation	2023	A site Investigation survey was undertaken by the Project across the OAA. The following works were undertaken by Fugro:
		• Geophysical survey (2 km x 500 metres (m) line spacing)
		  ○ Side Scan Sonar
		  ○ Multibeam Echosounder
		  ○ Sub Bottom Profiler
		  ○ Magnetometer
		• 57 benthic sediment grabs for contaminant, faunal, biomass and particle size distribution analysis;
		• 59 transects of DDV with seabed photographs; and
		• 29 water samples for environmental DNA analysis
		See **Appendix C Contaminants Survey Report**, **Appendix D MachairWind 2023 Benthic Characterisation Report** and **Appendix E Environmental DNA Survey Interpretative Report**.

Projects Metocean Survey	2023 to 2024	A metocean survey was undertaken by the Project. A Metocean Midi Buoy, Seabed Lander and Floating LiDAR Buoy* were deployed for one year from 2023 to 2024 within the OAA to measure: • Wind profile up to 300 m (speed and direction) • Wind data at 4 m (speed and direction) • Meteorological parameters at 4 m (air temperature, pressure, density) • Wave parameters (height, period, direction) • Current profile (speed and direction) • Sea surface temperature and salinity • Near bed current (speed and direction) • Seabed temperature and salinity • Seabed turbidity • Water level *The Floating LiDAR Buoy deployment has been extended for an additional year to Spring 2025 to complete a two-year data collection campaign.

6.6 MARINE PHYSICAL ENVIRONMENT STUDY AREA

280. This section describes the marine physical environment Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 6.7**) and the EIA will be conducted.

281. The description of the baseline marine physical environment within the Study Area includes both marine physical processes and water and sediment quality. Combined, these describe the existing environment.

282. The marine physical environment Study Area (**Figure 6.1**) is informed by a 23 km tidal excursion extent from the WDA in a southerly direction (i.e. the average distance travelled by tidal flow between low-water slack tide and high-water slack tide before the current direction reverses). The tidal excursion traverses only a short distance in all other directions. This encompasses the area over which suspended sediment could be transported following disturbance to the seabed. The tidal excursion extent has been estimated based on publicly available data including admiralty charts. The Study Area for marine physical processes and water and sediment quality is the same because the transport of contaminants and sediment is driven by the same physical tidal current processes.

283. This area accounts for the potential local and regional effects on physical and sedimentary processes.

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Windfarm Development Area

Option Agreement Area

Marine Physical Environment Study Area

N

0 5 10 20 Kilometres

Scale: 1:10,000,000

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	06/08/2024	JH	AB	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000032		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 6.1: Marine Physical Environment Study Area

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Name: MCW-GEN-GIS-MAP-RHS-000032_Site location

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6.7 EXISTING ENVIRONMENT

284. This section characterises the marine physical environment receptors using publicly available data sources (**Section 6.4**) alongside site-specific survey data (**Section 6.5**), deemed of relevance to the Study Area (**Section 6.6**). This sets the context for the identification of mitigation measures (**Section 6.8**) and scoping of potential impacts (**Section 6.9**) which then feeds into the consideration of cumulative effects (**Section 6.10**) and potential transboundary impacts (**Section 6.11**).

6.7.1 Bathymetry

285. The minimum and maximum water depths across the WDA are 28.6 to 89.6 m below Lowest Astronomical Tide (LAT) (**Figure 6.2**) (Fugro, 2024). Although the bathymetry across the WDA is highly variable, the variation between minimum and maximum water depths is consistent and changes only very gradually (very gentle average gradient of less than 1° (Fugro, 2024)). However, some smaller bedrock outcrops to the north and east of the WDA create maximum depth change gradients of up to 83° (Fugro, 2024).

6.7.2 Shallow Geology

286. The bedrock towards the north of the WDA consists of undifferentiated rocks, including mudstone, sandstone and limestone, with a smaller intruding patch of igneous rocks (BGS, 2023b). Across the centre of the WDA (east to west) a greater variety of undifferentiated rocks are present, comprising mudstone, sandstone, limestone, siliciclastic and argillaceous. In the south of the WDA, the bedrock is mainly metamorphic (metasedimentary) rocks (BGS, 2023b). Within the WDA, bedrock is partially exposed in outcrops, mainly surrounding the Dubh Artach lighthouse.

287. The Quaternary geology of the WDA contains soft mud, with the exception of some undifferentiated sands in the south (BGS, 2023c) (**Figure 6.3**). Across the WDA, Quaternary deposit thickness ranges from 5 to 20 m in the south and up to 30 m to greater than 50 m in the centre and north (BGS, 2023d).

6.7.3 Tidal Currents

288. Peak flows for mean spring tides are between approximately 0.65 and 1 m/s across the majority of the WDA (ABPmer, 2008a) (**Figure 6.4**). In the most southern part of the WDA, peak flows for mean spring tides are elevated from this to between 1 and 2.1 m/s.

6.7.4 Waves

289. Waves from the west and southwest are the most frequent across the WDA. Annual mean significant wave heights across the WDA range from 1.8 to 2.1 m (ABPmer, 2008b) (**Figure 6.5**).

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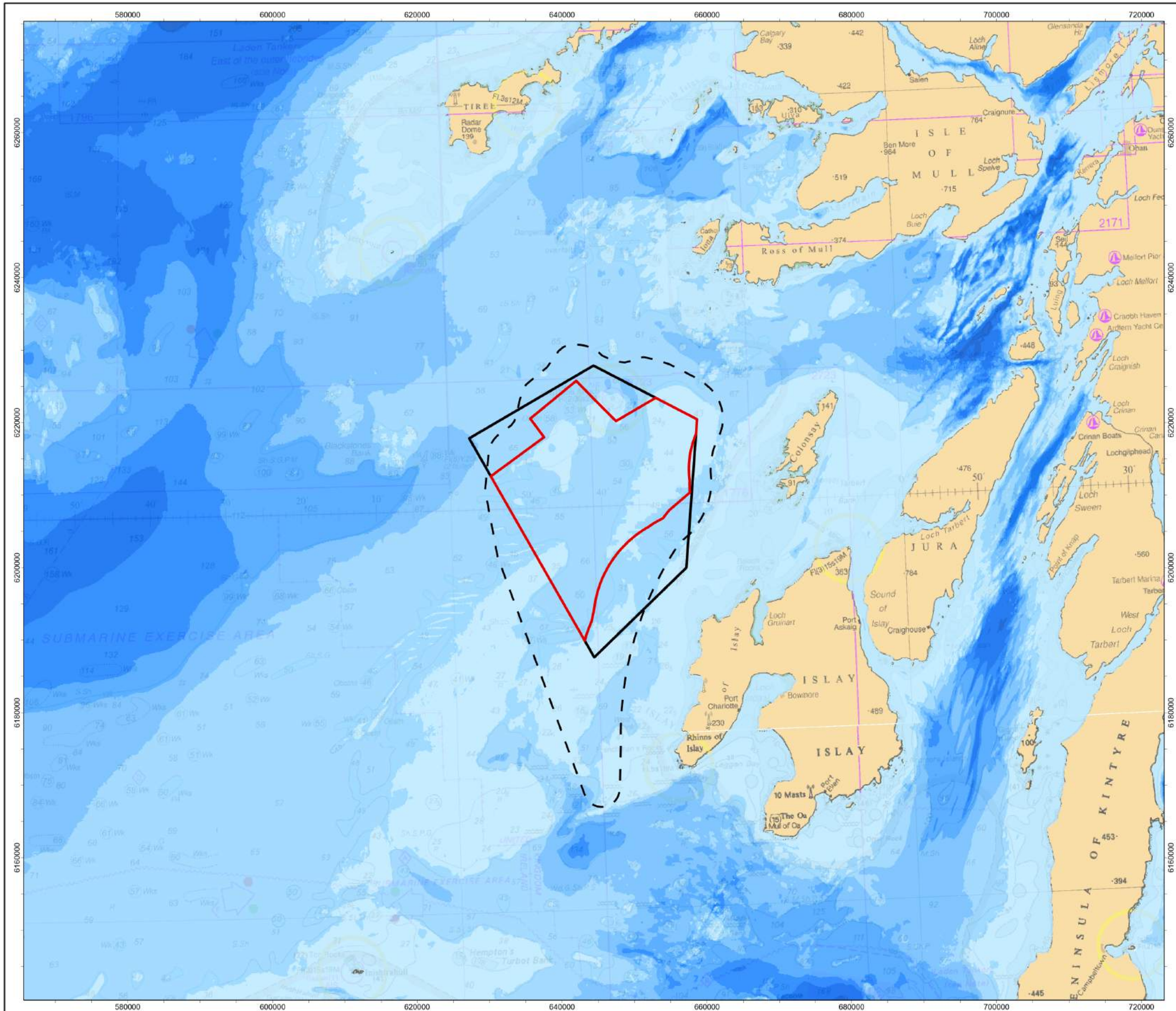

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DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000036		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 6.2: Bathymetry of the Marine Physical Environment Study Area

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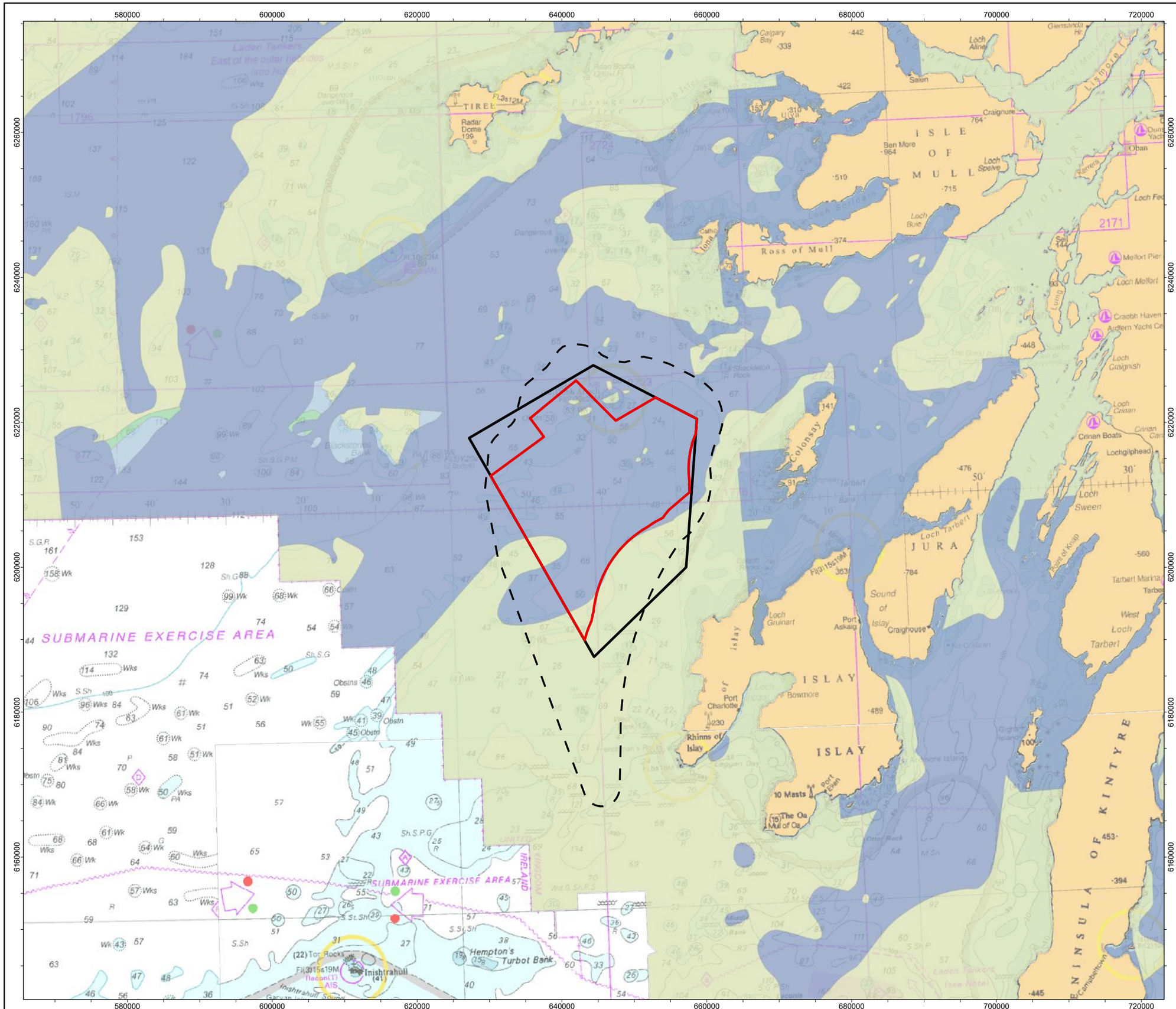

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DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000037		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 6.3: Quaternary Deposits in the Windfarm Development Area

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Name: MCW-GEN-GIS-MAP-RHS-000037_Quaternary Deposits

580000 600000 620000 640000 660000 680000 700000 720000

6260000 6240000 6220000 6200000 6180000 6160000

Windfarm Development Area

Option Agreement Area

Marine Physical Environment Study Area

Spring peak flow

- < 0.11 (m/s)
- 0.11 - 0.50
- 0.51 - 0.75
- 0.76 - 1.00
- 1.01 - 1.25
- 1.26 - 1.50
- 1.51 - 1.75
- 1.76 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 3.50

Notes: Base ABPmer data shows Scottish water only

N

0 5 10 20
Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	07/08/2024	JH	AB	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000038		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
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PROJECT TITLE	MachairWind		

Figure 6.4: Spring Tidal Current Peak Flow for the Windfarm Development Area

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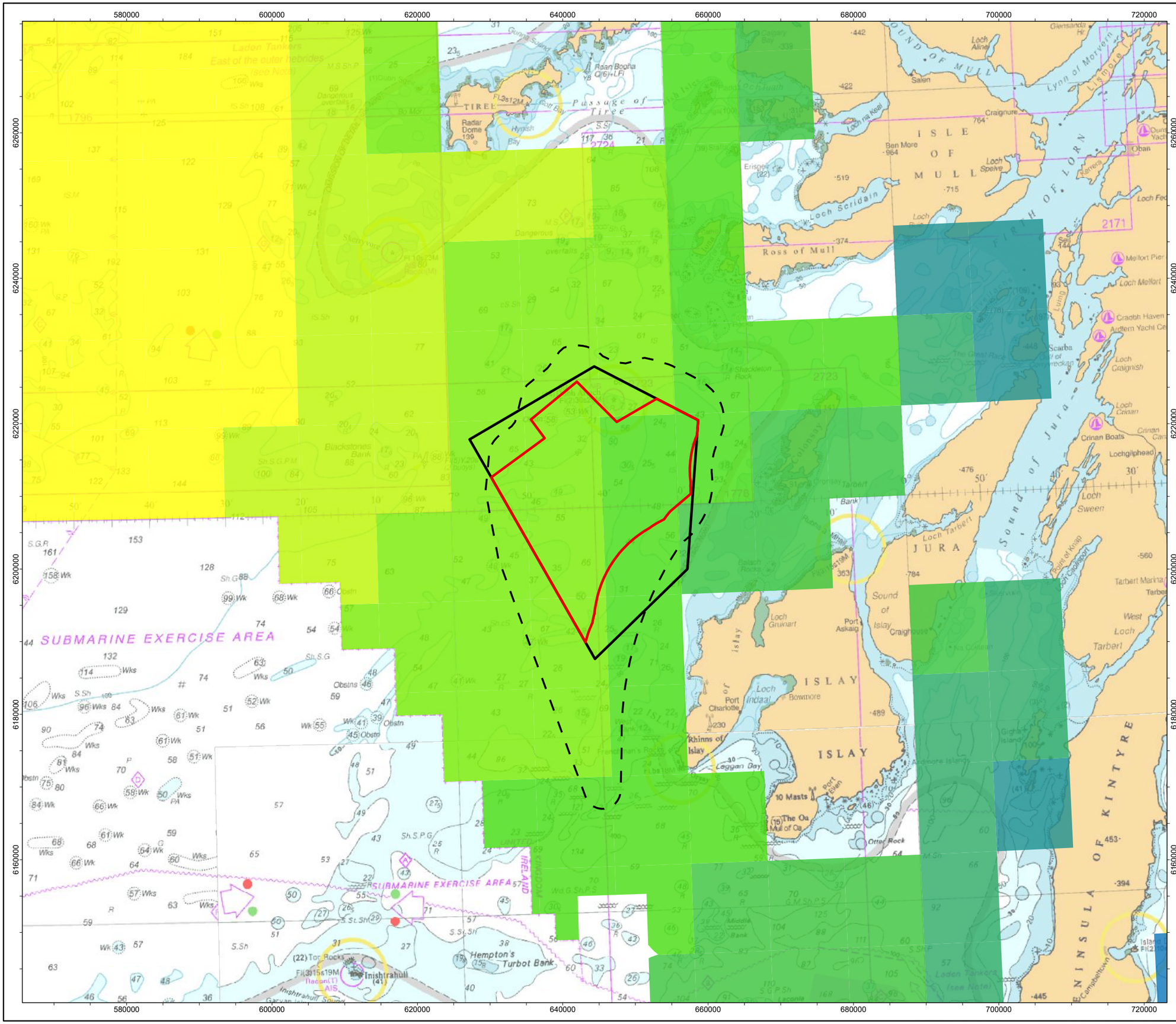

2	07/08/2024	JH	AB	CB	PB
REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000039		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 6.5: Annual Wave Height for the Windfarm Development Area

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6.7.5 Mixing and Stratification

290. Research on Offshore Windfarm (OWF) developments interacting with water column hydrodynamics has shown these structures could potentially alter balances in mixing and stratification (Carpenter et al., 2016). Changes in mixing and stratification are induced due to the increased turbulence generated by the presence of physical structure(s), both above (changes to atmospheric pressure) and within the water column (interactions induced by physical blockage) (Christiansen et al., 2022; 2023). This results in enhanced mixing as the greater turbulence could cause the breakdown of naturally stratifying water (Dorrell et al., 2022). However, this effect in areas which are naturally mixed for the majority of the year, will experience very little change as the mixing will continue as it would naturally.

291. Characterisation of mixing and stratification is based on the methods and classifications of modelled average annual regions of seawater density by van Leeuwen et al. (2015). This research focuses on comparing results for the larger data series available for the North Sea (1958 to 2008). The same modelling methods and classifications as in van Leeuwen et al. (2015) were also applied by the authors to UK shelf-wide mixing regimes (from 1996 to 2010).

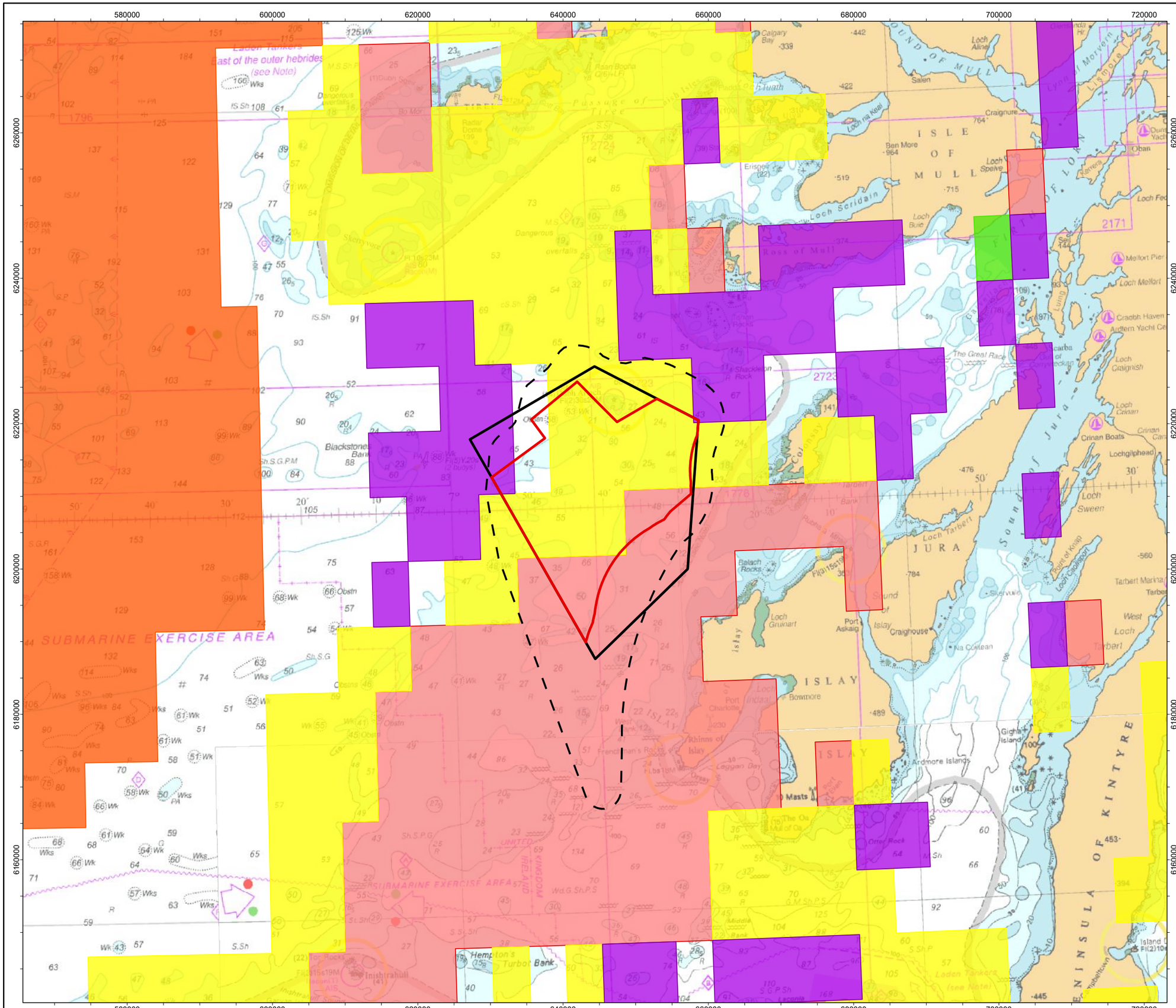
292. The WDA is situated within regions of intermittently stratified and permanently mixed marine environments (**Figure 6.6**). On average, the WDA is stratified between 20 and 40 days per year and mixed between 250 to 345 days each year.

6.7.6 Bedload Sediment and Transport

293. Across most of the WDA, sand is the dominant seabed sediment type (Fugro, 2024) (**Figure 6.7**). Coarse sand, gravel, cobbles and boulders are found enclosed within depressions across the WDA, immediately north of the WDA (around Dubh Artach lighthouse and associated scour) and in the south-east and south of the WDA, where boulders are also particularly prevalent (Fugro, 2024). Seabed sediment is sculpted into flow-transverse bedforms at numerous locations across the WDA, including ripples, megaripples, sand waves and sand dunes (Fugro, 2024). Comparisons by Fugro (2024) with EMODnet bathymetry data (EMODnet, 2022) suggests little migration has occurred over two years, but the types of bedforms observed (ripples to large dunes) suggest reorientation and migration could occur over a longer period, within the Project lifetime.

6.7.7 Suspended Sediment Concentrations

294. The spatial distribution of average annual SSCs from 1998 to 2015 was mapped by Cefas (2016). The majority of the WDA is characterised by values between 1 and 2 mg/l, with values of 0 to 1 mg/l in the west and north-west of the WDA (**Figure 6.8**).



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DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000040		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 6.6: Mixing and Stratification Zones of the Windfarm Development Area

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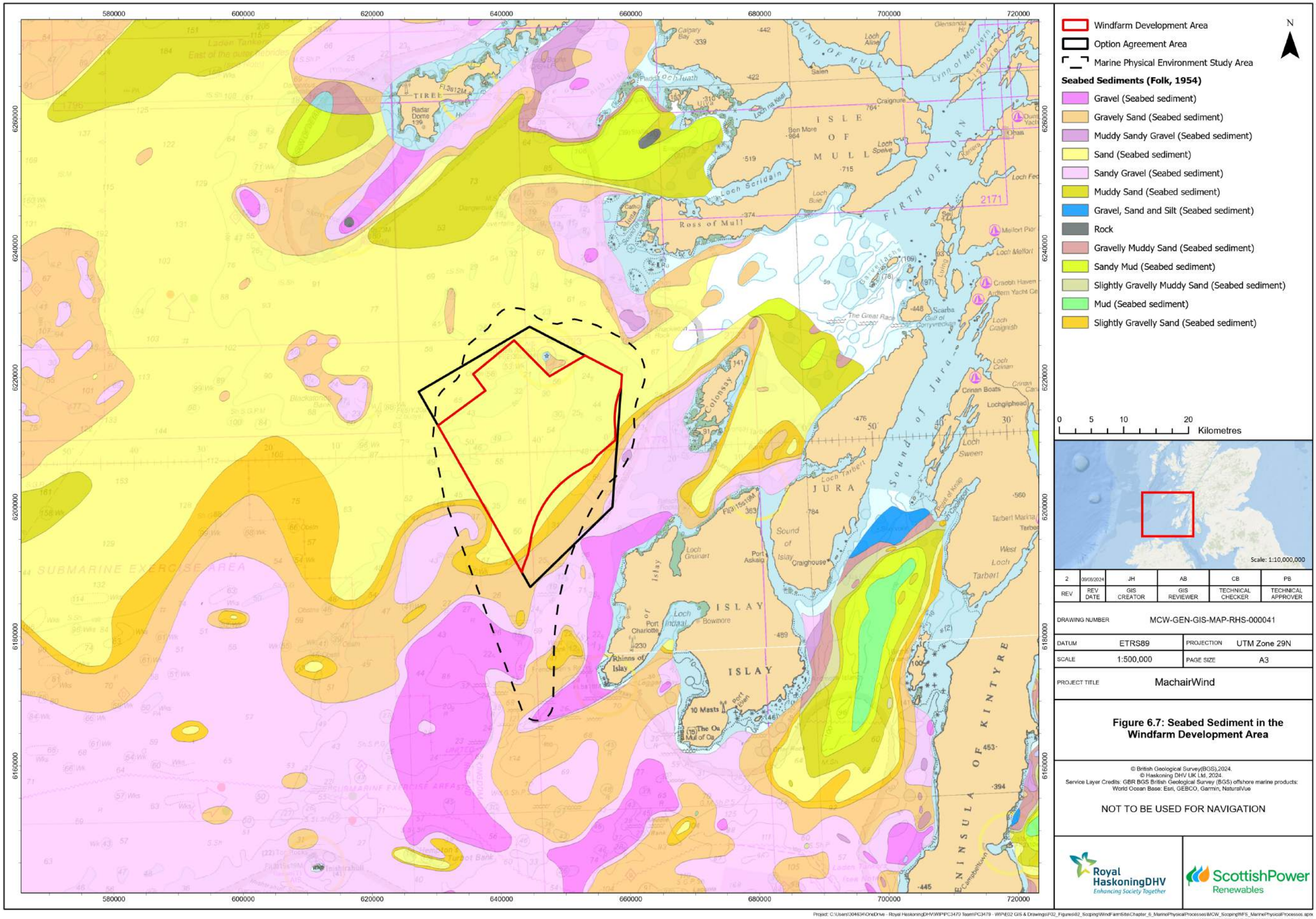

Figure 6.7: Seabed Sediment in the Windfarm Development Area

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580000 600000 620000 640000 660000 680000 700000 720000

6260000 6240000 6220000 6200000 6180000 6160000

Windfarm Development Area

Option Agreement Area

Marine Physical Environment Study Area

SPM 1988-2015 (mg/l)

- 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 5
- 5 - 10
- 10 - 15

N

0 5 10 20 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	07/08/2024	JH	AB	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000042		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 6.8: Suspended Sediment Concentration for the Windfarm Development Area

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Name: MCW-GEN-GIS-MAP-RHS-000042_Cefas Suspended Sediment

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6.7.8 Marine Water Quality

295. Water quality is an important component for compliance with the WFD requirements and therefore the information collected for the transitional and coastal water bodies is relevant for characterising the WDA. The WDA is partially situated within the Atlantic Ocean – Southwest Mull coastal water body (ID: 200505) (SEPA, 2024a). This water body has an overall status of 'High'[8] with a 'High' level of certainty. The water body is not deemed heavily modified. Classification details of this water body are provided in **Table 6.5**.

Table 6.5 Classification status of the Atlantic Ocean – Southwest Mull coastal water body

Parameter	Condition (in 2022)
Overall status	High
Pre-Heavily Modified Water Body status	High
Overall ecology	High
Physico-chemical	High
Dissolved oxygen	High
Dissolved inorganic nitrogen	High
Biological elements	High
Invertebrate animals	High
Benthic invertebrates	High
Phytoplankton	High
Specific pollutants	Pass
Unionised ammonia	Pass
Hydromorphology	High
Morphology	High
Water quality	High
Reference: (SEPA, 2024a)	

296. There are no water body designated sites (Bathing Waters and Shellfish Waters) in the vicinity of the WDA (SEPA, 2024b).

297. The OSPAR Convention has committed to systematic periodic assessments of the drivers of degradation, the multiple pressures exerted on marine systems including the monitoring of chemicals in sediments and nutrients in the water. These assessments are reported in Quality Status Reports (QSR) (OSPAR, 2023a). OSPAR has divided its Maritime Area into five regions; the WDA is located within Region III – Celtic Sea.

298. The QSR 2023 highlights that concentrations of many of the most serious hazardous substances, such as polychlorinated biphenyls, polyaromatic hydrocarbons, and organochlorine insecticides, have decreased substantially compared with the 1980s and 1990s (OSPAR, 2023b). Inputs of nitrogen and phosphorus have also decreased since QSR 2010, with nitrogen inputs into Region III

[8] A status of 'High' means the water body or quality element is in 'reference' condition, i.e. a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of physico-chemistry, hydromorphology and biology (UKTAG, 2007).

– Celtic Sea having decreased by a third between 1990 and 2018. As a result, eutrophication within Region III – Celtic Sea is not increasing. With respect to hazardous substances, the trends for the assessed hazardous organic substances are downward, and most OSPAR Regions are also seeing a decline in heavy metal pollution. However, 10 of the 12 OSPAR sub-regions continue to have a poor status for hazardous substances in indicator species, largely caused by high levels of mercury and polychlorinated biphenyls. While there is no data within the QSR 2023 that is specific to Region III – Celtic Seas, tributyltin concentration levels in the Southern North Sea have decreased by approximately 10% per year. Despite this, the general levels of tributyltin within the OSPAR Maritime Area remains capable of causing effects on the marine environment.

299. Two site-specific contaminants surveys have been undertaken across the Option Agreement Area (OAA) between August – September 2021 (**Appendix B Third-Party Benthic Subtidal Survey Interpretative Report**) and August to November 2023 (**Appendix C Contaminants Survey Report**).

300. Seabed sediments were tested for the following contaminants:

- Heavy metals (arsenic, cadmium, chromium, copper, mercury, nickel and lead);
- Organotins (tributyltin and dibutyltin);
- Polycyclic aromatic hydrocarbons;
- Total hydrocarbons;
- Polychlorinated biphenyls, and
- Organochlorine pesticides (Third-Party site investigation survey only).

301. The contaminants survey data results are provided in both (**Appendix B Third-Party Benthic Subtidal Survey Interpretative Report**) and (**Appendix C Contaminants Survey Report**) where they are compared to the Marine Directorate (MD) or Cefas Action Levels (AL). Action Levels are used to determine the degree of contaminant loading of marine sediments in the UK in relation to the disposal of dredged materials. These values can be useful reference points when considering the baseline state of the WDA and surrounding area. Contaminant levels in seabed sediments are defined by AL1 and AL2, whereby:

- Contaminant levels below AL1 are of no concern; and
- Contaminant levels between AL1 and AL2 and levels over AL2 may require further consideration and testing.

302. The contaminants survey analysis results show that the majority of the contaminants listed above are not present at levels that exceed MD AL1 within the WDA. However, in the third-party benthic survey (**Appendix B Third-Party Benthic Subtidal Survey Interpretative Report**) two stations within the WDA (Con1 and Con17) were found to contain elevated levels of the Organochlorine pesticides Dieldrin and Dichlorodiphenyltrichloroethane above Cefas AL1. Dichlorodiphenyltrichloroethane and Dieldrin are not water soluble and sorb to sediments and particulate matter in the aquatic environment due to their low water solubility and high affinity for solids (Hartwell, 2008). As such these compounds are unlikely to cause a decrease in water quality should the sediment be resuspended as they will remain bound to the sediment and fall out of suspension.

6.8 MITIGATION MEASURES

303. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on the marine physical environment. These measures described in **Table 6.6** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 6.6 Indicative embedded mitigation measures for the marine physical environment

ID	Parameter	Description of Mitigation Measure
M-1	Scour Protection	Scour protection measures will be designed, where applicable, to reduce impacts on the prevailing hydrodynamic, wave and sediment regimes.
M-4	Project Environmental Management Plan	Development of, and adherence to, a Project Environmental Management Plan (PEMP) which will be in accordance with an Outline PEMP to be submitted with the Section 36 Application. This will include measures to manage the environmental risks associated with the construction and operation of the offshore components of the Project. The PEMP will secure measures for preventing waste water discharges from vessels and procedures for informing Project personnel on best practice guidance to reducing the potential for water discharges during offshore construction and operation and maintenance.
M-7	Marine Pollution Contingency Plan	Development of, and adherence to, a Marine Pollution Contingency Plan (MPCP). The MPCP will provide guidance to the Project personnel, contractors and subcontractors on the actions and reporting requirements in the event of spills and collision incidents. The MPCP will also contain emergency plans and mitigation procedures for a range of potential marine pollution incidents.
M-8	Cable Plan	Development of, and adherence to, a Cable Plan (incorporating a Cable Burial Risk Assessment). The Cable Plan will confirm planned cable routeing, burial, and any additional external cable protection, and will set out methods for post-installation cable monitoring. Furthermore, this plan will detail environmental sensitivities and design considerations to mitigate, as far as practicable, the effects of inter-array cable laying and associated protection during installation and operation of the Windfarm Development Area infrastructure. Cable route selection will plan to avoid, as reasonably practicable, hard substrates so that cables can be buried which will reduce the requirement for bedform clearance.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each, whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

304. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts related to the marine physical environment will be assessed with this mitigation in place.

6.9 SCOPING OF POTENTIAL IMPACTS

305. A range of potential impacts on marine physical environment receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

306. **Table 6.7** outlines the marine physical environment impacts which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data become available.

Table 6.7 Potential impacts scoped in or scoped out for marine physical environment.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impacts on mixing and stratification	✘	✘	✘	The main potential impact is changes to near-field mixing due to foundation wake effects and the potential for destabilising local water column stratification, inside and immediately outside the Windfarm Development Area (WDA), driven by interaction of the tidal (hydrodynamic) processes with the foundations. The current state of mixing and stratification in and around the WDA is outlined in **Section 6.7.5**. The local marine environment is naturally mixed for most of the year. Mixing due to foundation wake effects will likely have little impact outside of natural conditions. Destabilising local water column stratification is also unlikely to occur as natural stratification is minimal. Therefore, potential impacts and effects on mixing and stratification has been **scoped out** of the Environmental Impact Assessment (EIA), for all phases.
Impacts on seabed morphology due to vessel indentations	✘	✘	✘	There is potential for certain vessels used during construction, operation and maintenance (O&M) and decommissioning of the WDA infrastructure to directly impact the seabed. This applies for those vessels that utilise jack-up legs or anchors to hold station and provide stability for a working platform. Where legs or anchors (and associated chains) have been placed on the seabed and then removed, there is potential for an indentation to remain, proportional to the dimensions and drag (if any) of the object. However, the disturbance footprint would be limited in scale and any impacts would be temporary in nature with indentations infilling through natural processes over the course of a few days to months. Therefore, potential impacts and effects on seabed morphology due to vessel indentations has been **scoped out** of the EIA, for all phases.
Impacts on water quality through the release of contaminants from suspended sediments	✘	✘	✘	Disturbance of seabed sediments could give rise to increases in contaminant concentrations within the water column if bound to seabed sediment particles. Contaminants survey data collected across the Option Agreement Area (OAA), summarised above and presented in **Appendix B Third-Party Benthic Subtidal Survey Interpretative Report** and **Appendix C Contaminants Survey Report,** shows that the seabed sediments across the WDA do not contain contaminants in concentrations that would pose a risk to water quality should the seabed sediments be suspended during construction, O&M and decommissioning activities. Therefore, potential impacts and effects on water quality through the release of contaminants from suspended sediments has been **scoped out** of the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impacts to water and sediment quality through pollution events	✘	✘	✘	There is potential for accidental spillages to occur during construction, O&M and decommissioning of the WDA as a result of the use of lubricants and chemicals. However, it is proposed that this impact is scoped out of the EIA due to the implementation of the comprehensive embedded mitigation practices detailed in **Section 6.8**. As a result of these embedded mitigation measures, it is considered that the risk of a spill occurring is low and with the appropriate management measures in place, should a spill occur, the risk to the marine environment is effectively mitigated. Therefore, potential impacts and effects to water and sediment quality through pollution events has been **scoped out** of the EIA, for all phases.
Impacts on Suspended Sediment Concentrations (SSCs) and transport	✓	✓	✓	Potential impacts during construction include temporary disturbance of the seabed due to the installation activities for foundations and Inter-Array Cables (IACs) (including seabed preparation and cable burial) which release sediment into the water column, resulting in increased SSCs and changes to seabed levels. Additionally, potential impacts during operation include re-suspension of sediment which may occur because of scour around structures. The potential receptors sensitive to impacts on SSCs and transport are Annex I reefs (subtype 'bedrock' and/or 'stony' reef), located primarily to the east and southeast of the WDA around the west coast of Colonsay, Oronsay and around the north and west coasts of Islay where it becomes more scattered, and Gruinart Flats Site of Special Scientific Interest (SSSI) (saltmarsh). There is also a very small aggregation within the east of the WDA. It is important to note that these reef areas are not designated as part of any Special Area of Conservation and have been identified through a semi-automated approach to the mapping of bedrock outcropping at the seabed (Brown et al. 2017). Therefore, potential impacts and effects on SSCs and transport has been **scoped into** the EIA, for all phases.
Impacts on seabed morphology and bedload sediment transport	✓	✓	✓	Construction in the WDA is unlikely to change the shallow geology other than in the case of local effects associated with Wind Turbine Generator (WTG) foundation (subject to foundation type) and IAC installation. However, there is the potential for changes in seabed morphology due to offshore construction activities (e.g., seabed preparation/boulder clearance) and the presence of external cable protection during O&M. Therefore, potential impacts and effects on seabed morphology and bedload sediment transport has been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impacts on bedload sediment transport	✓	✓	✓	Providing foundations are adequately spaced, impacts on bedload sediment transport O&M are expected to be low (spacing will vary depending on the details of the foundations and the WTG layout). Impacts on sediment transport are expected to be local to the areas immediately surrounding the individual foundations in the form of seabed scour, where the sediment is soft enough to be mobilised. Scour at each foundation will be considered as part of the EIA process using well established empirical methods applied to offshore windfarms elsewhere. Scour protection has the potential to interrupt sediment transport and increase the footprint of structures on the seabed. The potential receptors sensitive to impacts on seabed morphology and bedload sediment transport are the areas of Annex I reef (subtype 'bedrock' and/or 'stony' reef) and Gruinart Flats SSSI. Therefore, potential impacts and effects on bedload sediment transport has been **scoped into** the EIA, for all phases.
Impacts on waves and tidal currents	✘	✓	✘	Impacts on waves and tidal currents would increase incrementally as the WDA infrastructure is constructed with the greatest potential impacts resulting during O&M. Potential impacts during operation could occur due to the physical presence of the WDA infrastructure (i.e., foundations and scour/cable protection), which may result in local changes to tidal currents and waves due to physical blockage effects. These changes could potentially affect the sediment transport regime and/or seabed morphology. The potential receptors sensitive to impacts on waves and tidal currents are Annex I reefs, Gruinart Flats SSSI, and Glac na Criche SSSI (bedrock cliffs). Therefore, potential impacts and effects on waves and tidal currents has been **scoped into** the EIA, for the O&M phase.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

6.10 POTENTIAL CUMULATIVE EFFECTS

307. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA and OfTDA to affect marine physical environment receptors. The Cumulative Effects Assessment (CEA) will follow the approach outlined in **Chapter 4 Approach to Scoping and EIA**.

308. Offshore wind projects and other activities relevant to the assessment of cumulative effects on the marine physical environment will be identified through a screening exercise. The potential impacts to be taken forward for consideration in the CEA will be in line with those described for the WDA-alone assessment and OfTDA appraisal. Impacts assessed as negligible adverse significance (or lower) will not be taken forward to CEA and it is possible that some will be screened out on the basis that the potential impacts are highly localised or the risk of effects occurring is reduced, given management measures will be in place for the Project and other plans and projects.

6.11 POTENTIAL TRANSBOUNDARY IMPACTS

309. Transboundary effects on marine physical environment receptors are proposed to be scoped out recognising that the WDA is approximately 33 km from the Exclusive Economic Zone boundary of the Republic of Ireland. Given that the likely effects will be restricted to near-field change, coupled with their distance from the Exclusive Economic Zone boundary, there would be no pathway for transboundary effects.

6.12 APPROACH TO IMPACT ASSESSMENT

6.12.1 Method

310. The existing marine physical environment will be described in the EIAR, including, but not limited to the following:

- Bathymetry;
- Shallow geology;
- Tidal currents;
- Waves;
- Stratification and mixing;
- Seabed sediment distribution;
- Bedload sediment transport;
- Suspended sediment transport;
- Morphological change; and
- Anticipated trends in baseline conditions.

311. The assessment of effects on marine physical environment receptors will be based on a combination of a full suite of numerical models and a Source-Pathway-Receptor conceptual model. To determine the effects of foundations on tidal currents, waves, and sediment transport, numerical modelling will be used. The numerical modelling assessment will consider potential impacts on physical and sedimentary processes on the identified receptors in the offshore area (Annex I reefs) and at the coast (Gruinart Flats Site of Special Scientific Interest (SSSI) and Glac na Criche SSSI). Note that whilst both of these SSSIs are located outside of the Study Area, they have been included as receptors following feedback from NatureScot (see **Table 6.2**). Further information on Annex I reefs is provided in **Chapter 8 Benthic Ecology**.

312. An example of a Source-Pathway-Receptor conceptual model is provided by seabed preparation which disturbs sediment on the seabed (source). This sediment is then transported by tidal currents until it settles back to the seabed (pathway). The deposited sediment could change the composition and elevation of the seabed (receptor).

313. The impact assessment will consider a combination of the sensitivity of the receptor, its value (if applicable) and the magnitude of the change to determine a significance of effect.

6.12.2 Definitions

314. For each potential impact, the impact assessment will identify the sensitivity of the receptors within the Study Area which are sensitive to that impact and implement a systematic approach to understand the impact pathways and the level of impacts (i.e. magnitude) on given receptors.

315. In addition, the 'value' of the receptor will form an important element within the assessment, for instance if the receptor is a protected habitat. It is important to understand that high value and high sensitivity are not necessarily linked within a particular effect. A receptor could be of high value (e.g. Annex I habitat) but have a low or negligible sensitivity. Similarly, low value does not equate to low sensitivity and is judged on a receptor-by-receptor basis. The value will be considered, where relevant, as a modifier for the sensitivity assigned to the receptor, based on expert judgement.

316. The definitions of sensitivity, value and magnitude for the purpose of the marine physical environment impact assessment are provided in **Table 6.8**, **Table 6.9** and **Table 6.10** respectively. These expert-based judgements of receptor sensitivity, value and magnitude of impact will be closely guided by the conceptual understanding of baseline conditions.

Table 6.8 Definition of sensitivity for a marine physical environment receptor

Sensitivity	Definition
High	**Tolerance**: Receptor has very limited tolerance of impact. **Adaptability**: Receptor unable to adapt to impact. **Recoverability**: Receptor unable to recover resulting in permanent or long-term (>10 years) change.
Medium	**Tolerance**: Receptor has limited tolerance of impact. **Adaptability**: Receptor has limited ability to adapt to impact. **Recoverability**: Receptor able to recover to an acceptable status over the medium term (5-10 years).
Low	**Tolerance**: Receptor has some tolerance of impact. **Adaptability**: Receptor has some ability to adapt to impact. **Recoverability**: Receptor able to recover to an acceptable status over the short term (1-5 years).
Negligible	**Tolerance**: Receptor generally tolerant of impact. **Adaptability**: Receptor can completely adapt to impact with no detectable changes. **Recoverability**: Receptor able to recover to an acceptable status near instantaneously (<1 year).

Table 6.9 Definition of value for a marine physical environment receptor

Value	Definition
High	**Value**: Receptor is designated and / or of national or international importance for marine geology, oceanography or physical processes. Likely to be rare with minimal potential for substitution. May also be of significant wider-scale, functional or strategic importance.
Medium	**Value**: Receptor is not designated but is of regional importance for marine geology, oceanography or physical processes.

Value	Definition
Low	**Value**: Receptor is not designated but is of local importance for marine geology, oceanography or physical processes.
Negligible	**Value**: Receptor is not designated and is not deemed of importance for marine geology, oceanography or physical processes.

Table 6.10 Definition of magnitude for a marine physical environment receptor

Magnitude	Definition
High	**Scale**: A change which would extend beyond the natural variations in background conditions. **Duration**: Change persists for more than ten years. **Frequency**: The effect would always occur. **Reversibility**: The effect is irreversible.
Medium	**Scale**: A change which would be noticeable from monitoring but remains within the range of natural variations in background conditions. **Duration**: Change persists for five to ten years. **Frequency**: The effect would occur regularly but not all the time. **Reversibility**: The effect is very slowly reversible (five to ten years).
Low	**Scale**: A change which would barely be noticeable from monitoring and is small compared to natural variations in background conditions. **Duration**: Change persists for one to five years. **Frequency**: The effect would occur occasionally but not all the time. **Reversibility**: The effect is slowly reversible (one to five years).
Negligible	**Scale**: A change which would not be noticeable from monitoring and is extremely small compared to natural variations in background conditions. **Duration**: Change persists for less than one year. **Frequency**: The effect would occur highly infrequently. **Reversibility**: The effect is quickly reversible (less than one year).

6.12.3 Significance of effect

317. The assessment of significance of an effect is a function of the sensitivity of the receptor and the magnitude of the impact. Determining significance will be guided by the use of a significance of effect matrix, as shown in **Table 6.11.** Definitions of each level of significance are provided in **Table 6.12**.

318. Likely effects which are identified within the impact assessment as major or moderate are to be regarded as significant. If appropriate and where practicable, mitigation will be identified in consultation with the regulatory authorities and relevant stakeholders. The aim of mitigation measures would be to avoid or reduce the overall significance of an effect to determine the residual effect upon a given receptor (see **Section 6.8**).

Table 6.11 Significance of effect matrix

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Table 6.12 Definition of effect significance

Sensitivity	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No Change	No effect, therefore, no change in receptor condition.

6.13 SCOPING QUESTIONS TO CONSULTEES

319. The following questions are posed to consultees to help them frame and focus their response to the marine physical environment scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the receptors outlined?
- Have all the relevant data sources been identified in this Scoping Report?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on marine physical environment receptors?
- Do you agree with the marine physical environment impacts that have been scoped in and out from further consideration within the EIA?
- Do you agree that water quality impacts can be scoped out of the assessment due to the negligible concentrations of contaminants present in the WDA and the use of industry-practice mitigation measures in the embedded mitigation?
- Do you agree with the proposed approach to assessment with specific reference to numerical modelling?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

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7 OFFSHORE AIR QUALITY

7.1 INTRODUCTION

320. This chapter considers the scope of potential impacts and likely significant effects (LSE) on offshore air quality that may arise from the construction, operation and maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment only. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

321. An overview of the existing environment is provided in this chapter which should be read in conjunction with the following Scoping Report chapter:

- **Chapter 19 Climate Change** which identifies the potential impacts that the WDA may have on climate change to which anthropogenic emissions contribute.

322. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

7.2 LEGISLATION, POLICY AND GUIDANCE

323. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 7.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for offshore air quality.

Table 7.1 Summary of relevant legislation, policy and guidance for offshore air quality

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Legislation	
Climate Change (Emissions Reductions Targets) (Scotland) Act 2019	Scottish legislation which sets a target for net zero emissions by 2045.
Annex VI of the International Convention for the Prevention of Pollution from Ships (International Convention for the Prevention of Pollution from Ships Annex VI, International Maritime Organisation 2023)	Regulations from the International Maritime Organisation (IMO) to reduce vessel emissions.
Policy	
The Scottish Government National Marine Plan (2015)	The following general policies apply to this offshore air quality assessment: **The key references are:** **GEN 14: Air quality:** *"Development and use of the marine environment should not result in the deterioration of air quality and should not breach any statutory air quality limits".*
Cleaner Air for Scotland 2. Towards a Better Place for Everyone (Scottish Government, 2021)	Scottish policy sets out how the Scottish Government proposes to reduce air pollution to protect human health between 2021 and 2026.

7.3 CONSULTATION

324. It is proposed that offshore air quality is scoped out of the EIA. As such, no consultation has been undertaken to date for offshore air quality and there are no further plans for consultation engagement. Further detail and a justification for this approach is provided in **Table 7.3**.

7.4 EXISTING DATA SOURCES

325. There would be sufficient data available for the compilation of a baseline against which potential impacts and effects could be assessed. However, it is proposed that offshore air quality is scoped out of the EIA. As such, no existing data sources have been reviewed to inform this chapter. Further detail and a justification for this approach is provided in **Table 7.3**.

7.5 SITE-SPECIFIC SURVEY DATA

326. It is considered that no additional baseline information is required to inform this chapter as it is proposed to be scoped out of the EIA.

7.6 OFFSHORE AIR QUALITY STUDY AREA

327. No offshore air quality Study Area is required to inform this chapter as the WDA is at least 12 kilometres (km) from identified receptors and this chapter is therefore proposed to be scoped out. Further detail and a justification for this approach is provided in **Table 7.3**.

7.7 EXISTING ENVIRONMENT

328. This section describes the offshore air quality existing environment and receptors deemed of relevance to the WDA. This sets the context for the identification of mitigation measures (**Section 331**) and scoping of potential impacts (**Section 7.9**) which then feeds into the consideration of cumulative effects (**Section 7.10**) and potential transboundary impacts (**Section 7.11**).

329. Pollutant concentrations should only be compared to the relevant air quality objectives where there is representative exposure. There are no offshore human receptors in the vicinity of the WDA which are sensitive to air quality, and marine based ecological receptors, such as designated areas, are unlikely to be sensitive to air pollution impacts (UK Centre for Ecology and Hydrology, 2024).

330. Furthermore, the only source of offshore atmospheric emissions is likely to be from offshore marine vessels emitting nitrogen oxides (NO_x), Particulate Matter and Sulphur Dioxide (SO_2).

331. The International Maritime Organisation has enacted regulations to reduce vessel emissions under Annex VI “Regulations for the prevention of air pollution from ships” of International Convention for the Prevention of Pollution from Ships. These include the global 0.5% limit on the sulphur content of marine fuels as well as two tiers of control for NO_x emissions which are determined by the ship’s construction date and the engine-rated speed[9]. Annex VI also sets out tighter emission limits for Emission Control Areas, such as the North Sea; therefore, SO_2 and NO_x emissions from vessels associated with the WDA have the potential to have tighter restrictions, depending on the ports within the United Kingdom (UK) and worldwide from which vessels originate.

[9] The rules for applying NOx Tiers are set out in the NOx Technical Code 2008 (resolution Marine Environment Protection Committee (Marine Environment Protection Committee).177, as amended by resolution Marine Environment Protection Committee .251)

7.8 MITIGATION MEASURES

332. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on offshore air quality receptors. These measures described in **Table 7.2** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 7.2 Indicative embedded mitigation measures for offshore air quality

ID	Parameter	Description of Mitigation Measure
M-2	Air Quality Standards	The Applicant will require compliance with relevant national and international maritime air quality standards and legislation, including the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI Regulations.
M-4	Project Environmental Management Plan	Development of, and adherence to, a Project Environmental Management Plan (PEMP) which will be in accordance with an Outline PEMP to be submitted with the Section 36 Application. The PEMP will include measures to manage the environmental risks associated with the construction and operation of the offshore components of the Project.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each, whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

333. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Scoping of potential impacts to offshore air quality will be assessed with this mitigation in place.

7.9 SCOPING OF POTENTIAL IMPACTS

334. **Table 7.3** outlines the offshore air quality impacts, all of which are proposed to be scoped out of the EIA, alongside justification.

Table 7.3 Potential impacts scoped in or scoped out for offshore air quality.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impacts of emissions from vessels	✘	✘	✘	Vessels utilised during the construction, Operation and Maintenance (O&M), and decommissioning phases of the Windfarm Development Area (WDA) may contribute to emissions offshore. The closest human receptors (e.g., residential areas) and ecological receptors (e.g., Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSIs)) are located at least 12 kilometres (km) from the WDA at its closest point. All vessel activities will be undertaken within the WDA, except for transit to and from ports which would be within existing vessel transit routes. Additionally, the International Convention for the Prevention of Pollution from Ships (MARPOL) emissions regulations will be applied. Due to the distance from receptors, it is considered that impacts of emissions from vessels would not be significant and there is no potential for vessel emissions to impact onshore human or ecological receptors. Therefore, potential impacts and effects of emissions from vessels has been **scoped out** of the Environmental Impact Assessment, for all phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

335. Potential interactions between the WDA, OfTDA and OnTDA impacts will be considered taking a similar approach to that described for the EIAR in **Chapter 4 Approach to Scoping and EIA** of this Scoping Report. As described in **Table 7.3,** it is not considered the WDA alone will impact on both onshore and offshore human and ecological receptors. However, a WDA, OnTDA and OfTDA combined appraisal (if required) will be undertaken which considers any potential interactions between impacts and/or potential for additive effects. It is considered this will be focussed on the impact of vessel emissions when in transit to and from port(s) on nearby onshore human and ecological receptors. This will only be necessary if there is spatial and temporal overlap between vessels used in association with the WDA, OfTDA and OnTDA. If it is determined there is no overlap, then it is considered there is no potential for additive impacts and effects and will therefore be scoped out.

7.10 POTENTIAL CUMULATIVE EFFECTS

336. As described in **Table 7.3**, all offshore works will be undertaken at a distance of at least 12 km from any sensitive receptors. Given this distance, it is considered unlikely that any significant cumulative effects would occur with other offshore emission sources (i.e., vessels) used for any other plans or projects within the area. Therefore, cumulative impacts are proposed to be scoped out of the EIA.

7.11 POTENTIAL TRANSBOUNDARY IMPACTS

337. It is unlikely that exhaust emissions from vessels within the WDA would give rise to any significant transboundary effects. The closest European Economic Area (EEA) onshore receptors are in the Republic of Ireland, located over 60 km from the WDA boundary.

338. Due to the distance from shore, it is considered that there is no potential for vessel emissions to have transboundary impacts on onshore human or ecological receptors. Therefore, transboundary impacts on air quality receptors are proposed to be scoped out of the EIA.

7.12 APPROACH TO IMPACT ASSESSMENT

339. As offshore air quality is proposed to be scoped out of the EIA, no proposed approach to the EIA is presented. Potential air quality impacts associated with the Offshore Transmission Development Area and Onshore Transmission Development Area will be considered within separate EIARs for these aspects of the Project (see **Section 1.3**).

7.13 SCOPING QUESTIONS TO CONSULTEES

340. The following questions are posed to consultees to help them frame and focus their response to the offshore air quality scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the offshore air quality impacts resulting from the WDA been identified in this Scoping Report?
- Do you agree that all offshore air quality impacts have been scoped out of the EIA?
- Do you have any other matters or information sources that you may wish to be presented?

7.14 REFERENCES

International Maritime Organisation (2023). 'Special Areas under MARPOL, Annex VI'. Available at: https://www.imo.org/en/OurWork/Environment/Pages/Special-Areas-Marpol.aspx. [Accessed 21/09/2024]

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Scottish Government (2015). Scotland's National Marine Plan. A Single Framework for Managing Our Seas. Published 27 March 2015.

Scottish Government (2021). Cleaner Air for Scotland 2. Towards a Better Place for Everyone. Scottish Government, Published 15 July. ISBN 97818020100912021.

UK Centre for Ecology and Hydrology (UKCEH) (2024). Air Pollution Information System. Available at: https://www.apis.ac.uk/. [Accessed 21/09/2024]

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Biological Environment

- Chapter 8: Benthic Ecology
- Chapter 9: Fish (including Basking Shark) and Shellfish Ecology
- Chapter 10: Marine Mammals
- Chapter 11: Offshore Ornithology

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8 BENTHIC ECOLOGY

8.1 INTRODUCTION

341. This chapter considers the scope of potential impacts and likely significant effects (LSE) on benthic ecology that may arise from the construction, operation and maintenance (O&M), and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

342. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on benthic ecology in the Environmental Impact Assessment (EIA).

343. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 6 Marine Physical Environment** – describes aspects of the abiotic environment that influences the nature of the benthic ecology environment; and
- **Chapter 9 Fish (Including Basking Shark) and Shellfish Ecology** – fish species, particularly demersal or bentho-pelagic species, rely on prey resources living under and on the seabed**.**

344. Key inter-relationships between this chapter and those listed above will be considered where relevant in the EIA.

8.2 LEGISLATION, POLICY AND GUIDANCE

345. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 8.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for benthic ecology.

Table 8.1 Summary of the relevant legislation, policy and guidance for benthic ecology

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Legislation	
Nature Conservation (Scotland) Act 2004, Part 3 and Schedule 6 (amendments to the Wildlife and Countryside Act, 1981)	Makes amendments to the Wildlife and Countryside Act (1981), strengthening the legal protection for threatened species to include 'reckless' acts.
The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention; 1979)	Promotes national policies for the conservation of wild flora, wild fauna and natural habitats.
Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic Convention') 1992	Provides a legal framework to protect and conserve maritime ecosystems through the prevention and elimination of pollution from offshore sources.
Convention on Biological Diversity 1992	Provides a legal framework to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity.
The Conservation (Natural Habitats, &c.) Regulations 1994 and Conservation of Offshore Marine Habitats and Species Regulations 2017	Applies to Marine Licences and Section 36 applications within the Scottish Offshore region.
Policy	
National Planning Framework 4 (Scottish Government, 2023)	The National Planning Framework 4 (NPF4) sets out Scotland's spatial principles, regional priorities, national developments and national planning policy NPF4 presents Sustainable Places, Liveable Places and Productive Places to achieve national outcomes including benefits to the environment, communities, and health. NPF4 contains a notable focus on tackling both the climate and nature crises. **The key references are:** **Policy 3: Biodiversity** – *"Development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them. Proposals should also integrate nature-based solutions, where possible…"*
The Scottish Biodiversity Strategy (Post-2020: Statement of Intent) (Scottish Government, 2020a)	Reiterates the commitment (and desire to enhance) the 2020 Challenge for Scotland's Biodiversity (response to the Aichi Targets set by the United Nations Convention on Biological Diversity, and the European Union's (EU) Biodiversity Strategy for 2020) and supplements Scotland's Biodiversity: It's in Your Hands (2004).

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020a)	The Sectoral Marine Plan (SMP) for Offshore Wind Energy identifies sustainable areas for the future development of commercial scale offshore wind energy in Scotland, including a spatial strategy to inform the seabed leasing process for the purposes of offshore wind energy. The WDA is located in Plan Option W1, as identified in the SMP for Offshore Wind. Plan Options including W1 were subject to testing, refinement and area reduction through Strategic Environmental Assessment (SEA), Habitats Regulations Appraisal (HRA) and plan development processes. The SEA identified relevant characteristics of Plan Option W1 and identified key risks to be addressed in consenting applications. A key risk factor identified for the W1 area was potential impacts on benthic habitats and species.
The Scottish Government National Marine Plan (Marine Scotland, 2015)	The following general policies apply to this benthic ecology assessment: **The key references are:** **GEN 9: Natural heritage:** *": Development and use of the marine environment must: (a) Comply with legal requirements for protected areas and protected species. (b) Not result in significant impact on the national status of Priority Marine Features.* **GEN 10: Invasive non-native species:** "*Opportunities to reduce the introduction of invasive non-native species to a minimum or proactively improve the practice of existing activity should be taken when decisions are being made."*
Argyll and Bute Local Development Plan 2 (2024)	**The relevant policies are:** **Policy 28: Supporting Sustainable Aquatic and Coastal Development** – *"Proposals for marine and freshwater aquaculture, marine and coastal developments will be supported where it can be demonstrated that there will be no significant adverse effects, directly, indirectly or cumulatively on: The landscape/coastal character, seascape or visual amenity (including Isolated Coast, Wild Land and National Scenic Areas) …"* **Policy 73: Development Impact on Habitats, Species and Biodiversity** – *"When considering development proposals Argyll and Bute Council will give full consideration to the legislation, policies and conservation objectives, contained within the following: i) Wildlife and Countryside Act 1981; (and as amended by the Nature Conservation (Scotland) Act 2004) …"* **Policy 74: Development Impact on Sites of International Importance** – *"Unless development is directly connected with or necessary to their conservation, proposals likely to have a significantly adverse effect, including cumulative, upon an existing or proposed Special Protection Area, existing or candidate Special Area of Conservation, or Ramsar Site (i.e. European Sites), including development out with the site, shall require appropriate assessment…"*
Guidance	
Marine Monitoring Handbook (JNCC, 2001)	These guidelines have been produced by Joint Nature Conservation Committee (JNCC) to promote good practice in marine monitoring.
Guidelines for the Conduct of Benthic Studies at Marine Aggregate Extraction Sites (Ware and Kenny, 2011)	This guidance has been produced to accompany any dredging application and designed to promote a comprehensive and consistent approach to the assessment of the benthic environment (i.e. sediments and associated benthic fauna).

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Guidelines for Data Acquisition to Support Marine Environmental Assessments for Offshore Renewable Energy Projects (Cefas, 2012)	These guidelines assist in the design, review and implementation of environmental data collection and analytical activities associated with all stages of offshore renewable energy developments.
Guidance and publications from Scottish Natural Heritage (SNH) and Marine Scotland on Priority Marine Features and Marine Protected Area search features (Tyler-Walters *et al.*, 2016)	Provides guidance on the Priority Marine Features (PMF) and Marine Protected Area (MPA) features.
Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland Terrestrial, Freshwater, Coastal and Marine. (CIEEM, 2022)	This guidance provides practical advice for all professionals involved with ecological evaluation and assessment for proposed developments in terrestrial, freshwater, marine and coastal environments.
NatureScot guidance on marine invasive non-native species (NatureScot, 2023)	This document provides guidance on marine invasive non-native species (INNS).
Guidance on Non-Native Species, approved by the Scottish Parliament (Scottish Government, 2012)	Provides guidance on INNS known to threaten Scotland.
Marine Information Network / Marine Evidence-Based Sensitivity Assessments approach to sensitivity (Tyler-Walters et al., 2023)	The Marine Evidence-Based Sensitivity Assessments (MarESA) methodology provides a systematic process to compile and assess the best available scientific evidence to determine each sensitivity assessment.
Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR Commission, 2008a)	This guidance note provides assistance to Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) contracting parties, developers, consultants, regulators or any other interested parties or individuals in the identification and consideration of some of the issues associated with determining the environmental effects of offshore windfarm developments.
Assessment of the environmental impact of offshore wind-farms (OSPAR Commission, 2008b)	Describes the status of offshore wind-farm development within the OSPAR area in terms of the current scale and planned potential schemes, and the environmental effects.
Marine Scotland Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications (Marine Scotland, 2018) and proposed revision	Provides guidance on applying for Section 36 consents and marine licenses for offshore renewable energy projects within both Scottish Territorial Waters (out to 12 nm) and Scottish Offshore Waters (12-200 nm).

8.3 CONSULTATION

346. This benthic ecology chapter has been informed by engagement with stakeholders, including those listed below:

- Argyll and Bute Council;
- Marine Directorate - Licensing Operations Team (MD-LOT); and
- NatureScot.

347. As part of the consultation process, the Applicant presented the approach to assessment to stakeholders in order to offer transparency around the scoping methodology and rationale, capture stakeholder advice and guidance, and incorporate stakeholder feedback, where appropriate. A summary of the approach to stakeholder communication and consultation is outlined in **Chapter 5 Consultation and Stakeholder Engagement** with each engagement activity being listed within **Appendix L Stakeholder Engagement Log**.

348. The consultation outcomes in relation to benthic ecology are outlined in **Table 8.2**, which summarises stakeholder feedback, outlines how the Applicant has responded to the feedback received, and details how it has been considered within this chapter and/or will be used to inform the EIA process and preparation of the EIAR.

349. In addition to the engagement outlined in **Table 8.2,** the Applicant reached agreement with NatureScot and Argyll and Bute Council in relation to:

- The proposed approach to characterisation of the baseline environment;
- The proposed EIA methodology and approach to assessment;
- The proposed approach to consideration of benthic ecology receptors in Habitats Regulations Appraisal (HRA) and Nature Conservation Marine Protected Area (NCMPA) Screening; and
- Agreement in principle with the preliminary results presented for the HRA and NCMPA Screening for benthic ecology receptors.

350. Consultation relating to this topic will be ongoing throughout the EIA process. The Applicant welcomes the opportunity to work with stakeholders to deliver a proportionate and robust EIA.

Table 8.2 Summary of consultation relevant to benthic ecology

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot and Argyll and Bute Council	01 May 2024: Benthic Ecology Scoping Workshop (NatureScot) 13 May 2024: Written Feedback (Argyll and Bute Council)	NatureScot and Argyll and Bute Council advised that invasive non-native species (INNS) should be scoped in at this stage and noted the potential for WDA infrastructure to act as 'stepping-stones' for spread of INNS. NatureScot advised potential impacts associated with the potential removal and spread of INNS are considered for the decommissioning phase.	Potential impacts from INNS have been scoped in for all phases and will include consideration of potential 'stepping stone' effects (i.e. the potential for Project infrastructure to act as a vector for INNS spread).
		NatureScot advised that the proposed EIA methodology and approach to assessment is suitable, however advised that the benthic ecology study area should be the same as that for the Marine Physical Environment. Argyll and Bute Council agreed with this recommendation.	The Applicant has updated the benthic ecology Study Area to reflect the marine physical environment Study Area, which is a 23 kilometres (km) buffer in a southerly direction based on the maximum tidal excursion extent (**Figure 8.2**). As shown, the tidal excursion traverses only a short distance in all other directions.
		NatureScot advised that the National Marine Plan Interactive (NMPi) portal and OneBenthic portal should be added to the data sources list. Argyll and Bute Council agreed with this recommendation.	The Applicant has included both the NMPi and Centre for Environment, Fisheries and Aquaculture (Cefas) OneBenthic Baseline tool as existing data sources in **Table 8.3**.
NatureScot	01 May 2024: Benthic Ecology Scoping Workshop	NatureScot advised that the potential impacts on Benthic Ecology receptors from scour and changes in hydrodynamics be added.	Potential impacts on benthic receptors from scour and changes in hydrodynamics will be considered in the assessment of increased suspended sediment concentrations and sediment re-deposition.
NatureScot	03 June 2024: Benthic Ecology Scoping Workshop - Written Feedback	NatureScot advised that, in addition to O&M, noise and vibration impacts can also be scoped out for benthic receptors during construction and decommissioning.	Noise and vibration impacts have been scoped out for benthic receptors for all phases.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	26 July 2024: Benthic Ecology Scoping Workshop - Written Feedback	NatureScot advised that the Applicant include Benthic Ecology Characterisation Site Investigation Survey reports within the WDA Scoping Report.	The benthic characterisation survey reports are provided as **Appendix B Third-Party Benthic Subtidal Survey Interpretative Report**, **Appendix C Contaminants Survey Report** and **Appendix D MachairWind 2023 Benthic Characterisation Report**.

8.4 EXISTING DATA SOURCES

351. **Table 8.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA.

Table 8.3 Summary of key datasets and information sources

Dataset	Description	Author
Marine Protected Areas	NatureScot's Marine Protected Areas (MPAs) 2024 reports.	NatureScot, 2024
Priority Marine Habitats	Geodatabase of Marine features adjacent to Scotland Priority Marine Habitats (PMF) information.	NatureScot and Joint Nature Conservation Committee (JNCC), 2024
Priority Marine Features	Provides the characteristics, distribution and status of PMFs in Scotland.	Tyler-Walters et al., 2016
	PMFs list, species and habitats on existing conservation.	JNCC, 2012
Marine Recorder Public United Kingdom	The Marine Recorder public database holds information on United Kingdom (UK) marine benthic data such as species, biotopes and physical attributes. Latest version published in 2022.	JNCC, 2022
EUSeaMap	European Marine Observation and Data Network (EMODnet) seabed habitats mapping.	European Commission, 2024
Marine Life Information Network	Marine Life Information Network (MarLIN) provides sensitivity and distribution information for receptors.	Marine Biological Association, 2024; Tyler-Walters et al., 2023
National Marine Plan Interactive	The National Marine Plan Interactive (NMPi) is an interactive Geographic Information System (GIS)-based tool allowing you to view different types of information (as layers).	Marine Scotland, 2024
One Benthic Baseline Tool	Open Science open-access tool shows the faunal cluster identity of 0.1m^2 grab and core samples (processed using a 1mm sieve) held in the OneBenthic database.	Cefas, 2019

8.5 SITE-SPECIFIC SURVEY DATA

352. In addition to the existing data sources identified in **Section 8.4**, the Project has undertaken site specific surveys to inform the EIA (**Table 8.4**).

Table 8.4 Site-specific survey data

Dataset	Year(s)	Description
Third-party benthic survey	2021	Benthic survey undertaken by a third-party which overlaps the Option Agreement Area (OAA). The survey works were undertaken by Briggs Marine and comprised: • 60 benthic sediment grab samples contaminant, faunal, biomass and particle size distribution analysis (**Figure 8.1**); and • 20 transects of Drop-Down Video (DDV). This data has been acquired by the Applicant to supplement the Project's site investigation survey data which together has been used to characterise the Windfarm Development Area (WDA). See **Appendix B Third-Party Benthic Subtidal Survey Interpretative Report**.

Project's site investigation	2023	Site Investigation survey undertaken across the OAA by Fugro on behalf of the Project. The survey works comprised of the following:
		• Geophysical survey (2 km x 500 metres (m) line spacing)
		  ○ Side Scan Sonar;
		  ○ Multibeam Echosounder;
		  ○ Sub Bottom Profiler; and
		  ○ Magnetometer.
		• 57 benthic sediment grabs for contaminant faunal, biomass and particle size distribution analysis (**Figure 8.1**);
		• 59 transects of DDV with seabed photographs; and
		• 29 water samples for Environmental DNA analysis.
		See **Appendix C Contaminants Survey Report**, **Appendix D MachairWind 2023 Benthic Characterisation Report** and **Appendix E Environmental DNA Survey Interpretative Report**.

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620000
640000
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SUBMARINE EXERCISE
SUBMARINE EXERCISE AREA
BANK
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55°50'N

Windfarm Development Area
Option Agreement Area
Project site investigation (Fugro, 2023)
Third party site investigation (Briggs, 2021)

N

0 5 10 Kilometres

Edinburgh
Belfast
Scale: 1:10,000,000

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	23/08/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000046		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:200,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 8.1: MachairWind 2023 Benthic Survey Locations

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8.6 BENTHIC ECOLOGY STUDY AREA

353. This section describes the benthic ecology Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 8.7)** and the EIA will be conducted.

354. The benthic ecology Study Area (**Figure 8.2**) is defined by a 23 km tidal excursion that extends from the WDA in a southerly direction (i.e. the average distance travelled by tidal flow between low-water slack tide and high-water slack tide before the current direction reverses). The tidal excursion traverses only a short distance in all other directions. This encompasses the area over which suspended sediment could be transported following disturbance from the seabed. The tidal excursion extent has been estimated based on publicly available data including admiralty charts. The Study Area for benthic ecology provides regional context and ensures coverage of the Zone of Influence (ZoI) of potential impacts.

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Windfarm Development Area

Option Agreement Area

Benthic Ecology Study Area

N

0 5 10 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	07/08/2024	JH	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000043		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:350,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 8.2: Benthic Ecology Study Area

NOT TO BE USED FOR NAVIGATION

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Project: C:\Users\925591\Royal HaskoningDHV\P-PC3479-MachairWind-EIA-and-Consenting - PC3479 - WIP\E02 GIS & Drawings\F02_Figures\02_Scoping\WindFarmSite\Chapter_8_BenthicEcology\MCW_ScopingWFS_BenthicEcology.aprx
Name: MCW-GEN-GIS-MAP-RHS-000043_StudyArea

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8.7 EXISTING ENVIRONMENT

355. This section characterises the benthic ecology receptors using publicly available data sources (**Section 8.4**) alongside site-specific survey data (**Section 8.5**) deemed of relevance to the Study Area (**Section 8.6**). This sets the context for the identification of mitigation measures (**Section 8.8**) and scoping of potential impacts (**Section 8.9**) which then feeds into the consideration of cumulative effects (**Section 8.10**) and potential transboundary impacts (**Section 8.11**).

8.7.1 Subtidal Ecology

356. The seabed habitats derived from EUSeaMap (European Marine Observation and Data Network (EMODnet), 2023) have been used to provide broad-scale modelling to predict habitats based on known environmental characteristics across the WDA. This data was cross-checked with the third-party benthic survey and Project's site investigation data to identify correlations with the predicted habitats. The European Nature Information System (EUNIS) (EMODnet, 2024) habitat types indicated that the majority of the WDA was predicted to comprise of circalittoral fine sand or circalittoral muddy sand.

357. The main habitat assigned during the Project's site investigation survey, based on the photographic, macrofaunal and Particle Size Distribution data, was the habitat type 'Offshore circalittoral sand' (SS.Ss.Osa). This is consistent with the EMODnet habitat map of the area and immediate surroundings. Areas with gravelly sand, shell fragments, pebbles and infrequent cobbles were observed and classified as patches of the habitat type 'Offshore circalittoral coarse sediment' (SS.SCS.OCS). Where numerous cobbles and large boulders occurred, the habitat type assigned was 'Echinoderms and crustose communities' (CR.MCR.EcCr). A section in the west of the Study Area was classified as a mosaic of SS.SCS.OCS with CR.MCR.EcCr.

358. The third-party benthic survey found the elongated furrow shell *(Abra prismatica)*, the sand digger shrimp *(Bathyporeia elegans)* and polychaetes (*Polychaeta. Sp.*) in circalittoral fine sand (SS.SSa.CFiSa.ApriBatPo) and the white furrow shell *(Abra alba)* and bivalve mollusc (*Nucula nitidosa)* in circalittoral muddy sand or slightly mixed sediment (SS.SSa.CmuSa.AalbNuc) as the dominant habitats within the WDA. However, the survey area was generally classified as SS.SCS.OCS.

359. The habitats identified across both the third-party benthic survey and Project's site investigation survey campaigns are very similar, with circalittoral sands and areas of mixed sediments being the main sediment type.

360. Both surveys found areas resembling low to medium stony reef with epifauna relating to this habitat. These areas were not identified within the WDA however, they are located within the 23 km buffered Study Area.

361. Within the Project's site investigation survey, Anemones of the family *Edwardsiidae sp.* were recorded by grab sampling, indicating the possible presence of the UK Biodiversity Action Plan species, the timid burrowing anemone *(Edwardsia timida)* (JNCC, 2007).

362. Ocean quahog *(Arctica islandica)*, a long living bivalve listed as PMF and in the OSPAR List of Threatened and /or declining species (OSPAR, 2022), were also recorded in both surveys.

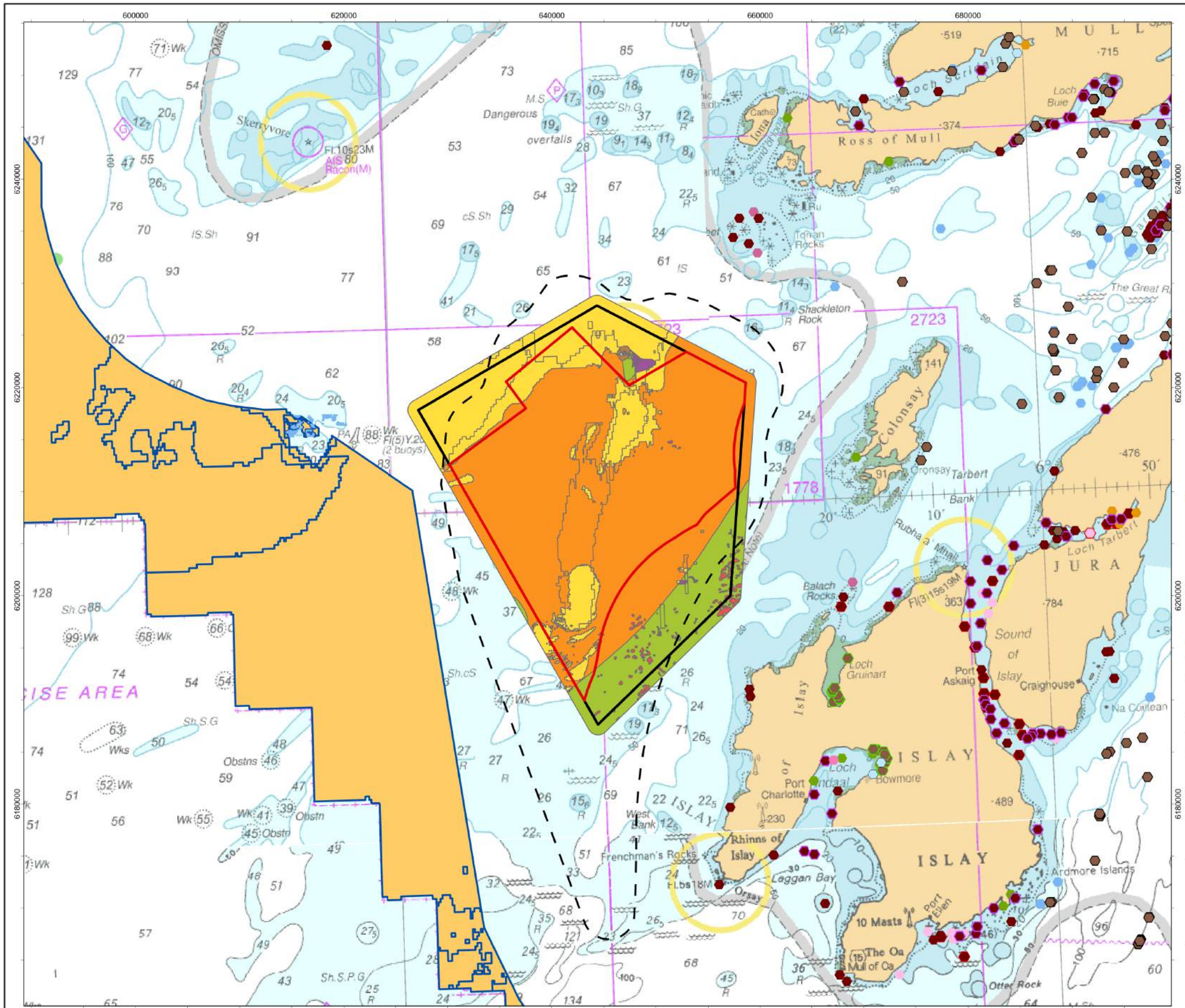
363. Scotland's NMP has identified a list of 81 PMFs (Tyler-Walters et al., 2016). These PMFs are species and habitats considered to be of greatest marine nature conservation importance in Scottish territorial waters and are considered under threat. Two of these PMFs include benthic habitats potentially present within the WDA and their importance, and locations are shown in **Table 8.5** and **Figure 8.3**.

Table 8.5 Priority Marine Features located within the Windfarm Development Area

Priority Marine Features (PMF)	European Nature Information System (EUNIS)	Characteristics (Tyler-Walters et al., 2016)
Burrowed mud	Seapens and burrowing megafauna in circalittoral fine mud (SS.SMu.CfiMu.SpnMeg) Burrowing megafauna and the volcano worm (*Maxmuelleria lankesteri)* in circalittoral mud (SS.Smu.CfiMu.MegMax) Tall seapen – (*Funiculina quadrangularis)* Fireworks anemone – (*Pachycerianthus multiplicatus)* Mud burrowing amphipod – (*Maera loveni)*	Areas of finer sediments that are home to a range of burrowing crustaceans, including langoustine *(Nephrops norvegicus)*, the mud shrimps (*Calocaris macandreae)*, (*Callianassa subterranean)*, or the mud burrowing amphipod (*Maera loveni)* and the crab (*Goneplax rhomboides)*. The burrowing action of these species makes burrows and mounds a prominent feature of this habitat. In some areas, burrowed mud may support conspicuous populations of seapens, so called due to their resemblance to feather quills. Typically, the species the slender sea pen *(Virgularia mirabilis)* and the phosphorescent sea pen *(Pennatula phosphorea)* are present, although in deeper waters off the continental shelf, the wild star sea pen (*Kophobelemnon stelliferum)* and the lily sea pen (*Umbellula encrinus)* may be recorded. This habitat can also support populations of the fireworks anemone, and the tall seapen (*Funiculina quadrangularis)* (SpnMeg.Fun). Large mounds of mud may also be found where the mud volcano worm is present (MegMax). Ocean quahog may also be present.
Offshore Subtidal Sand and Gravels	Offshore circalittoral coarse sediment (SS.SCS.OCS) Offshore circalittoral sand (SS.Ssa.Osa)	Sand and gravel sediments are the most common subtidal habitat around the coast of the British Isles. Offshore sands and gravels are more stable than their shallower equivalents with diverse infaunal communities dominated by polychaetes, hatchet shells (Thyasiridae family) (OCS.GlapThyAmy), and small bivalves (*Bivalvia. Sp.)*; e.g. the little tellin (*Tellina tenuis*) (OCS.HeloPkef). Offshore fine to muddy sands support a diversity of tube building polychaetes, burrowing brittlestars *(Amphiura Urtica)* and bivalves (Osa.OfusAfil and Osa.MalEdaf), while the pea urchin *(Echinocyamus pusillus),* occurs in medium sands (CfiSaEpusOborApri) and amphipods and hooded shrimp in fine sands (CfiSa.ApriBatPo). Mobile predators include flatfish, starfish and crabs (including hermit crabs). This habitat also includes the Atlantic and Arctic bathyal and abyssal sediments which occur off the continental slope in Scotland.

364. The Marine Directorate has identified 11 of the 81 PMFs (note the 11 PMFs do not include those listed in **Table 8.5**) to have further management measures to protect the most vulnerable PMFs in Scottish inshore waters (within 12 nm of shore). Any potential links will be reviewed and included, if required, as part of the EIA.

365. No other Annex I habitats or Annex II species, OSPAR threatened and/or declining species and habitats, or UK Priority Habitats and Species, or Scottish biodiversity list species and habitats were observed within the survey area.



2	07/08/2024	AB	GC	CB	PB
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PROJECT TITLE	MachairWind		

Figure 8.3: Annex I and Priority Marine Feature Habitats

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8.7.2 Designated Sites

366. There is no overlap of the Study Area with sites designated for the protection of benthic features (**Figure 8.4**). The nearest designated sites relevant to benthic ecology, within 50 km of the WDA (i.e. more than double the distance of one tidal excursion) are outlined in **Table 8.6**. Given that the nearest designated site is greater than 10 km from the 23 km tidal excursion (Study Area), there would not be any effect on designated site features.

Table 8.6 Designated sites for benthic ecology within 50 km of the Windfarm Development Area

Site	Distance (km)	Designated Features Assessment
Special Areas of Conservation (SAC)		
Firth of Lorn SAC	34.3	Reefs
Stanton Banks SAC	46.8	Reefs
Treshnish Isles SAC	38.3	Reefs
Marine Protected Areas (MPA)		
Loch Sunart to the Sound of Jura MPA	41.5	• Flame shell *(Limaria hians)* beds; • Northern Featherstars *(Leptometra celtica);* • *Serpulid* Aggregations; and • Common Skate *(Dipturus batis)* - considered in: ○ **Chapter 9 Fish (Including Basking Shark) and Shellfish Ecology**, ○ **Chapter 12 Commercial Fisheries**; and ○ **Appendix H Nature Conservation Marine Protected Area Screening**.
Loch Sween MPA	46.5	• Burrowed mud; • Maerl beds; • Native oysters; and • Sublittoral mud and mixed sediment communities.

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600000

700000

6300000

6200000

Windfarm Development Area

Option Agreement Area

Benthic Ecology Study Area

50km Windfarm Development Area Buffer

Special Areas of Conservation

Marine Protected Areas

N

0 10 20 Kilometres

Treshnish Isles (SAC)

Stanton Banks (SAC)

Loch Sunart to the Sound of Jura (MPA)

Firth of Lorn (SAC)

Loch Sween (MPA)

South Arran (MPA)

Clyde Sea Sill (MPA)

2	07/08/2024	JH	AB	CB	PB
REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000031		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:750,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 8.4: Designated Sites Within 50km of the WDA

NOT TO BE USED FOR NAVIGATION

Royal HaskoningDHV Enhancing Society Together

ScottishPower Renewables

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8.8 MITIGATION MEASURES

367. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on benthic ecology receptors. These measures described in **Table 8.7** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 8.7 Indicative embedded mitigation and monitoring measures for benthic ecology

ID	Parameter	Description of Mitigation Measure
M-3	Pollution from Ships	Compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 and adherence to the "OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic".
M-4	Project Environmental Management Plan	Development of, and adherence to, a Project Environmental Management Plan (PEMP) which will be in accordance with an Outline PEMP to be submitted with the Section 36 Application. The PEMP will include measures for preventing wastewater discharges from vessels and procedures for informing Project personnel on best practice guidance to reducing the potential for water discharges during offshore construction and Operation and Maintenance (O&M).
M-5	Invasive Non-Native Management Plan	Development of, and adherence to, an Invasive Non-Native Species Management Plan (INNSMP). This plan will detail mitigation measures to reduce the introduction and transfer of invasive non-native species.
M-7	Marine Pollution Contingency Plan	Development of, and adherence to, a Marine Pollution Contingency Plan (MPCP). The MPCP will provide guidance to the Project personnel, contractors and subcontractors on the actions and reporting requirements in the event of spills and collision incidents. The MPCP will also contain emergency plans and mitigation procedures for a range of potential marine pollution incidents.
M-8	Cable Plan	Development of, and adherence to, a Cable Plan (incorporating a Cable Burial Risk Assessment (CBRA)). The Cable Plan will confirm planned cable routeing, burial, and any additional external cable protection, and will set out methods for post-installation cable monitoring. Furthermore, this plan will detail environmental sensitivities and design considerations to mitigate, as far as practicable, the effects of inter-array cable laying and associated protection during installation and operation of the Windfarm Development Area (WDA) infrastructure. Benthic ecology receptors will be considered in the drafting of the Cable Plan.
M-9	Invasive Non-Native Species	Adherence to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) Convention (2004) which provides global regulations to control the transfer of potentially invasive species.
M-14	Micro-siting	Micro-siting of infrastructure, where practicable, around any identified sensitive habitats and identified anomalies of archaeological interest.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

368. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to benthic ecology will be assessed with this mitigation in place.

8.9 SCOPING OF POTENTIAL IMPACTS

369. A range of potential impacts on benthic ecology receptors may occur during the construction, O&M, and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. The impact assessment will be based on the realistic worst-case scenario.

370. It is anticipated that the potential decommissioning impacts would be similar to those of construction, although the magnitude of impact would vary, but in most cases is likely to be less (e.g., underwater noise would be reduced in decommissioning due to the lack of piling). It is likely that the WDA infrastructure will have been colonised by benthic species and the removal of this infrastructure could result in a greater adverse effect than during its construction. Given the Project lifetime (indicative operational life of 35 years), the baseline environment is likely to change, and this will be considered within the decommissioning impact assessment in the EIA where appropriate.

371. Impacts which span the entire lifetime of the Project[10] (e.g. permanent habitat loss as a worst case) will only be considered as part of the O&M phase in the EIA to avoid duplication. It will be highlighted in the O&M section of the EIAR that impacts such as permanent habitat loss begin to occur in construction and potentially continue after decommissioning.

372. **Table 8.8** outlines the benthic ecology impacts which are proposed to be scoped in or out of the EIA, alongside justification. Sensitivities of benthic habitats and communities will be assigned for each of these phases in reference to Marine Evidence-Based Sensitivity Assessments (MarESA) (Tyler-Walters et al., 2018) available on the Marine Life Information Network (MarLIN) website and using expert judgement where appropriate. These may be refined through consultation activities and as additional project information, and site-specific data become available.

[10] The WDA seabed lease is up to 60 years with an indicative operational life of 35 years. At the end of the operational life, any repowering will be subject to separate consents.

Table 8.8 Potential impacts scoped in or scoped out for benthic ecology

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Accidental spills and pollution events	✘	✘	✘	Accidental spills and pollution events can occur from vessels and installation techniques required for the installation and operation of the Windfarm Development Area (WDA). As discussed in **Section 8.8**, all vessels must comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78. A Project Environmental Marine Plan (PEMP) inclusive of a Marine Pollution Contingency Plan (MPCP), which will be in accordance with an outline PEMP (OPEMP) will be submitted with the Section 36 Application and implemented so that all works during all phases are undertaken in line with good practice for working in the marine environment which will reduce the risk of spills and pollution events. As a result of the embedded mitigation measures that will be secured through the OPEMP, it is considered that the risk of a spill occurring is low and with the appropriate management measures in place, should a spill occur, the risk to the marine environment is effectively mitigated. Therefore, potential impacts and effects on accidental spills and pollution events has been **scoped out** of the Environmental Impact Assessment (EIA), for all phases.
Remobilisation of contaminated sediment during intrusive works	✘	✘	✘	Sediment disturbance could lead to the mobilisation of contaminants (if present) that could be harmful to benthic communities. Contaminants survey data collected across the Option Agreement Area detailed in **Chapter 6 Marine Physical Environment** and illustrated on **Figure 8.1**, was assessed in relation to background contaminant levels (e.g. Centre for Environment, Fisheries and Aquaculture (Cefas) Action Levels or Marine Scotland Guideline Action Levels (2017)) and shows that the seabed sediments within the WDA do not contain contaminants in concentrations that would pose a risk should the seabed sediments be suspended during construction, operation and maintenance (O&M) and decommissioning activities. Therefore, potential impacts and effects on benthic receptors from the remobilisation of contaminated sediment during intrusive works has been **scoped out** of the EIA, for all phases.
Potential effects on designated sites	✘	✘	✘	The WDA does not directly overlap any designated sites (see **Section 8.7.2**). The nearest designated site with benthic qualifying features is the Firth of Lorn Special Area of Conservation (SAC) which is located 34.3 km east of the WDA. Considering the maximum extent of one mean tidal excursion of 23 km in a southerly direction, which applies a reasonable and suitable level of precaution, there is no pathway for indirect effects on designated sites associated with increased Suspended Sediment Concentrations (SSCs) arising from the WDA. Therefore, potential impacts and effects on designated sites has been **scoped out** of the EIA, for all phases. The **Habitats Regulations Appraisal (HRA) Screening Report** (Royal HaskoningDHV and MacArthur Green, 2024) provides further information and screening for likely significant effect of benthic SACs. In addition, **Appendix H Nature Conservation Marine Protected Area Screening** provides further information and screening for likely significant effect of benthic MPAs.
Disturbance from noise and vibration	✘	✘	✘	Following the Scoping Workshop, NatureScot advised that disturbance from noise and vibration could be scoped out for benthic receptors (**Table 8.2**). There may be reactions from some benthic species to episodic noise such as that from pile driving (Lovell et al., 2005; Heinisch and Weise, 1987) however any effect is likely to be localised and temporary and of negligible significance. Therefore, potential impacts and effects on disturbance from noise and vibration during O&M has been **scoped out** of the EIA, for all phases.

Temporary Physical Disturbance / Habitat Loss	✓	✓	✓	There is the potential for temporary physical disturbance of the seabed and habitat loss caused during the installation of the Inter-Array Cables (IACs), cable protection and foundations. Disturbance can potentially be caused by the following:
				• Installation of Wind Turbine Generators (WTG) could include a selection of the following types of piles;
				• Driven piles, or suction piles;
				• Scour protection for the WTG could include but not be limited to;
				• Rock berm placement, concrete mattress or nature inclusive design solutions;
				• Installation of the IACs could include the following burial techniques;
				  ○ Jetting, mechanical trenching, cable ploughing, and mass / controlled flow excavator;
				• Cable protection for the IACs could include the following:
				  ○ Cable burial, concrete mattress cable protection, rock berm placement, rock bags or nature inclusive design solutions.
				The magnitude of the potential impact will be assessed based on the outcomes of **Chapter 6 Marine Physical Environment** (i.e., the Zone of Influence (ZoI) from construction activities). The magnitude of the impact of temporary habitat loss / physical disturbance will be considered in terms of a worst-case scenario (i.e., maximum area affected) at any one location. Sensitivities will be informed by available literature, including the assessments available on Marine Information Network (MarLIN) and peer-review publications.
				
				There is potential for ongoing temporary physical disturbance of the seabed during the O&M phase activities, such as indentations on the seabed from jack-up vessels. The effects from planned maintenance should be temporary, localised and smaller in scale than during construction.
				
				Therefore, potential impacts and effects on temporary physical disturbance / habitat loss has been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Increased SSCs and sediment re-deposition	✓	✓	✓	WDA activities have the potential to cause mobilisation of sediments in the water column and an increase in SSCs. Such concentrations have the potential to affect benthos through blockage of filter feeders and/or smothering sessile species. Given that the substrate in the Study Area has sections of stable substrate supporting a more diverse benthic community (**Section 8.7**), it is likely that the benthic communities are not habituated to smothering from natural events and are therefore likely to be more sensitive to such impacts. The magnitude of the potential impact will be based upon the outcomes of **Chapter 6 Marine Physical Environment**. The magnitude of the impact of sediment plumes and smothering of benthic receptors will be considered in terms of a worst-case scenario (i.e., maximum area affected, the maximum concentration of the plume and duration of smothering and the maximum thickness of deposited material) at any one location. Effects will be assessed in relation to background SSC levels as well as natural variations and seasonal changes. The nature, type and duration of potential construction activities will be considered to determine the magnitude of impacts. During O&M, it is anticipated that any increased SSCs from activities such as IAC repairs and vessel movements will be small scale and temporary, and less than during construction. Consideration will be given to potential impacts related to the suspension of fine sediments, including from seabed alteration arising from changes in physical processes such as scour and sediment composition. Sensitivities will be informed by available literature including the assessments available on MarLIN and peer reviewed publications. Therefore, potential impacts and effects on increased SSCs and sediment re-deposition has been **scoped into** the EIA, for all phases.
Introduction of marine Invasive Non-Native Species	✓	✓	✓	The potential risk of spreading or introducing invasive non-native species (INNS) will be mitigated by adhering to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) Convention (2004) as noted in **Table 8.7**. Furthermore, commitments to biosecurity measures to reduce the spread of INNS would be detailed in the PEMP, which will be in accordance with an OPEMP to be submitted with the Section 36 and Marine Licence application(s). With the appropriate mitigations in place, it is expected that the risk of INNS being introduced and colonising WDA infrastructure would be reduced. However, NatureScot advised at the Scoping Workshop on 01 May 2024 that there are uncertainties with the effectiveness of mitigation measures to reduce the spread of INNS (**Table 8.2**). Therefore, the potential impact and effect of INNS has been **scoped into** the EIA, for all phases.
Permanent habitat loss	✗	✓	✗	The presence of infrastructure on the seabed (including any external cable protection) will result in a relatively small footprint of lost habitat in the context of the habitat from the surrounding region. Depending on whether the infrastructure is removed or left in-situ at the decommissioning stage, this impact is either long term or permanent. The level of effect will be dependent upon the habitat in question, its distribution in the wider area and the presence of a species that is reliant on that habitat (see **Section 8.7**). As a worst-case scenario, it will be assumed that infrastructure on the seabed causes permanent habitat loss, unless a commitment is made to remove infrastructure at decommissioning. It is acknowledged that the impact of permanent habitat loss begins in construction and continues through decommissioning. To avoid duplicating assessments, the full extent of this impact will be assessed for the O&M phase, with a clear acknowledgement that it spans the duration of the WDA . Therefore, the potential impact and effect of permanent habitat loss has been **scoped into** the EIA, for the O&M phase.
Interactions with Electromagnetic Fields	✗	✓	✗	Potential impacts of Electromagnetic Fields (EMF) from operational cables will be considered. A comparison of EMF strength across ten different cables and windfarms (Normandeau et al., 2011) suggests that EMF may be detectable above background levels up to 10 metres (m) from the vicinity of the cable. However, this decreases at lower voltages and where cable protection measures, including burial, are used. Any impacts are likely to be highly localised, as EMF are strongly attenuated and decrease as an inverse square of distance from the cable (Gill and Bartlett, 2010). Benthic invertebrates have been shown to use the earth's magnetic fields for navigation, such as the amphipods, the Baltic isopod *(Idotea baltica basteria)* and the Antarctic amphipod *(Gondogenia antarctica)*, and the spiny lobster (*Panulirus argus)* (Herrnkind and McLean, 1971, Lohmann et al. 1995, Ugolini and Pezzani, 1995, Boles and Lohmann, 2003, Tomanová and Vácha, 2016). However, Bochert and Zettler (2006) studied the effects of EMF on the survival and physiology of various crustaceans, marine worms, and echinoderms in the context of a variety of cables associated with offshore windfarms in the Baltic Sea and demonstrated no significant effects for any species after three months of exposure. Gibb et al. (2014) states that there is no evidence of EMF affecting the ross worm *(Sabellaria spinulosa)*. Where cables are buried to sufficient depth, significant effects on benthic receptors are not expected. The United Kingdom (UK) National Policy Statement for Renewable Energy Infrastructure (EN-3) states that where cables are buried to *'a depth of at least 1.5 m below the seabed, the applicant should not have to assess the effect of the cables on benthic habitats during the operational phase of the offshore wind farm'.* It is currently expected that cables will be buried where practicable, but the target depth will vary depending on the ground conditions encountered. There is also the potential that it is not practicable to bury cables at all locations (e.g., in areas of hard substrate) and therefore there may be sections of surface laid cables with external cable protection. Interactions with EMF will be scoped into the EIAR, and the assessment will consider a realistic worst-case scenario based on the extent of cables buried and unburied. Therefore, the potential impact and effect of EMF has been **scoped into** the EIA, for the O&M phase.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Colonisation of introduced hard substrate	✘	✓	✓	The subsea WDA infrastructure is expected to be colonised by a range of species leading to a localised increase in biodiversity. However, there is the potential for some of these species to appear from further afield that do not normally occur in the WDA and for these species to be INNS. The presence of the WDA infrastructure would also provide habitat for mobile species and serve as a refuge for fish. Across much of the WDA, this is likely to represent a change from the baseline ecology (**Section 8.7**) which is unlikely to support hard surfaces for attachment. Overall, the area available for colonisation would be low and to date there is no evidence of significant changes of the seabed beyond the vicinity of the foundations due to the installation of windfarm infrastructure (Lindeboom et al., 2011). However, there is potential for a change in habitat type from a largely soft sediment dominated area to small areas of hard substrate. Therefore, the potential impact and effect of a colonisation of introduced hard substrate has been **scoped into** the EIA, for the O&M and decommissioning phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

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8.10 POTENTIAL CUMULATIVE EFFECTS

373. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA and OfTDA to affect benthic ecology receptors. The Cumulative Effects Assessment (CEA) will follow the approach outlined in **Chapter 4 Approach to Scoping and EIA**.

374. Offshore wind projects and other activities relevant to the assessment of cumulative effects on benthic ecology will be identified through a screening exercise. The potential impacts to be taken forward for consideration in the CEA will be in line with those described for the WDA-alone assessment and OfTDA appraisal. Impacts assessed as negligible adverse significance (or lower) will not be taken forward to CEA and it is possible that some will be screened out on the basis that they are highly localised or the risk of effects occurring is reduced, given management measures will be in place for the Project and other plans and projects.

8.11 POTENTIAL TRANSBOUNDARY IMPACTS

375. Due to the localised and small-scale nature of the impacts on benthic ecology, significant transboundary effects are considered unlikely due to the nearest maritime boundary being approximately 33 km away. It is therefore proposed that transboundary benthic effects are scoped out from further consideration within the EIA.

8.12 APPROACH TO IMPACT ASSESSMENT

376. In combination with guidance from Chartered Institute for Ecology and Environmental Management (CIEEM) (2022), the EIA Regulations (2017) provide a framework for the methodology to be adopted in the EIA to assess the LSE on benthic habitat receptors.

377. Due to the complexity of ecological system processes and the uncertainty of some impacts and efficacy of some mitigation measures, experienced professional judgement also plays a key role in the evaluation of features and in determining significance of effects. The impact assessment methodology for this chapter will follow the procedures described in **Chapter 4 Approach to Scoping and EIA**, as well as the guidance documents presented in **Section 8.2**.

378. Specific to marine ecology, the CIEEM (2022) guidelines will be followed in order to identify Important Ecological Features. Assessments of the identified Important Ecological Features will be presented in the baseline characterisation of each relevant technical section. The CIEEM (2022) guidelines will also be used to reflect topic specific interests and produce criteria defining the value of each Important Ecological Feature and will include specific consideration of PMFs within the WDA.

379. The assessment of the LSE upon the benthic environment will be cross referenced to the assessments discussed in **Chapter 6 Marine Physical Environment**.

380. Regarding the characterisation of the benthic subtidal ecology baseline, a combination of MarESA (Tyler-Walters et al., 2018) and Feature Activity Sensitivity Tool (FeAST) will be used to inform the sensitivity of benthic receptors in the EIA. The framework determines sensitivity based on resistance (tolerance) and resilience (recoverability), which are defined as:

- **Resistance**: the likelihood of damage (termed intolerance or resistance) due to a pressure; and
- **Resilience**: the rate of (or time taken for) recovery (termed recoverability, or resilience) once the pressure has abated or been removed.

381. Site-specific surveys will inform vulnerability and sensitivity assessments.

Table 8.9 Resistance and resilience scale definitions

Level	Description
Resistance (Tolerance)	
None	Key functional, structural, characterising species severely decline and/or physicochemical parameters are also affected e.g. removal of habitats causing a change in habitats type. A severe decline/reduction relates to the loss of 75% of the extent, density or abundance of the selected species or habitat component e.g. loss of 75% substratum (where this can be sensibly applied).
Low	Significant mortality of key and characterising species with some effects on the physicochemical character of habitat. A significant decline/reduction relates to the loss of 25-75% of the extent, density, or abundance of the selected species or habitat component e.g. loss of 25-75% of the substratum.
Medium	Some mortality of species (can be significant where these are not keystone structural/functional and characterising species) without change to habitats relates to the loss <25% of the species or habitat component.
High	No significant effects on the physicochemical character of habitat and no effect on population viability of key/characterising species but may affect feeding, respiration and reproduction rates.
Resilience (Recovery)	
Very Low	Negligible or prolonged recovery possible; at least 25 years to recover structure and function.
Low	Full recovery within 10-25 years.
Medium	Full recovery within 2-10 years.
High	Full recovery within 2 years.

382. MarESA uses a matrix approach using both recovery and resilience to determine sensitivity. The sensitivity matrix used in this assessment, based on MarESA, is presented in **Table 8.10**.

383. MarESA sensitivities are not available at the habitat level (EUNIS level 3). However, the confidence in the data at the habitat level is higher than at the biotope level (EUNIS level 5). Therefore, where sensitivity at the habitat level is assessed, it is based on the worst-case sensitivity of biotopes identified within the habitat.

Table 8.10 Sensitivity Matrix

		Resistance (Recovery)			
		None	Low	Medium	High
Resilience (Tolerance)	High	High	High	Medium	Low
	Medium	High	High	Medium	Low
	Low	Medium	Medium	Medium	Low
	Negligible	Medium	Low	Low	Negligible

384. In addition, the 'value' of the receptor forms an important element within the assessment, for instance if the receptor is a protected species or habitat. It is important to understand that high value and high sensitivity are not necessarily linked within a particular effect. A receptor could be of high value (e.g. Annex I habitat) but have a low or negligible physical/ecological sensitivity to an effect. Similarly, low value does not equate to low sensitivity and is judged on a receptor-by-receptor basis. The value will be considered, where relevant, as a modifier for the sensitivity assigned to the receptor, based on expert judgement. **Table 8.11** states the definitions of value levels for benthic ecology.

Table 8.11 Definition of value for benthic ecology receptors

Value	Definition
High	Habitats (and species) protected under international law (e.g. Annex I habitats within a Special Area of Conservation (SAC) boundary).
Medium	Habitats protected under national law (e.g. Annex I habitats within an MPA boundary). Species/habitat that may be rare or threatened in the United Kingdom (UK).
Low	Habitats or species that provide prey items for other species of conservation value.
Negligible	Habitats and species which are not protected under conservation legislation and are not considered to be particularly important or rare.

385. The terms used to define magnitude of impact is outlined in **Table 8.12**.

Table 8.12 Definition of terms relating to magnitude of an impact

Magnitude	Definition
High	Fundamental, permanent / irreversible changes, over the whole receptor, and / or fundamental alteration to key characteristics or features of the particular receptor's character or distinctiveness.
Medium	Considerable, permanent / irreversible changes, over the majority of the receptor, and / or discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness.
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and / or limited but discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness.
Negligible	Discernible, temporary (for part of the Offshore Project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the particular receptor's character or distinctiveness.

386. The significance of the effect upon benthic ecology is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in **Table 8.13**.

Table 8.13 Significance of effect matrix

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

387. There are some areas within the WDA where the presence of PMFs is predicted and PMFs have been identified from the survey data. However, these PMFs are not classified as vulnerable receptors within the benthic communities and there are no other sensitive areas noted, as shown in the most vulnerable PMFs identified by Tyler-Walters et al., 2016 (**Section 8.7.1**).

8.13 SCOPING QUESTIONS TO CONSULTEES

388. The following questions are posed to consultees to help them frame and focus their response to the benthic ecology chapter, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on benthic receptors?
- Have all benthic ecology impacts resulting from the WDA been identified in the Scoping Report?
- Do you agree with the benthic ecology impacts that have been scoped in and out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed approach to assessment?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

8.14 REFERENCES

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9 FISH (INCLUDING BASKING SHARK) AND SHELLFISH ECOLOGY

9.1 INTRODUCTION

389. This chapter considers the scope of potential impacts and likely significant effects (LSE) on fish and shellfish ecology that may arise from the construction, operation and maintenance (O&M), and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

390. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on fish (including basking shark (*Cetorhinus maximus*)) and shellfish ecology in the Environmental Impact Assessment (EIA).

391. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 6 Marine Physical Environment** – describes aspects of the abiotic environment that can influence the nature of the fish and shellfish ecology environment;
- **Chapter 8 Benthic Ecology** – provides a detailed account of benthic habitats which can influence the fish and shellfish habitat described in this chapter;
- **Chapter 10 Marine Mammals** – describes marine mammal species which prey on fish and shellfish species;
- **Chapter 11 Offshore Ornithology** – describes offshore ornithology species which prey on fish and shellfish species; and
- **Chapter 12 Commercial Fisheries** – describes potential impacts on commercial fisheries which can be influenced by potential ecological impacts on those fish and shellfish populations which are commercially exploited.

392. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

9.2 LEGISLATION, POLICY AND GUIDANCE

393. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 9.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for fish (including basking shark) and shellfish ecology.

Table 9.1 Summary of relevant legislation, policy and guidance for fish and shellfish ecology

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Legislation	
Marine (Scotland) Act 2010 and (2014)	Applies to Marine Licences and Section 36 applications within the Scottish marine area (0-12 nautical miles (nm)). The Act provides a framework to help balance competing demands on Scotland's seas. It introduces a duty to protect and enhance the marine environment and includes measures to help boost economic investment and growth in areas such as marine renewables.
The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (Habitats Regulations)	Applies to Marine Licences and Section 36 applications within the Scottish inshore region. It applies European Protected Species (EPS) protections in waters within 12 nm from shore.
The Wildlife and Countryside Act 1981, as amended in The Nature Conservation (Scotland) Act 2004, Part 3 and Schedule 6	Provides a list of threatened species for which killing, injuring, or taking by any method is prohibited. Basking sharks are protected from intentional or reckless disturbance or harassment. If a risk of disturbance or harassment that cannot be removed or sufficiently reduced by using alternatives or mitigation measures, then the activity may still go ahead under licence (Basking Shark Licence). The Nature Conservation (Scotland) Act 2004, Part 3 and Schedule 6 makes amendments to the Wildlife and Countryside Act 1981, strengthening the legal protection for threatened species to include 'reckless' acts.
Policy	
National Planning Framework 4 (Scottish Government, 2023a)	**The key reference is:** **Policy 3: Biodiversity:** *"Development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them…"*
Scottish Wild Salmon Strategy (Scottish Government, 2022a)	Sets out the vision, objectives and priority themes to ensure the protection and recovery of Scottish Atlantic wild salmon populations.
UK Marine Policy Statement (UK Government, 2011)	**The key reference is:** **3.3.24: Potential impacts:** *"Renewable energy developments can potentially have adverse impacts on marine fish and mammals, primarily through construction noise …"*

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020)	The Sectoral Marine Plan (SMP) for Offshore Wind Energy identifies sustainable areas for the future development of commercial scale offshore wind energy in Scotland, including a spatial strategy to inform the seabed leasing process for the purposes of offshore wind energy. The WDA is located in Plan Option W1, as identified in the SMP for Offshore Wind. Plan Options including W1 were subject to testing, refinement and area reduction through Strategic Environmental Assessment (SEA), Habitats Regulations Appraisal (HRA) and plan development processes. The SEA identified relevant characteristics of Plan Option W1 and identified key risks to be addressed in consenting applications. A key risk factor identified for the W1 area is potential impacts on migratory fish species.
The Scottish Government National Marine Plan (Scottish Government, 2015a)	**The key references are:** **GEN 9: Natural heritage:** "*Development and use of the marine environment must: a) Comply with legal requirements for protected areas and protected species. b) Not result in significant impact on the national status of Priority Marine Features. c) Protect and, where appropriate, enhance the health of the marine area."* **GEN 13: Noise**: "*Development and use in the marine environment should avoid significant adverse effects of man-made noise and vibration, especially on species sensitive to such effects."* **WILD FISH 1:** *"The impact of development and use of the marine environment on diadromous fish species should be considered in marine planning and decision-making processes."*. It is acknowledged however that *"there is uncertainty around the likelihood and severity"* of wind energy impacts and *"continued efforts to better understand potential impacts should be encouraged*".
Argyll and Bute Local Development Plan 2 (2024)	**The relevant policies are:** **Policy 28: Supporting Sustainable Aquatic and Coastal Development** – *"Proposals for marine and freshwater aquaculture, marine and coastal developments will be supported where it can be demonstrated that there will be no significant adverse effects, directly, indirectly or cumulatively on: Designated sites, habitats and species for nature conservation, (including Priority Marine Features, wild migratory salmonids, and European Protected Species)."* **Policy 73: Development Impact on Habitats, Species and Biodiversity** – *"When considering development proposals Argyll and Bute Council will give full consideration to the legislation, policies and conservation objectives, contained within the following: i) Wildlife and Countryside Act 1981; (and as amended by the Nature Conservation (Scotland) Act 2004)"* **Policy 74: Development Impact on Sites of International Importance** – *"Unless development is directly connected with or necessary to their conservation, proposals likely to have a significantly adverse effect, including cumulative, upon an existing or proposed Special Protection Area, existing or candidate Special Area of Conservation, or Ramsar Site (i.e. European Sites), including development out with the site, shall require appropriate assessment"*
Guidance	
Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2022)	These Guidelines have been produced to promote good practice in Ecological Impact Assessment relating to terrestrial, freshwater, coastal and marine environments in the United Kingdom (UK) and Ireland.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Sound exposure guidelines for fishes and sea turtles: A technical Report (Popper et al., 2014)	Peer reviewed guidelines providing directions and recommendations for setting underwater noise impact criteria (including injury and behavioural criteria) for fish, based on their anatomy and available information on hearing thresholds.
Strategic Review of Offshore Wind Farm Monitoring Data Associated with Food and Environmental Protection Act Licence Conditions: Fish (Report No. ME1117). Report by Cefas (Walker et al., 2009)	This report considers the Food and Environmental Protection Act (FEPA) licence conditions relating to fish for nine offshore windfarms the fish surveys undertaken under the FEPA licence. It draws conclusions as to which license conditions have been successfully applied, those that might no longer be necessary, and how data collection could be improved.
Offshore Wind Marine Environmental Assessments: Best practice advice for evidence and data standards. Phase 1: (Parker et al., 2022)	Sets out Natural England's expectations for pre-application baseline data for designated nature conservation and landscape receptors to support offshore wind applications. Whilst led by Natural England, the findings remain relevant to the Project.

9.3 CONSULTATION

394. This fish (including basking shark) and shellfish ecology chapter has been informed by engagement with stakeholders, including those listed below:

- Argyll and Bute Council;
- Fisheries Management Scotland (FMS);
- Marine Directorate - Licensing Operations Team (MD-LOT); and
- NatureScot.

395. As part of the consultation process, the Applicant presented the approach to assessment to stakeholders in order to offer transparency around the scoping methodology and rationale, capture stakeholder advice and guidance, and incorporate stakeholder feedback, where appropriate. A summary of the approach to stakeholder communication and consultation is outlined in **Chapter 5 Consultation and Stakeholder Engagement** with each engagement activity being listed within **Appendix L Stakeholder Engagement Log**.

396. The consultation outcomes in relation to fish (including basking shark) and shellfish ecology are outlined in **Table 9.2**, which summarises stakeholder feedback, outlines how the Applicant has responded to the feedback received, and details how it has been considered within this chapter and/or will be used to inform the EIA process and preparation of the EIAR.

397. In addition to the engagement outlined in **Table 9.2,** the points of agreement between the Applicant and NatureScot are listed below:

- The proposed approach to Habitats Regulations Appraisal (HRA) Screening, i.e. that SACs for diadromous fish species should be considered through the EIA only and not through the HRA; and
- A narrative approach to the consideration of seabed particle motion effects is appropriate.

398. The Applicant reached agreement with both NatureScot, and Argyll and Bute Council in relation to:

- Defining the Local Study Area as the boundaries of the International Council for the Exploration of the Sea (ICES) statistical rectangles 41E3 and 40E3;
- The approach to characterising the baseline environment;
- The proposed outline approach to underwater noise modelling, including sandeel, spawning herring, and eggs being treated as stationary receptors;
- The impact titles for basking shark being satisfactory; and
- Screening in underwater noise impacts on the basking shark feature of the Sea of the Hebrides Nature Conservation Marine Protected Area (NCMPA).

399. Consultation in relation to this topic will be ongoing throughout the EIA process. The Applicant welcomes the opportunity to work with stakeholders to deliver a proportionate and robust EIA.

Table 9.2 Summary of consultation relevant to fish and shellfish ecology

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
Fisheries Management Scotland	08 February 2023: Fisheries Management Scotland (FMS)-MachairWind Update Meeting	FMS explained that the ScotMER evidence mapping process identifies substantial evidence gaps in terms of potential impact pathways for diadromous fish.	ScotMER Diadromous Fish Evidence Map is included as an existing data source in **Table 9.3** and will inform the EIA.
NatureScot	23 June 2023 and 28 August 2023: email correspondence	NatureScot confirmed that the Benthic Sampling Strategy document shared by the Applicant on 23 June 2023 was appropriate.	Noted. Regarding the results of the Environmental DNA (eDNA) analysis, these are presented in a technical report (**Appendix E Environmental DNA Survey Interpretative Report**). However, eDNA survey data will not be used to inform the WDA assessment due to there being no NatureScot guidance on its use within EIA. The eDNA Survey Interpretive Report will provide supplementary information to the Environmental Impact Assessment Report (EIAR).
NatureScot	04 December 2023: Marine Mammals Expert Topic Group (ETG)	Speedie and Witt data sources should be included specifically for basking sharks.	Speedie and Witt data sources have been reviewed and referenced in **Section 9.7.1.3** where relevant.
Fisheries Management Scotland	12 March 2024: FMS-MachairWind Update Meeting	FMS highlighted that Atlantic salmon *(Salmo salar)* are now considered near threatened by the International Union for Conservation of Nature (IUCN). FMS stated that all rivers entering the Clyde could be affected by the Project.	The Windfarm Development Area (WDA) EIAR will consider the potential impacts from the construction of the WDA infrastructure on Atlantic salmon. A separate scoping report and EIAR will be provided for the Offshore Transmission Development Area (OfTDA) once a route to landfall in South Ayrshire has been more accurately defined (see **Section 1.3**). However, as appropriate, potential impacts from construction of the OfTDA components on Atlantic salmon will be considered within the WDA EIA (commensurate with the level of detail that is available at the time of carrying out that assessment) (**Section 4.4.2.2**).

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot and Argyll and Bute Council	01 May 2024: Fish and Shellfish Ecology Scoping Workshop (NatureScot) 13 May 2024: Fish and Shellfish Ecology Scoping Workshop - Written feedback (Argyll and Bute Council)	Potential impacts from Invasive Non-Native Species (INNS) should be scoped in for further assessment.	The potential for the introduction and spread of INNS has been scoped in for further assessment for all phases (**Section 9.9**).
NatureScot	01 May 2024: Fish and Shellfish Ecology Scoping Workshop	NatureScot advised that cod may need to be considered as stationary receptors if they are known to spawn in the area.	As described in **Table 9.6** there is no overlap of cod spawning grounds with the WDA. The nearest cod spawning grounds described in Ellis et al. (2012) are located in the North Channel between Northern Ireland and Scotland and there is therefore unlikely to be an overlap with the underwater noise impact range from the WDA however, cod will be considered as stationary receptors if there is potential for an overlap with identified spawning grounds.
NatureScot	23 May 2024: Fish and Shellfish Ecology Scoping Workshop - Written feedback	Regarding the proposed approach to Nature Conservation Marine Protected Area (NCMPA) Screening, it is advised that vessel collision and vessel disturbance, as with protected marine mammal features under the same designated site, is considered.	Vessel collision and vessel disturbance impacts on the basking shark feature of the Sea of the Hebrides NCMPA has been screened in – see **Appendix H Nature Conservation Marine Protected Area Screening**.
		Additional data sources that will be useful for fish and shellfish include: • Langton et al. 2021 • González-Irusta, and Wright (2016a); • González-Irusta, and Wright (2016b); • González-Irusta, and Wright (2017); and • ScotMER (2024).	These additional data sources have been included in **Table 9.3** and will inform the EIA as appropriate.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		NatureScot recommend inclusion of data from the Hebridean Whale and Dolphin Trust (HWDT) as well as the Shark Trust.	The Applicant has requested data from HWDT with a view to including information on basking sharks within the EIAR. Basking shark sightings information provided to the Basking Shark Project via the Shark Trust is considered in **Section 9.7.2** with reference to Pikesley, et al. (2024).
		NatureScot confirmed it is content with the impact titles for basking shark however noted that if floating technology is brought back into the project envelope, then secondary entanglement (dynamic cables and mooring lines) and Electromagnetic Fields (EMF) from dynamic cables would require to be scoped in.	Floating technology will not be utilised by the Project (see **Section 3.4**).
		Mitigation of impacts to basking shark (and other marine megafauna) is likely to be similar to those for marine mammals, so it is advised basking sharks (and other marine megafauna) are included for any proposed mitigation for marine mammals.	Relevant mitigations for marine mammals will also be applied for basking shark. See **Section 9.8**.
Argyll and Bute Council and NatureScot	13 May 2024: Fish and Shellfish Ecology Scoping Workshop - Written feedback (Argyll and Bute Council) 26 July 2024: Fish and Shellfish Ecology Scoping Workshop - Written feedback (NatureScot)	In relation to whether NatureScot and Argyll and Bute Council have a preferred approach to defining the Regional Study Area, both consultees advised that they don't have a preferred approach. NatureScot highlighted that the study area should cover all the potential impacts from the proposal.	As described in **Section 9.6**, the Regional Study Area is bounded by ICES rectangles 45E2, 45E4, 39E2 and 39E4 which is a precautionary approach and will capture potential natal salmon rivers in northwest Scotland.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	04 June 2024: the Marine Directorate - Licensing Operations Team (MD-LOT) / NatureScot Quarterly Update Meeting	NatureScot advised that European Protected Species (EPS) and basking shark should be considered at EIA stage together with likely mitigation options. This is necessary to provide sufficient confidence, should the project receive s36 consent, that the likely worst-case scenario (impact) is able to be addressed through a subsequent derogation under EPS licensing. Leaving this entirely to the post-consent stage has led to substantial difficulties and delays.	As described in **Section 2.8.4**, Basking shark is protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). A basking shark licence application will be submitted to MD-LOT post consent at which point the project design envelope will have been further refined through detailed design and procurement activities and further detail will be available on the techniques selected for construction. Mitigation measures relevant to basking shark are included in **Table 9.8** and further information on the basking shark licensing process and mitigation measures will be provided in the EIAR. In addition, a full assessment of the scoped in potential impacts on basking shark, based on the worst-case scenario, will be provided in the EIAR. See equivalent comment in **Table 10.2** for the Applicant's response regarding EPS.

9.4 EXISTING DATA SOURCES

400. **Table 9.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA.

Table 9.3 Summary of key datasets and information sources

Dataset	Description	Author
International Herring Larvae Survey	The International Council for the Exploration of the Sea (ICES) programme of international herring (*Clupea harengus*) larval surveys in the North Sea, undertaken from 2014 to 2024, provides annual quantitative estimates of herring larval abundance in Scottish waters.	ICES, 2024
Fisheries sensitivity maps in British Waters	Mapped extents of the spawning and nursery grounds of various commercially important fish species and the relative intensity and duration of spawning.	Coull et al., 1998
Mapping the spawning and nursery grounds of selected fish for spatial planning	Mapped extents of spawning and nursery grounds of various fish species, using the original maps produced by Coull et al. (1998), updated with newer data on larvae, juvenile, and egg abundance.	Ellis et al., 2012
Updates to Fisheries Sensitivity Maps in British Waters	Updated modelling for probability of larvae presence for various fish species in British waters. Use and interpretation is recommended alongside the Coull et al. (1998) maps.	Aires et al., 2014
A verified distribution model for the lesser sandeel	Species distribution models were developed to predict the occurrence and density of sandeels (*Ammodytes marinus*) in parts of the North Sea and Celtic Seas regions. Hurdle model evaluation with independent data demonstrated that it had significant discrimination ability across the study region. The distribution model helps refine past inferences about sandeel availability to predators and indicates to marine planners, potential areas where anthropogenic impacts should be considered.	Langton et al., 2021
Nephrops functional units and suitable grounds in Scottish and adjacent waters	Mapped extents of stocks or ICES 'functional units' based on the discrete patches of mud which Nephrops (*Nephrops norvegicus*) inhabit. In addition, the suitable Nephrops ground within the ICES functional units around Scottish waters is also shown and is based on British Geological Survey (BGS) information and Vessel Monitoring System data (to map inferred fishing distribution of the Nephrops fleet).	Scottish Government, 2022b
Nephrops – TV-assessed burrow density	Stock assessments make use of size composition data from catches, combined with information on stock abundance obtained from underwater television surveys. At each station, a custom-built sledge is towed along the seabed and all Nephrops burrow complexes are counted and used to derive density estimates, as shown in this data layer. Surveys were undertaken from 2007 to 2014.	Scottish Government, 2015b
Marine Information Network fish and shellfish sensitivity reports	Marine Information Network (MarLIN)'s The Marine Evidence-Based Sensitivity Assessments (MarESA) sensitivity assessments examine the biology or ecology of a fish or shellfish species, compile the evidence of the effect of a given pressure on the species, assess the likely sensitivity of the species to the pressure against standard scales, documenting the evidence used.	Tyler-Walters et al., 2018
DATRAS Scottish West Coast Groundfish Survey	The dataset includes age- and length-based catch per unit effort data for commercial fish species collected during the Scottish West Coast Bottom Trawl Survey. This is a survey from 2011, replacing the historical DATRAS SWC-IBTS dataset.	ICES, 2013

Dataset	Description	Author
Scottish salmon and sea trout fishery statistics 2022	Summary of the salmon and sea trout fishery catch statistics updated for the 2022 season.	Scottish Government, 2023b
United Kingdom sea fisheries annual statistics	Illustrates species of commercial importance in terms of landings weight and value by vessels in relation to ICES rectangles. Current available reports from 2012 to 2022.	Marine Management Organisation (MMO), 2024
Diadromous Fish ScotMER Receptor Group	The Diadromous Fish Scottish Marine Energy Research (ScotMER) Receptor Group is concerned with evidence gaps related to the health, distribution, and impacts on Diadromous fish (salmon, sea trout, etc.).	ScotMER, 2024
National Biodiversity Network Atlas species assemblage data	The National Biodiversity Network (NBN) Atlas is a species occurrence data portal, combining 995 datasets from 165 data partners at the time of writing.	NBN, 2023
Developing Essential Fish Habitat maps for fish and shellfish species in Scotland Report	Modelled extent of essential fish habitat in Scottish waters for 16 species in offshore waters. The lower data availability in inshore waters i.e. where the Windfarm Development Area is located (due to higher survey fragmentation, lower method standardisation and coverage gaps) prevented the application of Essential Fish Habitat modelling in this region. However, habitat proxies for species/life stages that may have their essential fish habitat inshore were identified and mapped based on data layers for pre-defined habitat types (European Nature Information System (EUNIS) habitat classification).	Franco et al., 2022
West Coast Tracking Project	The West Coast Tracking Project aims to advance understanding of the marine and near-coastal migratory distribution of wild Atlantic salmon around the west coast of Scotland.	Atlantic Salmon Trust, 2022
Hebridean Whale and Dolphin Trust Whale Watch citizen sightings data	Citizen science resource with basking shark sightings data. Data has been gathered from 2017 to present and any new data will be used at EIA stage.	Hebridean Whale and Dolphin Trust (HWDT), 2024
Basking shark satellite tagging project	A joint project between NatureScot and the University of Exeter has provided insights into basking sharks' horizontal and vertical use of the waters on Scotland's west coast. Basking shark satellite tagging project providing insights into basking shark movement, distribution and behaviour using satellite telemetry.	Witt et al., 2016
Analysis of Basking Shark Watch Database 1987 to 2020	Collates and analyses Basking Shark Watch public sightings data (which has operated since 1987) to enhance accessibility and utility of the dataset. Furthermore, the report investigates the spatial and temporal patterns within the Sea of the Hebrides Marine Protected Area (MPA) in Scotland and broader geographical areas.	Booth et al. 2013
Argyll Array Offshore Windfarm Boat-Based Surveys	Twenty- seven months of boat-based marine mammal and basking shark survey data taken for the now withdrawn Argyll Array Offshore Windfarm (OWF).	AMEC, 2013
Islay OWF Boat-Based Surveys	Fourteen months of boat-based marine mammal and basking shark survey data undertaken for the now withdrawn Islay OWF.	González-Irusta, and Wright, 2016a

Dataset	Description	Author
Spawning grounds of Atlantic cod	Generalised additive models predict the spawning habitat of North Sea cod (*Gadus morhua)*, based on the abundance of spawning fish within three population subareas and nine environmental layers.	González-Irusta, and Wright, 2016b
Spawning grounds of haddock	Examines the importance of physical constraints on the spawning distribution of northern shelf haddock *(Melanogrammus aeglefinus)* using a two-stage generalised additive model applied to bottom trawl survey data from the North Sea and west of Scotland.	González-Irusta, and Wright, 2017
Spawning grounds of whiting	Examines the importance of environmental influences on spawning distribution of whiting *(Merlangius merlangus)* using generalised additive models.	Booth et al. 2013

9.5 SITE-SPECIFIC SURVEY DATA

401. In addition to the existing data sources identified in **Section 9.4**, the project has undertaken site specific surveys to inform the EIA (**Table 9.4**).

Table 9.4 Site-specific survey data

Dataset	Year(s)	Description
Third-party Digital Aerial Survey	2020 to 2021	Digital Aerial Surveys (DAS) undertaken by APEM on behalf of a third-party developer across a portion of the Option Agreement Area (OAA), including a 6 km buffer (**Figure 10.2**). Monthly surveys were actioned over 16 months from October 2020 to January 2022 inclusive.
Project's Digital Aerial Survey	2021 to 2023	DAS undertaken by APEM for the Project across the full OAA, including a 4 km buffer (analysed) and 6 km buffer, extending to 10 km during the survey (**Figure 10.1**). Monthly surveys were actioned over 30 months from April 2021 to September 2023 inclusive.
Third-party benthic survey	2021	Benthic survey undertaken by Briggs Marine which overlaps with the OAA. The survey work comprised of the following: • 60 benthic sediment grab samples contaminants, faunal, biomass and particle size distribution analysis; and • 20 transects of Drop-Down Video (DDV). This data has been acquired by the Applicant to supplement the Project's site investigation survey data which together has been used to characterise the Windfarm Development Area (WDA). See **Appendix B Third-Party Benthic Subtidal Survey Interpretative Report**.

Project's site investigation	2023	Site Investigation survey undertaken across the OAA by Fugro on behalf of the Project. The survey works comprised of the following:
		• Geophysical survey (2 km x 500 m line spacing)
		  ○ Side Scan Sonar
		  ○ Multibeam Echosounder
		  ○ Sub Bottom Profiler
		  ○ Magnetometer
		• 57 benthic sediment grabs for contaminants, faunal, biomass and particle size distribution analysis;
		• 59 transects of DDV with seabed photographs; and
		• 29 water samples for environmental DNA analysis.
		See **Appendix C Contaminants Survey Report**, **Appendix D MachairWind 2023 Benthic Characterisation Report** and **Appendix E Environmental DNA Survey Interpretative Report**.

9.6 FISH AND SHELLFISH ECOLOGY STUDY AREAS

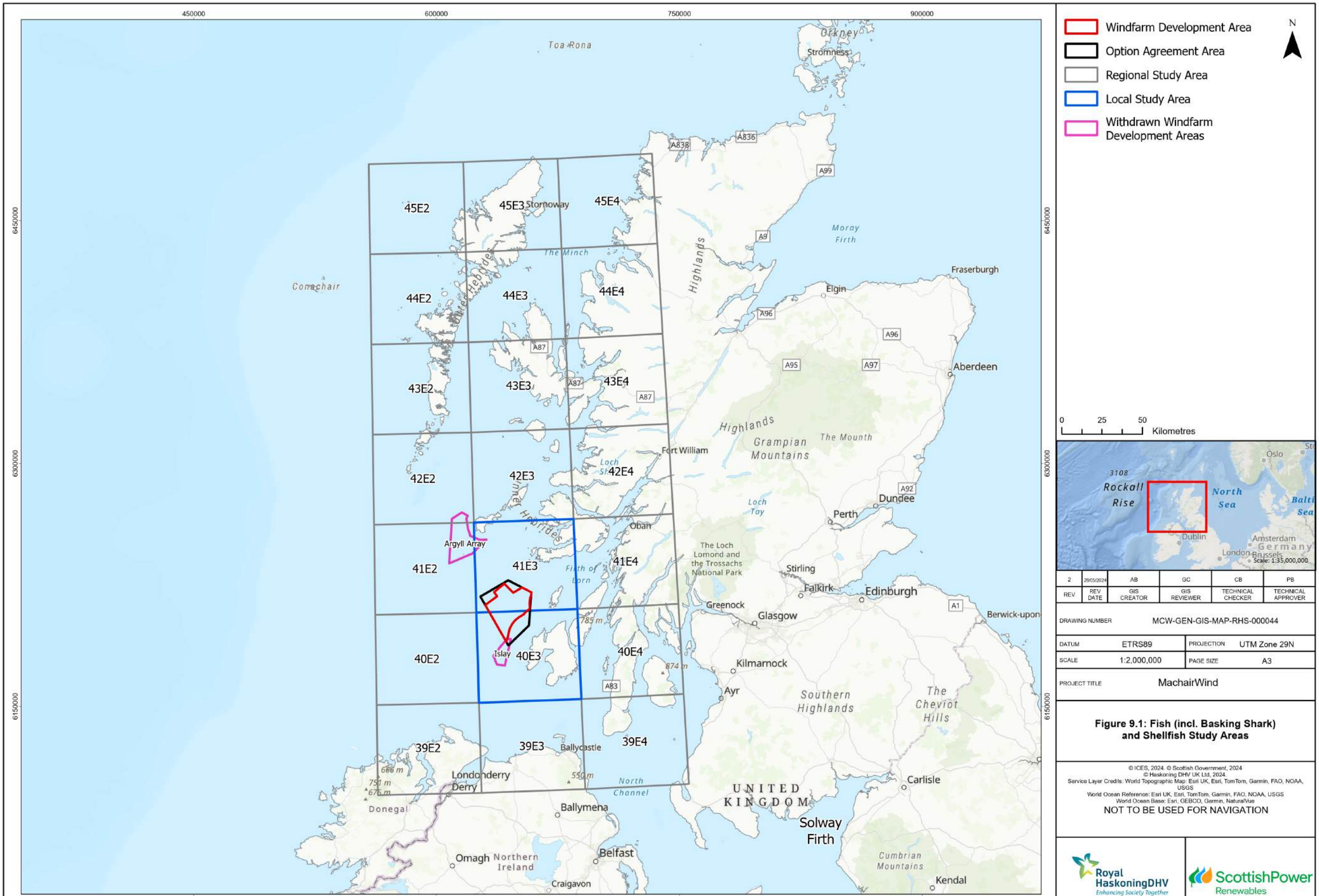
402. This section describes the fish and shellfish Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 9.7**) and the EIA will be conducted.

403. Fish and shellfish populations are spatially and temporally variable and therefore, a Local Study Area and a Regional Study Area have been defined for the purposes of the fish and shellfish ecology characterisation.

404. The International Council for the Exploration of the Sea (ICES) developed in the 1970s a gridded notation system covering the north-east Atlantic. The statistical rectangles are approximately 30 by 30 nautical miles and are used for simplified analysis and visualisation of spatial data. The WDA is located within the ICES Division 6a (West of Scotland), within UK Exclusive Economic Zone waters.

405. For the EIA and because several data sources are based on these rectangles to provide information such as abundance estimates, the Study Areas are also based on these rectangles:

- The fish and shellfish Local Study Area, defined as ICES rectangles 40E3 and 41E3 in which the WDA is located. This will be used to determine the assemblage, i.e. which species are to be considered as receptors for the EIA.
- The fish and shellfish Regional Study Area, bounded by ICES rectangles 45E2, 45E4, 39E2 and 39E4. This will be used specifically to inform and assess impacts affecting fish and shellfish receptors over long distances (e.g., underwater noise and capturing natal salmon rivers in northwest Scotland and basking shark hotspots throughout the Hebrides).



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000044		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:2,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 9.1: Fish (incl. Basking Shark) and Shellfish Study Areas

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9.7 EXISTING ENVIRONMENT

406. This section characterises the fish and shellfish ecology receptors, using publicly available data sources (**Section 9.4**) alongside site-specific survey data (**Section 9.5**), deemed of relevance to the Local and Regional Study Areas (**Section 9.6**). This sets the context for the identification of mitigation measures (**Section 9.8**) and scoping of potential impacts (**Section 9.9**) which then feeds into the consideration of cumulative effects (**Section 9.10**) and potential transboundary impacts (**Section 9.11**).

9.7.1 Fish and Shellfish Assemblage

9.7.1.1 Pelagic Fish, Demersal Fish and Shellfish Species in the Local Study Area

407. Within the fish and shellfish Local Study Area, given the close proximity to the coast, fishing effort is dominated by shellfish fisheries.

408. Landings data indicating that the following key target species are likely to be present: Nephrops, velvet crab *(Necora puber)*, king scallops *(Pecten maximus)*, European lobster *(Homarus gammarus),* brown crab *(Cancer pagarus)*, common whelk (*Buccinum undatum),* and razor clam *(Ensis* spp.[11]) (**Table 9.5**).

409. Commercial fish species landings are generally lower in quantity compared to shellfish (**Table 9.5**) and indicate the following demersal and elasmobranch species as likely to be present: haddock, cod, monkfish or Anglerfish *(Lophiidae* spp), thornback ray (*Raja clavate)*, common sole *(Solea solea)*, common (blue) skate *(Dipturus batis)* and flapper skate *(Dipturus intermedius)*.

410. Other fish species include the following pelagic species (**Appendix D MachairWind 2023 Benthic Characterisation Report**; Coull et al., 1998; Ellis et al., 2012): Norway pout *(Trisopterus esmarkii)*, sandeels *(Ammodytes* spp.*)* (semi-pelagic species as they are buried in sand between September and February), sprat *(Sprattus sprattus)*, herring, whiting *(Merlangius merlangus)*, saithe *(Pollachius virens)*, ling *(Molva molva)*, European hake *(Merluccius merluccius)* and blue whiting (*Micromesistius poutassou)*.

411. In addition, the following demersal species are also likely to be present (**Appendix D MachairWind 2023 Benthic Characterisation Report**): dragonet (*Callionymus* spp.), thickback sole (*Microchirus variegatus),* solenette / yellow sole (*Buglossidium luteum),* European plaice *(Pleuronectes platessa)* and common dab (*Limanda limanda)*.

412. Elasmobranch species in addition to common skate and flapper skate mentioned above, and likely to be present include spurdog *(Squalus acanthias)*, thornback ray, undulate ray *(Raja undulata)* and spotted ray *(Raja montagui)* (**Appendix D MachairWind 2023 Benthic Characterisation Report**; Ellis et al., 2012). Two individuals belonging to the family *Rajidae* were observed in photographic stills imagery during the Project's site investigation survey (at stations MCW-A-ST02 (Thornback ray) and MCW-D-ST88A (unidentified to species level)), indicating the potential presence of thornback ray, undulated ray or spotted ray (**Appendix D MachairWind 2023 Benthic Characterisation Report**). Basking shark, an elasmobranch species, is described separately at **Section 9.7.2**.

413. Adult and juvenile ocean quahogs (*Arctica islandica*), an Oslo and Paris Commission (OSPAR) threatened species and PMF in Scotland, were recorded at 18 stations from grab sampling and

[11] Note that fishing and landing of razor clams in Scotland is restricted to hand caught techniques (UK Government, 2017) and a trial exploring the use of electrofishing (and subsequent retrieval by hand) which began in 2018 has been extended to January 2025 (Scottish Government, 2023b).

observed within 18 stations in photographic data during the 22 August to 08 November 2023 environmental surveys (**Appendix D MachairWind 2023 Benthic Characterisation Report**).

414. In summary, the following species have been recorded within the WDA and / or are likely to be present in the Local Study Area. In addition to the below, basking shark are also likely to pass through the WDA en-route to favoured grounds in the Sea of the Hebrides Marine Protected Area (MPA) as described in **Section 9.7.2**. All these species will be scoped in for further assessment.

- **Pelagic Fish**
  - Norway pout
  - Sandeel
  - Sprat
  - Herring
  - Whiting
  - Saithe
  - Ling
  - European hake
  - Blue whiting
- **Demersal Fish**
  - Haddock
  - Cod
  - Monkfish
  - Dragonet
  - Thickback sole
  - Yellow sole
  - European plaice
  - Common dab
  - *Raja* spp.
  - *Squalidae* spp.
- **Shellfish**
  - Nephrops
  - Velvet crab
  - King scallop
  - Brown crab
  - European lobster
  - Common whelk
  - Razor clam
  - Ocean quahog

415. It should be noted that many of these species form important prey resources for marine mammals and seabirds. For this reason, the findings of the fish and shellfish assessment will be considered in the marine mammals and offshore ornithology chapters in the EIAR.

416. The mean annual landings of key fish species landed by commercial vessels over the period 2018-2022 within the fish and shellfish Local Study Area are listed in **Table 9.5** (Marine Management Organisation (MMO), 2024). As noted above landings are dominated by shellfish species.

Table 9.5 Mean annual quantity and value of species landed from the Local Study Area, where landings were greater than or equal to 3 tonnes, between 2018-2022

Species	40E3		41E3	
	Quantity (tonnes)	Value (Great British Pound)	Quantity (tonnes)	Value (Great British Pound)
Velvet crab	5.1	18,793	72.66	222,604
Brown crab	8.0	17,571	525.8	1,253,905
Nephrops (Norway lobster)[1]	3.0	15,501	235.5	942,818
King scallop	9.3	19,236	159.8	391,440
Common whelk	7.7	6,002	< 3	N/A
Razor clam[2]	5.1	25,942	54.8	411,021
Sprat	< 3	N/A	220.2	60,295
European lobster	< 3	N/A	47.0	663,767
Herring	< 3	N/A	4.8	956
Unidentified dogfish *(Squalidae* Sp.)	< 3	N/A	4.1	4,399

[1] Note that no landings greater than or equal to 3 tonnes were recorded for Nephrops in 2020 and 2021 and therefore these years have been excluded from the mean calculation.

[2] Note that there were either no landings (i.e., in 2018); or no landings greater than or equal to 3 tonnes (i.e. in 2019 and 2020) for razor clam and therefore these years have been excluded from the mean calculation.

9.7.1.2 Diadromous Fish Species

417. Diadromous fish species migrate from saltwater to freshwater to spawn (anadromous migrants) or from freshwater to saltwater to spawn (catadromous migrants). Relevant diadromous species that are likely to pass through the Regional Study Area during their spawning migrations, or during foraging and maturation stages of their life cycles are:

- Atlantic salmon;
- Sea trout *(Salmo trutta)*;
- Sea lamprey *(Petromyzon marinus)*;
- River lamprey *(Lampetra fluviatilis)*; and
- European eel *(Anguilla anguilla)*.

418. Atlantic salmon, sea trout, river lamprey and sea lamprey are all anadromous, and as such have predominantly marine adult life phases with spawning and nursery grounds located in freshwater rivers. The European eel is catadromous, so migrates from freshwater river systems to spawn in saltwater. All these species will be scoped in for further assessment.

419. The only known Scottish populations of Allis shad *(Alosa alosa)* and twaite shad *(Alosa fallax)* (which are also Annex II diadromous fish)[12] are closely associated with the Solway Estuary. The Solway Firth / Estuary is located approximately 260 km southeast from the fish and shellfish Local Study Area. It is therefore considered that there is no pathway for impact on these species, and they are scoped out of further assessment on this basis.

420. Whilst sites designated for Annex II diadromous fish, and their distance to the WDA are set out in **Table 9.7**, other non-designated river systems have populations of diadromous fish that may pass through the WDA, for example the River Laggan on Islay has an active Atlantic salmon and brown trout fishery (catch and release) and there are numerous lochs on Islay with active sea trout fisheries (**Figure 9.2**).

[12] i.e. species listed on Annex II of the Habitats Directive and whose conservation requires the designation of SACs.

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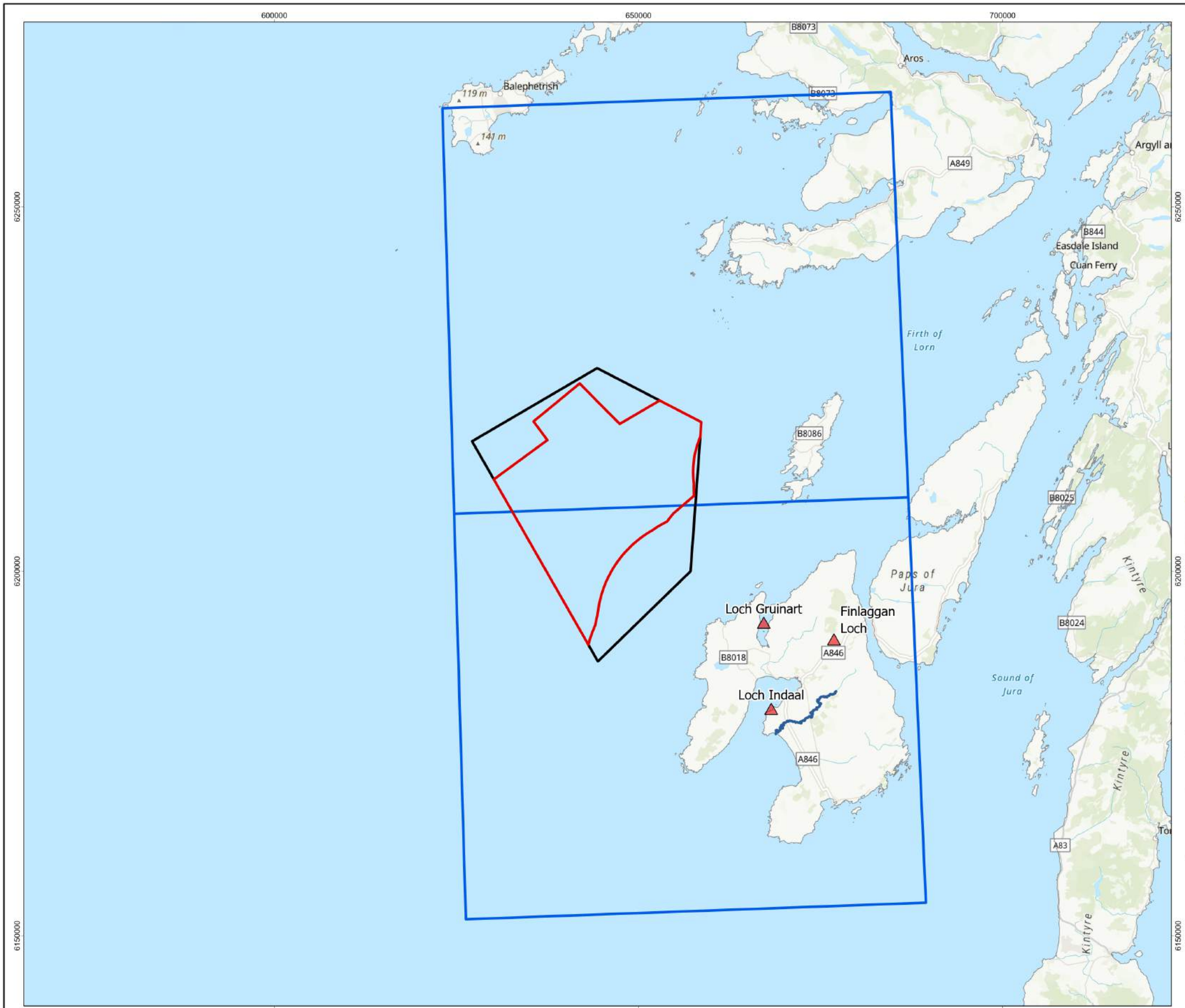

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DATUM	ETRS89	PROJECTION	UTM Zone 29N
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PROJECT TITLE	MachairWind		

Figure 9.2 Known Atlantic salmon and sea trout (or brown trout with access to the sea) fisheries on Islay

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9.7.1.3 Spawning and Nursery Grounds

421. Spawning and nursery habitats for a variety of fish species are found within the waters of Scotland's west coast (**Figure 9.3** to **Figure 9.9**). Species likely to be spawning in the vicinity of the fish and shellfish Local Study Area are listed in **Table 9.6**. This is primarily informed by Coull et al., 1998 and Ellis et al., 2012.

Table 9.6 Spawning grounds, nursery grounds, and conservation designations, of fish and shellfish species overlapping the fish and shellfish Local Study Area

Species	Spawning	Time of Year of Spawning (inclusive)* (Ellis et al., 2012)	Nursery	Conservation Designations
Pelagic species				
Herring	Undetermined intensity (Coull et al., 1998) No overlap (Ellis et al., 2012)	Summer spawning occurs in August – September Spring-spawning herring spawn in shallower nearshore environments along the west coast (Frost and Diele, 2022)	Undetermined intensity (Coull et al., 1998) Low intensity (Ellis et al., 2012)	International Union for Conservation of Nature (IUCN) (vulnerable), Scottish Biodiversity List (SBL)
Sandeel	Undetermined intensity (Coull et al., 1998) No overlap (Ellis et al., 2012)	November – February	Undetermined intensity (Coull et al., 1998) Low intensity (Ellis et al., 2012)	Priority Marine Features (PMF), SBL
Norway pout	Spawns in higher concentrations across a small overlap of the north/northwest portion of the Local Study Area (Coull et al., 1998) No overlap (Ellis et al., 2012)	January - April Peak February – March	Undetermined intensity (Coull et al., 1998) No overlap (Ellis et al., 2012)	PMF, SBL
Sprat	Undetermined intensity but covers most waters around the British Isles (Coull et al., 1998) No overlap (Ellis et al., 2012)	May – August Peak May – June	No overlap (Coull et al., 1998 and Ellis et al., 2012)	N/A
Mackerel	No overlap (Coull et al., 1998 and Ellis et al., 2012)	May – August Peak May – July	No overlap (Coull et al., 1998) Low intensity (Ellis et al., 2012)	PMF, IUCN (least concern), SBL

Species	Spawning	Time of Year of Spawning (inclusive)* (Ellis et al., 2012)	Nursery	Conservation Designations
Demersal species				
Plaice	Undetermined intensity (Coull et al., 1998) No overlap (Ellis et al., 2012)	January – March Peak: January – February	Undetermined intensity (Coull et al., 1998) No overlap (Ellis et al., 2012)	IUCN (least concern), SBL
Cod	No overlap (Coull et al., 1998 and Ellis et al., 2012)	January - April Peak: February – March	Undetermined intensity (Coull et al., 1998) Low intensity (Ellis et al., 2012)	PMF, Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) species, IUCN (vulnerable), SBL
Haddock		February – May. Peak: February – April	No overlap (Coull et al., 1998 and Ellis et al., 2012)	IUCN (vulnerable)
Saithe		January – April Peak: January – February	Undetermined intensity (Coull et al., 1998) No overlap (Ellis et al., 2012)	PMF
Whiting		February – June	Undetermined intensity (Coull et al., 1998) Overlap with both low and high intensity nursery grounds (Ellis et al., 2012)	PMF, SBL
Ling		February – May	No overlap (Coull et al., 1998) Partial overlap with low intensity nursery grounds (Ellis et al., 2012)	PMF, SBL
European Hake		January – June Peak: February – March.	No overlap (Coull et al., 1998) Low intensity (Ellis et al., 2012)	SBL
Anglerfish		January – June	No overlap (Coull et al., 1998) Low intensity (Ellis et al., 2012)	PMF, SBL

Species	Spawning	Time of Year of Spawning (inclusive)* (Ellis et al., 2012)	Nursery	Conservation Designations
Blue Whiting		April – June. Peak: May – June	No overlap (Coull et al., 1998) Partial overlap with high intensity nursery grounds (Ellis et al., 2012)	PMF, IUCN (least concern), SBL
Shellfish				
Nephrops	Undetermined intensity (Coull et al., 1998).	January – December Peak: April – June	Undetermined intensity (Coull et al., 1998) No overlap (Ellis et al., 2012)	N/A
Elasmobranchs				
Spurdog	No overlap (Coull et al., 1998 and Ellis et al., 2012).	Gravid females present year-round	No overlap (Coull et al., 1998) High intensity (Ellis et al., 2012)	Scottish Nature Conservation Marine Protected Area (MPA) search feature (marine life stages), PMF, OSPAR, IUCN (Vulnerable), SBL
Common skate (species complex)		Unknown.	No overlap (Coull et al., 1998) Low intensity (Ellis et al., 2012)	Scottish Nature Conservation MPA search feature (marine life stages), OSPAR, PMF, SBL
Spotted ray		May – July	No overlap (Coull et al., 1998) Low intensity (Ellis et al., 2012)	OSPAR, IUCN (Least concern)
*Coull et al., 1998 did not assess time of year of spawning.				

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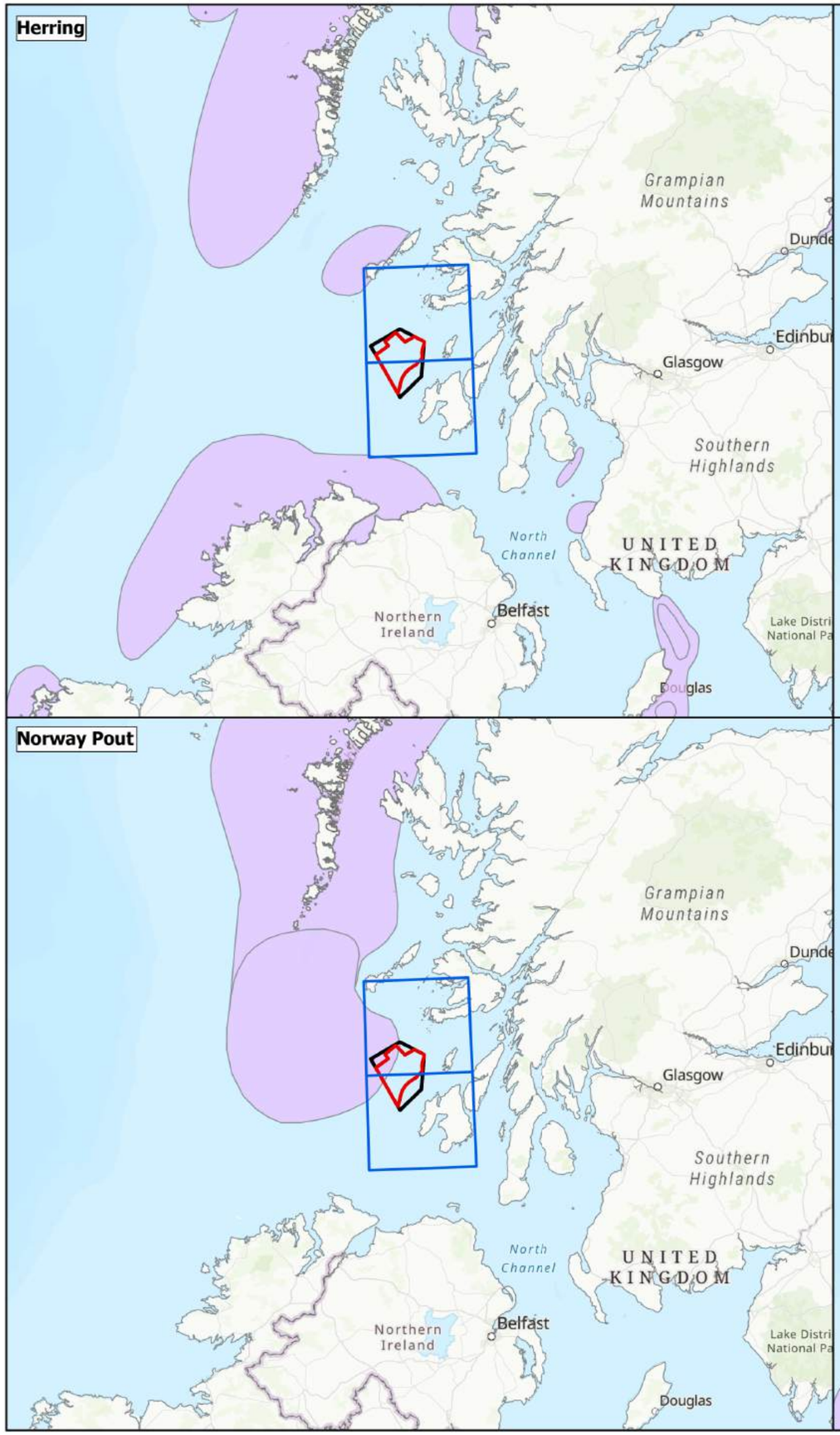

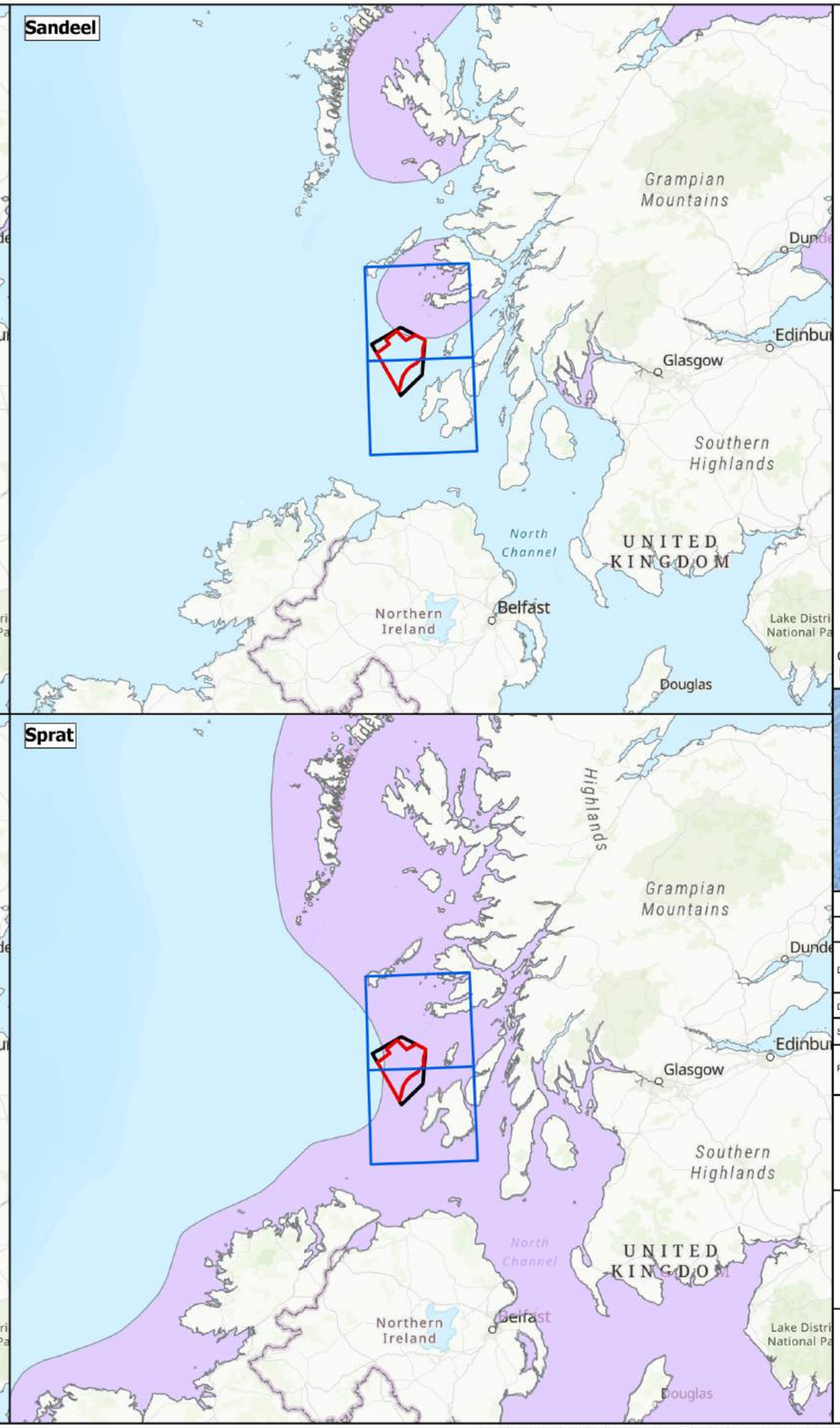

Windfarm Development Area
Option Agreement Area
Local Study Area
Spawning Grounds (Coul et al, 1998)

N

0 25 50 100 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000061		
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SCALE	1:3,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 9.3 Pelagic Fish Species Spawning Grounds Which Overlap with the Local Study Area

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Herring

Sandeel

Norway Pout

Mackerel

Windfarm Development Area
Option Agreement Area
Local Study Area
Nursery Grounds (Coul et al, 1998)

Nursery Grounds (Ellis et al, 2010)

Intensity

High
Low

N

0 25 50 100 Kilometres

Scale: 1:35,000,000

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000062		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:3,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 9.4 Pelagic Fish Species Nursery Grounds which Overlap with the Local Study Area

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Plaice

Windfarm Development Area
Option Agreement Area
Local Study Area
Spawning Grounds (Coul et al, 1998)
Nursery Grounds (Coul et al, 1998)

N

0 25 50 Kilometres

Scale: 1:35,000,000

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	28/05/2024	AB	GC	CB	PB

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DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 9.5 Demersal Fish Species Spawning Grounds which Overlap with the Local Study Area (Plaice Only)

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Name: MCW-GEN-GIS-MAP-RHS-000063_DemersalSpawningGrounds

Plaice

Cod

Saithe

Whiting

Windfarm Development Area
Option Agreement Area
Local Study Area
Nursery Grounds (Coul et al, 1998)

Nursery Grounds (Ellis et al, 2010)

Intensity

High
Low

N

0 25 50 100 Kilometres

3108 Rockall Rise

Scale: 1:35,000,000

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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PROJECT TITLE	MachairWind		

Figure 9.6 Demersal Fish Species Nursery Grounds which Overlap with the Local Study Area (Figure 1 of 2)

NOT TO BE USED FOR NAVIGATION

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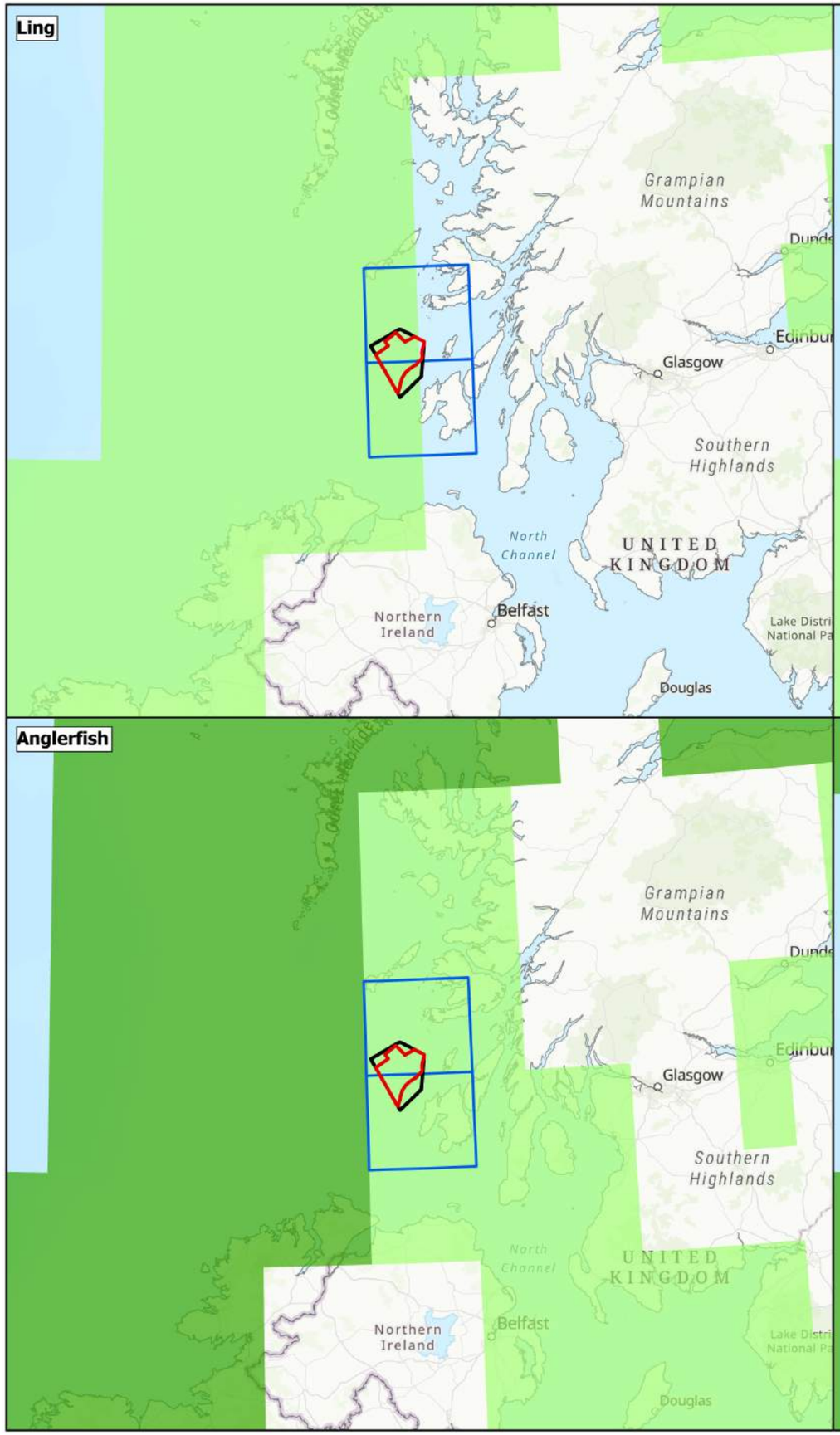

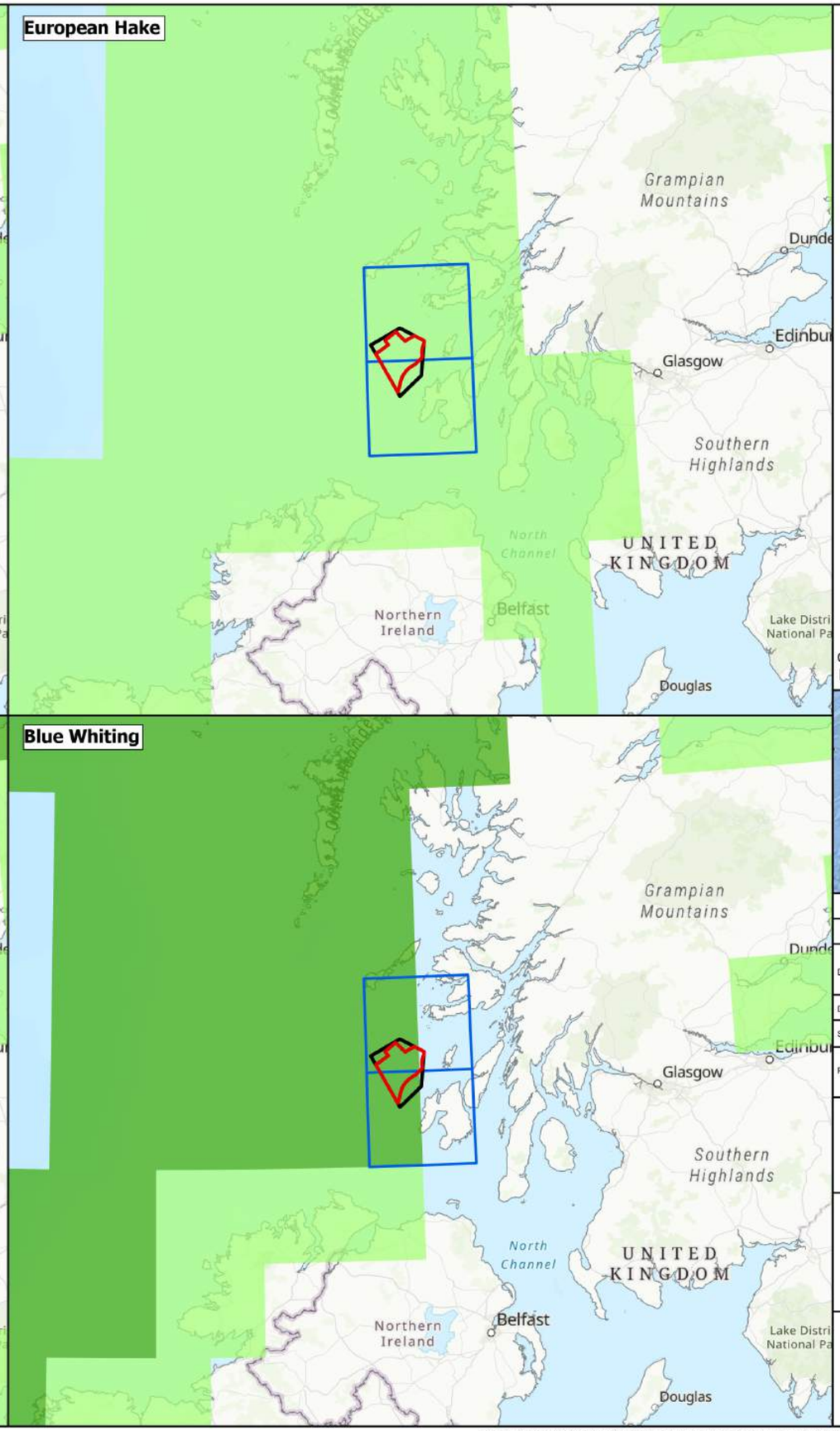

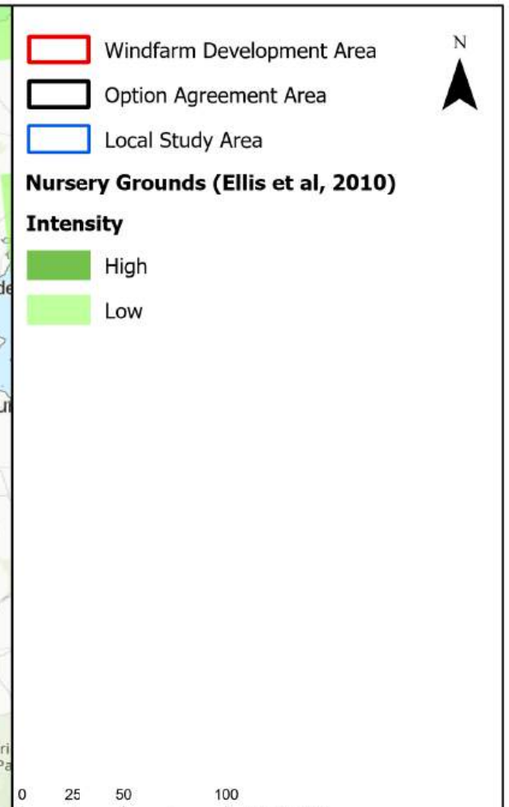

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PROJECT TITLE	MachairWind		

Figure 9.7 Demersal Fish Species Nursery Grounds which Overlap with the Local Study Area (Figure 2 of 2)

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Nephrops

Windfarm Development Area
Option Agreement Area
Local Study Area
Spawning Grounds (Coul et al, 1998)
Nursery Grounds (Coul et al, 1998)

N

0 25 50 Kilometres

Scale: 1:35,000,000

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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PROJECT TITLE	MachairWind		

Figure 9.8 Nephrops Spawning and Nursery Grounds which Overlap with the Local Study Area

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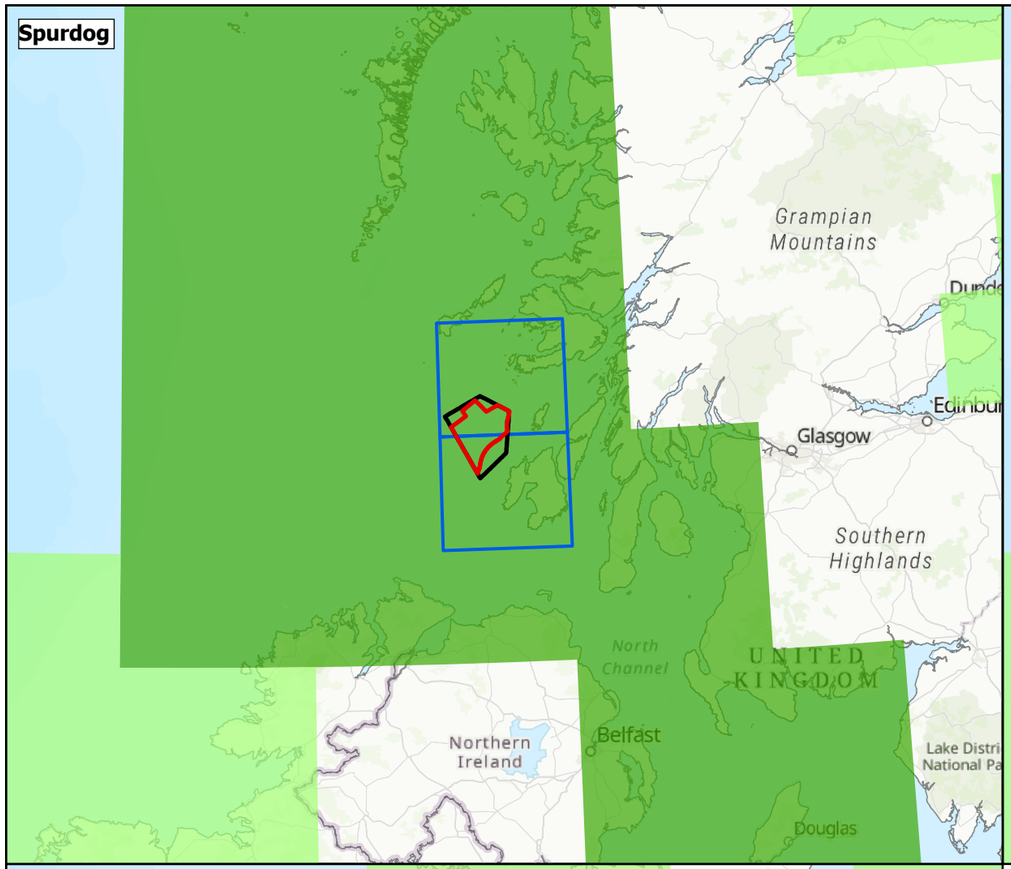
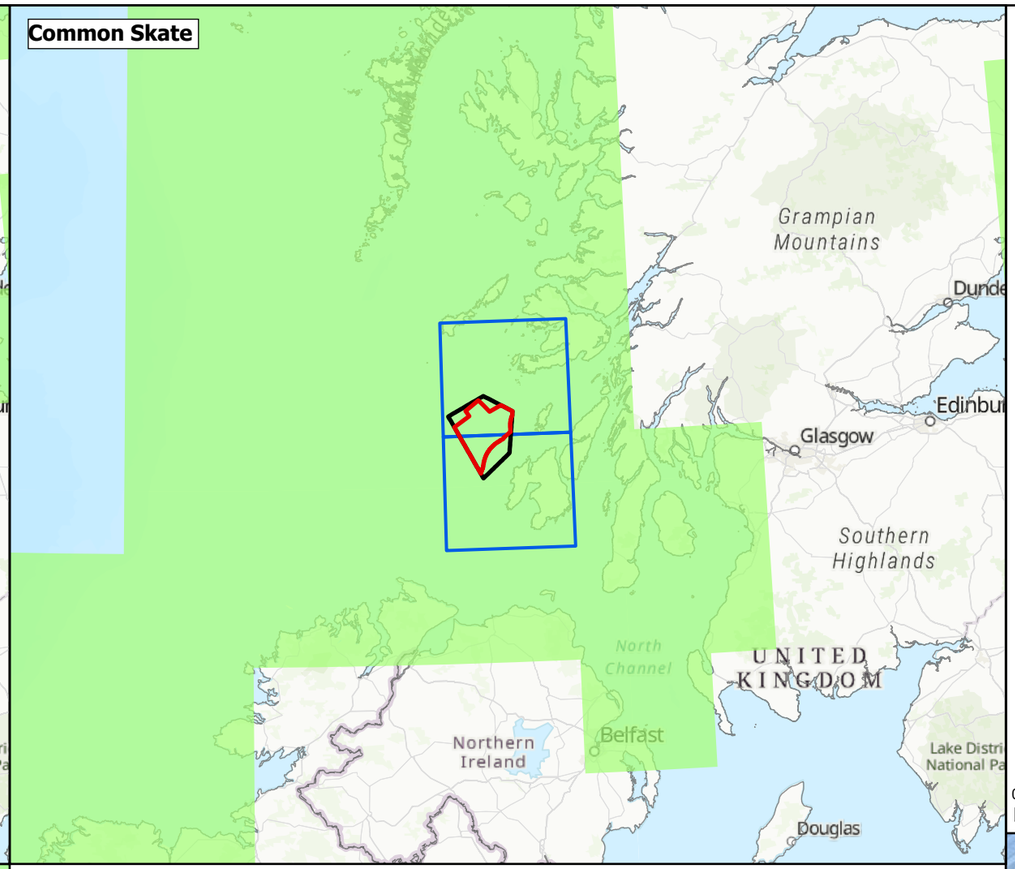
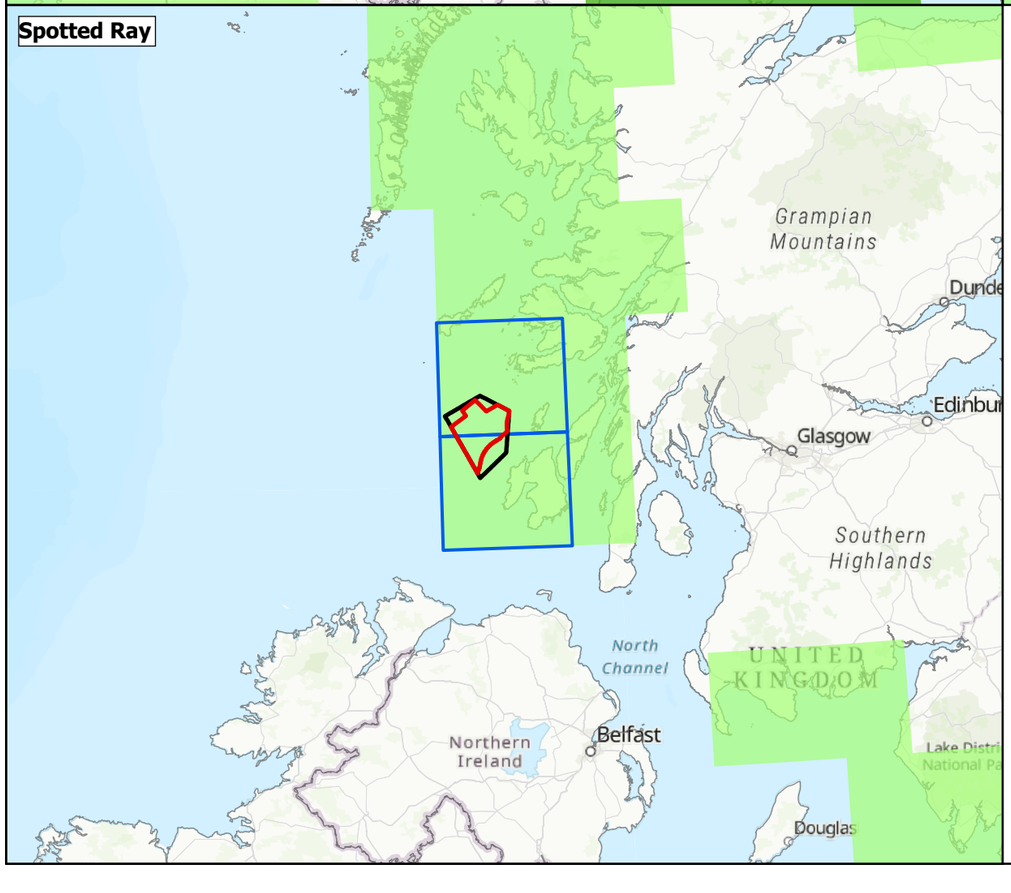
Spurdog



Common Skate



Spotted Ray



No data

Windfarm Development Area
Option Agreement Area
Local Study Area

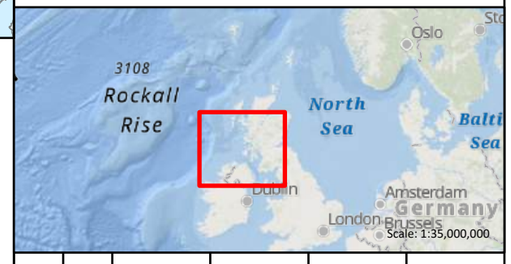
Nursery Grounds (Ellis et al, 2010)

Intensity

High
Low

N

0 25 50 100 Kilometres



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SCALE	1:3,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 9.9 Elasmobranch Nursery Grounds which Overlap with the Local Study Area

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9.7.2 Basking Shark

422. Basking shark is listed as 'Endangered' on the IUCN Red List and is an OSPAR threatened or declining species having undergone widespread historic exploitation in the northeast Atlantic (Witt et al., 2012). The species is highly migratory and inhabits a very wide geographical area with seasonal aggregations of basking shark often occurring in the temperate continental shelf waters of the Atlantic, Pacific and Indian Oceans for feeding and presumed reproduction purposes (Witt et al, 2016). Basking shark is the world's second largest fish and one of three species of shark known to filter seawater for food. It has a unique feeding strategy which strongly influences its ecology and life history (Sims, 2008). Basking Shark has been scoped in for further assessment.

9.7.2.1 Distribution Information and Sightings Data

423. Within UK waters, there is a marked seasonality in basking shark sightings, with peak sightings between May and September (Pikesley et al., 2024). The vast majority of surface sightings occur in western Scotland (including the Sea of the Hebrides MPA), the Isle of Man and southwest England.[13] **Figure 9.10** (Pikesley et al., 2024) shows basking shark density estimates for the UK based on public sightings data from 2014-2020. A density estimate of 0-0.01 basking shark / km^2 is estimated for the area which overlaps the WDA.

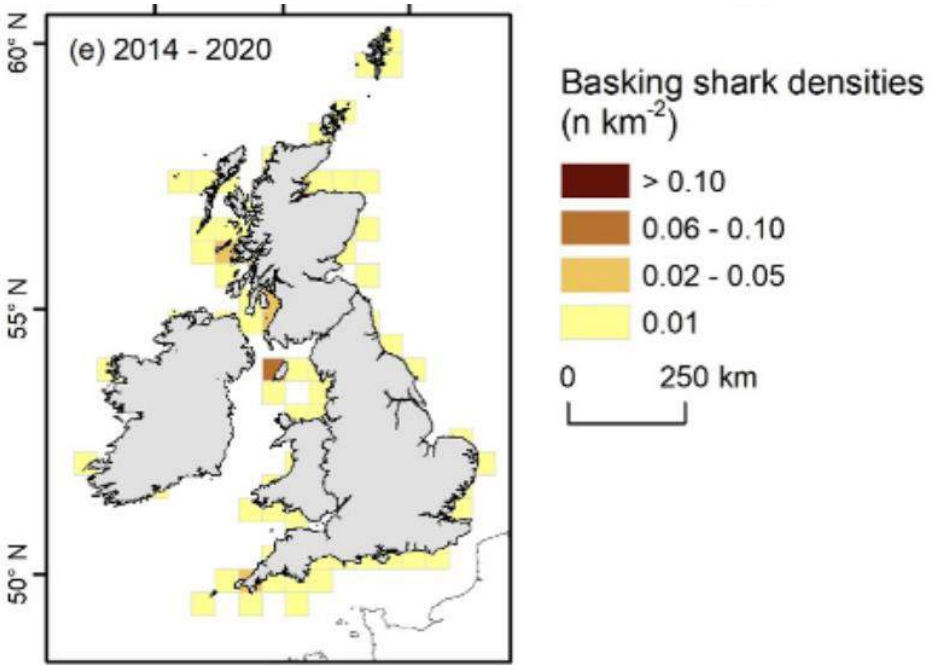

Figure 9.10 Basking shark density estimates based on public sightings data from the Marine Conservation Society and the Shark Trust for 2014-2020

424. Off the west coast of Scotland, areas to the west of Coll, north of Tiree, and Hyskeir are known to be seasonal hotspots for basking shark with peak occurrence from July to the end of September (Witt et al., 2016). In December 2020, the Sea of Hebrides MPA (approximately 3 km north of the WDA) came into force with the conservation objective to conserve the favourable condition of the basking shark feature (NatureScot, 2020) (see **Section 9.7.3** for more details on this MPA).

425. In the summer months, basking sharks spend a greater proportion of time in coastal areas and at the sea surface where they feed on the correspondingly high abundances of zooplankton. During the

[13] It should however be noted that unusually high numbers of basking shark have been reported as sighted on the north-east coast of Scotland in 2023 (The Scotsman, 2023)

summer period they are associated with shallow waters overlaying rock and reef seabed substratum with low to moderate tidal speeds (Witt et al., 2016). Basking sharks appear to move to deeper waters in autumn (with gathered data suggesting basking sharks likely depart coastal waters of Scotland in October and November). Basking sharks disperse either into the north-east Atlantic Ocean or through the Irish Sea into the Celtic Sea and Bay of Biscay. Varying overall patterns of dispersal have been observed i.e., with some moving to the west of Ireland, the Bay of Biscay, Iberian Peninsula and North Africa (Witt et al., 2016) with at least some individuals returning each year. Some sharks however remain relatively close to Scotland throughout the winter (Witt et al., 2016) although there is little evidence to show significant northerly migration, despite basking sharks being present in Norway (Compagno, 2001).

426. Summer movements of basking shark described in Witt et al. (2016) indicate potential movement patterns through the WDA on transit to favoured grounds around Coll and Tiree within the Sea of the Hebrides MPA.

9.7.2.2 Site-Specific Survey Data for Basking Shark

427. The Project's DAS gathered 30 months of survey data starting in April 2021. Results recorded very low numbers of basking shark, most of which were in the month of April (two, one and four in 2021, 2022 and 2023 respectively) and one record in November 2021. Third-party DAS data (see **Section 9.5**) gathered over 16 months of survey and recorded seven basking sharks all in May 2021.

428. The Project's DAS results therefore indicate that the WDA is unlikely to be an area where a large number of basking sharks are present and it can be expected that if any feeding or courtship behaviour occurs, it is at low levels. Concentrations of the species occur further to the north in the Sea of the Hebrides MPA with small numbers of basking shark likely to transit through the WDA whilst transiting to favoured grounds in the MPA.

429. However, given the observed presence of basking shark within the WDA, this species is scoped in for further assessment in the EIA.

9.7.2.3 Argyll Array and Islay Offshore Windfarm Boat-Based Surveys Data for Basking Shark

430. The proposed Argyll Array Offshore Windfarm (OWF) (located west of Tiree and 27 km north west of WDA) collected 27 months of boat-based survey data (see **Figure 9.1**). Between September 2009 and August 2012, a total of 1,844 basking sharks with a peak of 950 in August 2012 (Booth et al., 2013) were recorded. This suggests that the waters around Coll and Tiree (i.e., within the Sea of the Hebrides MPA) and further north into the Sea of the Hebrides, are where basking shark numbers are higher.

431. Another cancelled OWF project, Islay OWF (0 km from the WDA (**Figure 9.1**)), did not record any basking sharks during a 14-month boat-based survey campaign. Only one individual was recorded in an 'off-effort' sighting which suggests that the waters around Islay are not likely to be of particular importance to the species relative to areas further north (AMEC, 2013).

9.7.3 Designated Sites

432. The WDA does not overlap with any designated site for fish or shellfish features. However, the Sea of the Hebrides MPA is approximately 3 km from the WDA at its nearest point and is considered in **Appendix H Nature Conservation Marine Protected Area Screening**. Given that several riverine UK SACs are designated for diadromous fish species, which can undertake extensive marine migrations, those sites that fall within the fish and shellfish Regional Study Area are considered (**Table 9.7**). Also considered are those sites where individuals from the population may migrate past the WDA as part of their lifecycle. MPAs which are designated for non-migratory fish and shellfish features are screened in if within 70 km from the WDA (to account for worst-case underwater noise

impact ranges). These sites are designated for protection from development and other activities that may affect their conservation objectives.

433. There is no overlap of any designated sites with the WDA, and therefore no pathway for direct impacts upon them (i.e., to the habitat within the boundaries of the sites that supports the fish or shellfish species). In terms of longer distance impacts such as underwater noise, the Sea of the Hebrides MPA (approximately 3 km north of the WDA) and potentially Loch Sunart to the Sound of Jura MPA (approximately 41.5 km east of the WDA) fall within the potential Zone of Influence (ZoI) of the Project (to be verified with site-specific underwater noise modelling, although, no OWF to date has modelled maximum impact ranges greater than 70 km).[14] Therefore, with the likely exception of these two MPAs and their qualifying features, only potential impacts upon the qualifying fish species which occur outside the designated sites will be considered in the EIA.

434. **Table 9.7** describes the designated sites relevant to fish and shellfish ecology and the WDA.

Table 9.7 Designated sites for fish and shellfish ecology features

Designated Site	Protected fish and shellfish ecology feature(s)	Closest approximate distance from the WDA ((km)
Special Areas of Conservation (SAC)		
Loch Creran SAC	• Horse mussel *(Modiolus modiolus)* beds	79.7
Endrick Water SAC	• Brook lamprey (*Lampetra planeri*)[1] • River lamprey • Atlantic salmon (not primary reason for designation)	119.5
River Moriston SAC	• Freshwater pearl mussel *(Margaritifera margaritifera)* • Atlantic salmon (not primary reason for designation)	146.0
Little Gruinard River SAC	• Atlantic salmon	189.5
North Harris SAC	• Freshwater pearl mussel • Atlantic salmon (not primary reason for designation)	200.1
Langavat SAC	• Atlantic salmon	204.6
River Oykel SAC	• Atlantic salmon • Freshwater pearl mussel	217.0
Marine Protected Areas (MPAs) and Nature Conservations MPAs (NCMPAs)		
Sea of the Hebrides NCMPA	• Basking shark	2.9
Loch Sunart to the Sound of Jura NCMPA	• Flapper skate	41.5
Loch Sween NCMPA	• Native oyster *(Ostrea edulis)*	46.5
Loch Sunart NCMPA	• Flame shell *(Limaria hians)* beds • Northern feather star aggregations (*Leptometra celtica*) on mixed substrata • Serpulid aggregations	66.7

[14] Note that Loch Sween NCMPA, Loch Sunart NCMPA and Upper Loch Fyne and Loch Goil NCMPA, whilst within the 70 km ZoI of underwater noise, do not contain qualifying features which are sensitive to underwater noise and are therefore not considered.

Designated Site	Protected fish and shellfish ecology feature(s)	Closest approximate distance from the WDA ((km)
Upper Loch Fyne and Loch Goil NCMPA	• Flame shell beds • Horse mussel beds • Ocean quahog aggregations	67.1
Small Isles NCMPA	• Fan mussel *(Atrina fragilis)* aggregations	78.2
Loch Creran NCMPA	• Flame shell beds	79.7
Loch Carron NCMPA	• Flame shell beds	136.7
Red Rocks and Longay NCMPA	• Flapper skate	137.2
North-East Lewis NCMPA	• Sandeels (*A. marinus* / *A. tobianus*)	163.3
Wester Ross NCMPA	• Flame shell beds	197.5
West of Scotland MPA	• Blue ling *(Molva dypterygia)*	220.0
[1] This species spends its entire lifecycle in freshwater and hence is not considered in **Section 9.7.1.2**.		

9.8 MITIGATION MEASURES

435. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on fish and shellfish ecology receptors. These measures described in **Table 9.8** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 9.8 Indicative embedded mitigation measures for fish (including basking shark) and shellfish ecology

ID	Parameter	Description of Mitigation Measure
M-3	Pollution from Ships	Compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 and adherence to the "OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic".
M-4	Project Environmental Management Plan	Development of, and adherence to, a Project Environmental Management Plan (PEMP) which will be in accordance with an Outline PEMP to be submitted with the Section 36 Application. The PEMP will include measures for preventing wastewater discharges from vessels and procedures for informing Project personnel on best practice guidance to reducing the potential for water discharges during offshore construction and operation and maintenance (O&M).
M-5	Invasive Non-Native Species Management Plan	Development of, and adherence to, an Invasive Non-Native Species Management Plan. This plan will detail mitigation measures to reduce the introduction and transfer of invasive non-native species.

ID	Parameter	Description of Mitigation Measure
M-6	Soft-Start and Ramp-Up for Piling	Implementation of soft-start and ramp-up procedure for piling. Each piling event would commence with a soft-start at a lower hammer energy followed by a gradual ramp-up for at least 20 minutes to the maximum hammer energy required. The soft-start and ramp-up allows mobile species to move away from the area before the maximum hammer energy with the greatest noise impact area is reached. The soft-start and ramp-up procedure, along with other mitigation measures for piling, will be detailed in the Marine Mammal Mitigation Protocol (MMMP).
M-7	Marine Pollution Contingency Plan	Development of, and adherence to, a Marine Pollution Contingency Plan (MPCP). The MPCP will provide guidance to the Project personnel, contractors and subcontractors on the actions and reporting requirements in the event of spills and collision incidents. The MPCP will also contain emergency plans and mitigation procedures for a range of potential marine pollution incidents.
M-8	Cable Plan	Development of, and adherence to, a Cable Plan (incorporating a Cable Burial Risk Assessment (CBRA)). The Cable Plan will confirm planned cable routeing, burial, and any additional external cable protection, and will set out methods for post-installation cable monitoring. Furthermore, this plan will detail environmental sensitivities and design consideration to mitigate, as far as practicable, the effects of Inter-Array Cables (IACs) laying and associated protection during installation and operation of the Windfarm Development Area (WDA) infrastructure. Fish and shellfish receptors will be considered in the drafting of the Cable Plan.
M-9	Invasive Non-Native Species	Adherence to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) Convention (2004) which provides global regulations to control the transfer of potentially invasive species.
M-11	Hierarchy of Unexploded Ordnance Clearance Methods	The current hierarchy of Unexploded Ordnance (UXO) clearance techniques, in order of preference, are: • Avoid (through micro-siting); • Move UXO without clearing it (if safe to do so); • Remove the UXO to an onshore facility without clearing it (if safe to do so); • Low-order clearance if above options not practicable; and • High-order clearance, if low-order clearance not possible, or in the unlikely event that low-order deflagration was unsuccessful.
M-12	Marine Mammal Mitigation Protocol	Development of, and adherence to, a Marine Mammal Mitigation Protocol (MMMP) for UXO and a MMMP for piling which will also reduce underwater noise effects on fish species.
M-13	Scottish Marine Wildlife Watching Code	The Scottish Marine Wildlife Watching Code (Scottish Natural Heritage (SNH), 2017) approach will be followed for all Project vessels (with respect to basking sharks). In the unlikely event that a collision event occurs, this will be reported on, and full information of the incident, will be recorded. Vessel movements to and from any port will be incorporated within existing vessel routes where possible.
M-14	Micro-siting	Micro-siting of infrastructure, where practicable, around any identified sensitive habitats and identified anomalies of archaeological interest.

ID	Parameter	Description of Mitigation Measure
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

436. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to fish and shellfish ecology will be assessed with this mitigation in place.

9.9 SCOPING OF POTENTIAL IMPACTS

437. A range of potential impacts on fish and shellfish ecology receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

438. Potential impacts during the construction phase of the WDA could arise from the installation of substructures for Wind Turbine Generators (WTGs) and their foundations, Inter-Array Cables (IAC) and any associated external cable protection and ancillary equipment (including any seabed preparation, boulder clearance and Unexploded Ordnance (UXO) investigation/clearance),[15] as well as the use of vessels for any associated activities.

439. Impacts which span the life of the WDA[16] (e.g. permanent habitat loss) will only be considered as part of the O&M phase in the EIA to avoid duplication. It will be highlighted in the O&M section of the EIAR that impacts such as permanent habitat loss begin to occur in construction and potentially continue after decommissioning.

440. Potential impacts during O&M will mostly result from loss of habitat and changes to seabed substrata from the physical presence of infrastructure (i.e., substructures and any external cable protection). The presence of infrastructure introduces new hard substrate habitat to the seabed. Maintenance activities may result in disturbance to seabed habitats, these would be similar in nature to those during construction, but at a lower magnitude and frequency of occurrence.

441. It is anticipated that decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower. For example, where construction may require drilling of piles and/or seabed preparation, decommissioning could require cutting of piles to at or below seabed level which would likely result in less seabed disturbance than construction. Therefore, all impacts scoped in for construction are also scoped in for decommissioning.

442. **Table 9.9** outlines the fish and shellfish ecology impacts which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data become available.

[15] A separate marine licence application(s) will be made prior to UXO clearance works, with an accompanying assessment of UXO clearance effects on fish and shellfish ecology. The assessment included in the EIA Report will be indicative only.
[16] The WDA seabed lease is up to 60 years with an indicative operational life of 35 years. At the end of the operational life, any repowering will be subject to separate consents.

Table 9.9 Potential impacts scoped in or scoped out for fish (including basking shark) and shellfish ecology

Potential Impact	Phase* Scoped In (✓) / Scoped Out (x)			Justification
	C	O&M	D	
Remobilisation of contaminated sediment	✘	✘	✘	As described in **Chapter 6 Marine Physical Environment**, contaminants survey data collected across the Option Agreement Area (OAA) shows that the seabed sediments within the Windfarm Development Area (WDA) do not contain contaminants in concentrations that would pose a risk to water quality should the seabed sediments be suspended during construction, operation and maintenance (O&M) and decommissioning activities. Therefore, the potential impact and effect of a remobilisation of contaminated sediment has been **scoped out** of the Environmental Impact Assessment (EIA), for all phases.
Accidental release of pollutants	✘	✘	✘	As described in **Chapter 6 Marine Physical Environment** it is proposed that this impact is scoped out of the EIA due to the implementation of the embedded mitigation practices detailed in **Section 6.8**. As a result of these embedded mitigation measures, it is considered that the risk of a spill occurring is low and with the appropriate management measures in place, should a spill occur, the risk to the marine environment is effectively mitigated. Therefore, the potential impact and effect of the accidental release of pollutants has been **scoped out** of EIA, for all phases.
Temporary physical disturbance / habitat loss	✓	✓	✓	Demersal fish and shellfish including the egg and larval stages of certain species, may be particularly sensitive to direct physical disturbance during the construction phase from the installation of the WDA infrastructure (Wind Turbine Generator (WTG) foundations and substructures, Inter-Array Cables (IACs), scour protection and external cable protection). This will especially be the case if disturbance coincides with key spawning or migration periods. The level of effect will be dependent upon the habitat in question, its distribution in the wider area and the presence of a species that is reliant on that habitat. Some O&M activities will cause physical disturbance of the seabed. These activities will include excavating and lifting buried cables for repair, and any required maintenance or replacement of external cable protection. These activities are expected to result in localised impacts and be sporadic in nature. Therefore, the potential impact and effect of temporary physical disturbance / habitat loss has been **scoped into** the EIA, for all phases.
Increased suspended sediment concentrations and sediment redeposition	✓	✓	✓	During construction activities there may be a temporary increase in Suspended Sediment Concentrations (SSC) and sediment redeposition. Suspended sediment has the potential to impair respiratory, filter feeding or reproductive functions, including the disruption of migration / spawning activity. Sediment deposition, especially if it changes the characteristics of the existing seabed sediments, could affect the quality of spawning and nursery habitats. In addition, whilst unlikely to have a significant effect, an increase in SSCs could potentially affect zooplankton abundance which is an important prey resource for basking sharks. Small volumes of sediment could be resuspended during maintenance activities however, the volumes would be lower than for construction and therefore the magnitude of impact will be lower. Therefore, the potential impact and effect of increased SSCs and sediment redeposition has been **scoped into** the EIA, for all phases.
Underwater noise and vibration	✓	✓	✓	Underwater noise generated by pile driving, construction vessels and Unexploded Ordnance (UXO) clearance may result in mortality to or disturbance and displacement of fish species and have the potential to affect spawning behaviour, nursery areas and migration patterns. The main source of noise during O&M (in addition to ambient noise) originates from the WTG gearbox and generator, alongside any surface vessels undertaking maintenance activities. Operational noise impacts are considered highly unlikely to cause physical damage to fish or shellfish species (Nedwell et al., 2007a, b; Marine Management Organisation (MMO), 2014) and it follows that any significant behavioural disturbance would be limited to the area immediately surrounding the WTG. However, further justification will be undertaken with full baseline information. Therefore, the potential impact and effect of underwater noise and vibration has been **scoped into** the EIA, for all phases.
Disturbance and displacement of basking shark	✓	✓	✓	Basking sharks tend to exhibit a relative lack of awareness of vessel traffic. The observed lack of a behavioural response to increased vessel presence suggests they do not have a particular susceptibility to longer distance disturbance effects from vessel traffic such as noise or visual effects (Speedie et al., 2009). However, basking shark have been known to dive or change direction when vessels approach to within approximately 10 metres (m) (Bloomfield & Solandt, 2008). Regarding potential displacement effects, the distribution of basking sharks primarily correlates with the distribution of their prey i.e., zooplankton. Consequently, basking sharks do not possess a clearly defined 'habitat' like species that rely on more stationary resources.. Therefore, it is unlikely that the presence of WTGs would deter them from the WDA. Furthermore, the WDA infrastructure is unlikely to result in any significant change in zooplankton abundance. However, further justification with full baseline information will be provided. Therefore, the potential impacts and effects of the disturbance and displacement of basking shark has been **scoped into** the EIA, for all phases.
Vessel collision for basking shark	✓	✓	✓	Given the potential presence of basking sharks in the WDA during construction, the risk of Project vessels colliding with this species requires consideration in the EIA. Due to their large size, the fact they spend a high proportion of time at the surface feeding, and often do not actively swim away from vessels, they have a high sensitivity to collision risk compared to other fish and shellfish species. Vessel collision risk will be assessed for the construction phase as a worst-case, given the higher number of vessels onsite at any one-time during construction. However, the finding of this assessment will also apply during all phases, as similar levels of effects (considering lower ship passage frequency, but longer duration in the O&M) is anticipated. Therefore, the potential impact and effect of vessel collision for basking shark has been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped In (✓) / Scoped Out (x)			Justification
	C	O&M	D	
Permanent habitat loss	✘	✓	✘	The presence of infrastructure on the seabed (including any external cable protection) will result in a relatively small footprint of lost habitat in the context of the habitat from the surrounding region. Depending on whether the infrastructure is removed or left in-situ at the decommissioning stage, this impact is either long term or permanent. The level of effect will be dependent upon the habitat in question, its distribution in the wider area and the presence of a species that is reliant on that habitat. As a worst-case scenario, it will be assumed that infrastructure on the seabed causes permanent habitat loss, unless a commitment is made to remove infrastructure at decommissioning. It is acknowledged that the impact of permanent habitat loss begins in construction and continues through decommissioning. To avoid duplication, the full extent of this impact will be assessed for the O&M phase, with a clear acknowledgement that it spans the duration of the WDA. Therefore, the potential impact and effect of permanent habitat loss has been **scoped into** the EIA, for the O&M phase.
Electro-magnetic fields	✘	✓	✘	Subsea electrical cabling produces Electro-Magnetic Fields (EMF) which may affect fish and shellfish behaviour. This may be of particular relevance to electrosensitive species such as elasmobranchs, or species which use the earth's geomagnetic field to orient themselves for migration. For phases of the WDA where power is not being generated, no EMF will be produced by IAC. It is acknowledged that the impact of EMF begins with commissioning, which takes place during the construction phase however the phase with greatest potential magnitude of impact will be O&M To avoid duplication this impact will be considered in the O&M phase section of the EIA. Therefore, the potential impact and effect of EMF has been **scoped into** the EIA, for the O&M phase.
Introduction of hard substrate	✘	✓	✘	Concrete and steel structures may be colonised by a range of benthic invertebrate species, potentially increasing ecological diversity and with the potential to act as fish aggregating devices. This may have knock-on effects on localised predator-prey dynamics. The potential effect on fish and shellfish species will be dependent on the substructure used, and the volume and type of external cable protection and scour protection used. It is acknowledged that the impact of introduction of hard substrate begins in construction and continues through decommissioning, however the phase with the greatest potential magnitude of impact is O&M. To avoid duplication the full extent of this impact will be assessed in the O&M phase section of the EIAR, with a clear acknowledgement that it spans the duration of the WDA. Therefore, the potential impact and effect of the introduction of hard substrate has been **scoped into** the EIA, for the O&M phase.
Invasive non-native species	✓	✓	✓	The potential risk of spreading or introducing Invasive Non-Native Species (INNS) will be mitigated by adhering to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) Convention (2004) as noted in **Table 9.8**. Furthermore, commitments to biosecurity measures to reduce the spread of INNS would be detailed in the Project Environmental Management Plan (PEMP), which will be in accordance with an outline PEMP (OPEMP) to be submitted with the Section 36 and Marine Licence application(s). With the appropriate mitigations in place, it is expected that the risk of INNS being introduced and colonising WDA infrastructure would be reduced. However, NatureScot advised at the Scoping Workshop on 01 May 2024 that there are uncertainties with the effectiveness of mitigation measures to reduce the spread of INNS (**Table 9.2**). Therefore, the potential impact and effect of INNS has been **scoped into** the EIA, for all phases.
Changes in fishing activity	✓	✓	✓	The construction of offshore infrastructure could result in changes to fishing activity within the WDA but also in the wider area due to potential displacement of fishing activity into other areas. This could in turn result in changes to commercially targeted fish stocks. Further discussion on impacts to the fishing industry is provided in **Chapter 12 Commercial Fisheries**. O&M could result in changes to fishing activity within the fish and shellfish Local Study Area, but also in the wider area due to potential displacement of fishing activity into other areas. This could result in changes in fish and shellfish populations in the fish and shellfish Local Study Area, both within and outside the WDA footprint. Therefore, the potential impact and effect of changes in fishing activity has been **scoped into** the EIA, for all phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning respectively				

9.10 POTENTIAL CUMULATIVE EFFECTS

443. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA and OfTDA to affect fish and shellfish ecology receptors. The approach to assessment of potential cumulative impacts is set out in **Chapter 4 Approach to Scoping and EIA**.

444. Offshore wind projects and other activities (such as oil and gas operations) relevant to the assessment of cumulative effects on fish and shellfish ecology will be identified through a screening exercise. The potential impacts to be taken forward for consideration in the Cumulative Effects Assessment (CEA) will be in line with those described for the WDA-alone assessment and OfTDA appraisal. Impacts assessed as negligible adverse significance (or lower) will not be taken forward to CEA and it is possible that some will be screened out on the basis that the impacts are highly localised or the risk of effects occurring is reduced, given management measures will be in place for the Project and other plans and projects.

445. Noise propagation modelling for the WDA will be used to determine the ZoI for long range effects associated with loud noise sources such as piling and UXO clearance. This ZoI will be used to determine whether other projects or plans have the potential to combine with WDA-alone noise impacts cumulatively.

9.11 POTENTIAL TRANSBOUNDARY IMPACTS

446. The distribution of fish and shellfish species is independent of national geographical boundaries. The EIA will take into account the distribution of fish stocks and populations irrespective of national jurisdictions.

447. Noise modelling for the WDA will be conducted as part of the EIA. Experience of recent OWF projects is instructive in predicting the likely worst-case impact ranges for fish and shellfish receptors. No OWF to date has predicted an impact range greater than 70 km for fish and shellfish receptors. The WDA is approximately 32 km from the Republic of Ireland's territorial sea limit and therefore there is potential that the underwater noise impact range will overlap with other jurisdictions. At this stage, transboundary impacts are therefore scoped in for fish and shellfish receptors however may later be scoped out based on the results of underwater noise modelling.

9.12 APPROACH TO IMPACT ASSESSMENT

448. The impact assessment methodology for the fish and shellfish ecology chapter will follow the procedures described in **Chapter 4 Approach to Scoping and EIA**, as well as the guidance presented in **Section 9.2**. This will include consideration of the confidence value of the assessment and inter-relationships of impacts on individual receptors.

449. Diadromous fish will be included in the fish and shellfish ecology impact assessment. A separate section covering sensitivity of receptor and magnitude of impact on diadromous fish for each impact will be included in the EIA. Discussion with stakeholders throughout the consultation process will be undertaken to finalise the approach and focus of these impact assessments.

450. Species will be assessed as groups based on shared life-history traits (resulting in broadly shared sensitivities). These groups are elasmobranchs, demersal fish, and pelagic fish. The different sensitivities of these groups arise from general differences in their life history traits (e.g., pelagic fish are less likely to come into contact with localised benthic impacts compared to demersal fish, and elasmobranchs may have particular sensitivities to Electro-magnetic Fields (EMF)). Sensitivities will be based on Marlin's Marine Evidence-Based Sensitivity Assessments (MarESA) database as a starting point (where available). Expert judgement and review of the scientific literature will also influence determination of sensitivity for fish and shellfish receptors. For feature-pressure

combinations that have been assessed by Scottish Government at the time of conducting the EIA, the Feature Activity Sensitivity Tool (FeAST) will be used to further inform receptor sensitivities.

451. Uncertainties around impact magnitudes and significance will be acknowledged where significant knowledge gaps exist in the literature. This will be informed by the Scottish Marine Energy Research group (ScotMER) research gaps for fish and shellfish.

452. Herring and sandeel habitat suitability assessments will be informed by particle size analysis data collected as part of the Project's site investigation survey. The assessment will be conducted in line with industry good practice techniques, and in consultation with stakeholders.

453. An assessment of LSE on basking shark will be undertaken with consideration of site-specific survey data and up to date literature on their likely distribution throughout the Regional Study Area and their sensitivities to potential impacts.

454. Site-specific underwater noise modelling will be undertaken for underwater noise sources from the WDA, including pile driving, seabed preparation, dredging, rock dumping, UXO clearance, cable installation, vessel presence, and operational WTG noise. Further detail on noise modelling can be found in **Chapter 10 Marine Mammals** and **Appendix G Marine Mammals and Turtles Approach to Assessment**. Sound impacts for fish will be based on the thresholds developed by Popper et al. (2014). Receptors will be treated either as stationary or fleeing, depending on their behaviour and the level of precaution required:

- Sandeel, spawning herring, spawning cod, and eggs will be treated as stationary receptors.
- Other species will be treated as fleeing receptors at 0.5 ms^{-1}.
- The vessel collision risk assessment for basking shark will be qualitative and based on expert judgement, in consideration of the Project and third-party DAS data, sightings records and the worst-case number of vessel passages anticipated for the WDA over the construction phase (as a worst-case).

455. The Popper et al. (2014) sound impact thresholds are based on the pressure component of sound. It is acknowledged, however, that many fish and invertebrate species can detect the particle motion component of sound. The propagation of pressure waves through a medium (sound pressure) is the most studied in terms of impacts on marine fauna. In contrast, particle motion, which is the oscillation of individual water molecules that allows the pressure waves to propagate, is understudied and no reliable impact thresholds exist to apply in an EIA context (Popper and Hawkins, 2018). Particle motion will be considered in the EIA qualitatively.

9.12.1 Impact Assessment Methodology

456. For each impact, the assessment will identify receptors sensitive to that impact and will implement a systematic approach to understanding the impact pathways and the level of impacts on given receptors. Definitions of sensitivity, value and magnitude for the purpose of the fish (including basking shark) and shellfish ecology EIAR assessment are provided in **Table 9.10**, **Table 9.11** and **Table 9.12** respectively.

Table 9.10 Definition of sensitivity for fish and shellfish receptor

Sensitivity	Definition
High	Individual* receptor (species or stock) has very limited or no capacity to avoid, adapt to, accommodate or recover from the anticipated impact.
Medium	Individual* receptor (species or stock) has limited capacity to avoid, adapt to, accommodate or recover from the anticipated impact.

Sensitivity	Definition
Low	Individual* receptor (species or stock) has some tolerance to accommodate, adapt or recover from the anticipated impact.
Negligible	Individual* receptor (species or stock) is generally tolerant to and can accommodate or recover from the anticipated impact.

**In this case individual receptor does not refer to an individual organism but refers to the population or stock of a species*

457. The 'value' of the receptor forms an important element within the assessment, for instance if the receptor is a protected species or habitat. It is important to understand that high value and high sensitivity are not necessarily linked within a particular impact. A receptor could be of high value (e.g. Annex II species) but have a low or negligible physical/ecological sensitivity to an impact. Similarly, low value does not equate to low sensitivity and is judged on a receptor-by-receptor basis. The value will be considered, where relevant, as a modifier for the sensitivity assigned to the receptor, based on expert judgement. Note that for stocks of species which support significant fisheries, commercial value is also taken into consideration. Value definitions are provided in **Table 9.11**.

Table 9.11 Definition of value for fish and shellfish receptor

Magnitude	Definition
High	Internationally or nationally important.
Medium	Regionally important or internationally rare.
Low	Locally important or nationally rare.
Negligible	Not considered to be particularly important or rare.

458. The magnitude of an impact is considered for each predicted impact on a given receptor and is defined geographically, temporally and in terms of the likelihood of occurrence. The definitions of terms relating to the magnitude of a potential impact on fish and shellfish ecology are provided in **Table 9.12**.

Table 9.12 Definition of magnitude for fish and shellfish receptor

Magnitude	Definition
High	Fundamental, permanent / irreversible changes, over the whole receptor, and / or fundamental alteration to key characteristics or features of the receptors' character or distinctiveness.
Medium	Considerable, permanent / irreversible changes, over the majority of the receptor, and / or discernible alteration to key characteristics or features of the receptors' character or distinctiveness.
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and / or limited but discernible alteration to key characteristics or features of the receptors' character or distinctiveness.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the receptors' character or distinctiveness.

459. The significance of the effect upon fish and shellfish ecology is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in **Table 9.13**.

Table 9.13 Significance of effect matrix

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

9.13 SCOPING QUESTIONS TO CONSULTEES

460. The following questions are posed to consultees to help them frame and focus their response to the fish (including basking shark) and shellfish ecology chapter which will in turn inform the Scoping Opinion. As described in **Table 9.2**, responses to a number of these questions were provided by NatureScot, and Argyll and Bute Council following the Scoping Workshop however these have been retained in case other stakeholders wish to provide further feedback that can be used to inform the Scoping Opinion:

- Do you agree that the existing data available to describe the fish and shellfish ecology baseline remains sufficient to describe the baseline environment in relation to the WDA?
- Are there any further desktop datasets which you would recommend are included?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on commercial fisheries receptors?
- Do you agree that all potential impacts have been identified for fish and shellfish ecology?
- Do you agree with the potential impacts scoped in and out?
- Do you agree with the proposed approach to the EIA?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

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10 MARINE MAMMALS

10.1 INTRODUCTION

461. This chapter considers the scope of potential and likely significant effects (LSE) on marine mammals and turtles that may arise from construction, operation and maintenance (O&M) and decommissioning within the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

462. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on marine mammals in the WDA Environmental Impact Assessment (EIA).

463. This chapter is supported by, and should be read in conjunction with, **Appendix F Marine Mammals and Turtles Baseline** and **Appendix G Marine Mammals and Turtles Approach to Assessment**.

464. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 9 Fish (Including Basking Shark) and Shellfish Ecology** – as potential impacts on these receptors may cause indirect effects (i.e., through changes to prey resources) on marine mammals;
- **Chapter 12 Commercial Fisheries** – as potential impacts on commercial fisheries receptors may cause indirect effects (e.g., through changes to prey resources) on marine mammals; and
- **Chapter 13 Shipping and Navigation** – as increased vessel activity within and on transit to the WDA may impact marine mammals, this chapter will be used to inform behavioural disturbance impacts from vessels and vessel interaction (i.e., increased risk of collision).

465. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

10.2 LEGISLATION, POLICY AND GUIDANCE

466. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 10.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for marine mammals.

Table 10.1 Summary of relevant legislation, policy and guidance for marine mammals

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Legislation	
Nature Conservation (Scotland) Act, 2004	The Nature Conservation (Scotland) Act 2004 sets out a series of measures designed to conserve biodiversity, and to protect and enhance the biological and geological natural heritage. This Act also provides amendments to the Wildlife and Countryside Act 1981 specifically for Scottish waters, adding that it is an offence to disturb cetacean species (either recklessly or intentionally). This Act also enacts requirements under the Bern Convention 1979.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Marine (Scotland) Act, 2010	This Act provides a framework for the sustainable management of Scotland's seas and one of its key aims is to streamline and simplify the licensing and consenting process for marine projects. Under the Marine (Scotland) Act, the Conservation of Seals Act 1970 has been re-enacted, providing designation of specific seal haul-out sites for protections from intentional or reckless harassment. Under Part 6 of the new act, it is an offence to kill, injure or take a seal at any time of year, except to alleviate suffering or where a licence has been issued to do so by Marine-Directorate Licensing Operations Team (MD-LOT).
Oslo and Paris Convention for the Protection of the Marine Environment 1992 commission	Oslo and Paris Convention for the Protection of the Marine Environment 1992 (OSPAR) commission established a group on Offshore Renewable Energy Developments, ICG-ORED, in 2021 which is taking the lead in progressing tasks and actions related to OSPAR's North-East Atlantic Environmental Strategy 2030 Operational Objective S12.O4: By 2024 OSPAR will develop guidance to promote and facilitate sustainable development and scaling up of offshore renewable energy in a way that cumulative environmental impacts are minimised. This is guided by the application of the Ecosystem Approach. Understanding and assessing cumulative effects is the front line of implementing an ecosystem-based approach to the management of human activities in the OSPAR Maritime Area.
Habitats Regulations	The Habitats Regulations place an obligation on 'competent authorities' to carry out an Appropriate Assessment of any proposal likely to have a significant effect on a European site, to seek advice from Statutory Nature Conservation Bodies and to reject an application that would have an adverse effect on the integrity of a European site except under very tightly constrained conditions. Under the Habitats Regulations, all cetacean species are defined as European Protected Species (EPS). All seals are listed under Schedule 3 (animals which may not be captured or killed in certain ways).
Policy	
National Planning Framework 4 (Scottish Government, 2023a)	The National Planning Framework 4 (NPF4) sets out Scotland's spatial principles, regional priorities, national developments and national planning policy. NPF4 presents Sustainable Places, Liveable Places and Productive Places to achieve national outcomes including benefits to the environment, communities, and health. NPF4 contains a notable focus on tackling both the climate and nature crises. **The key references are:** **Policy 3: Biodiversity** – *"Development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them. Proposals should also integrate nature-based solutions, where possible…"* **Policy 4: Natural places** – "*Development proposals that are likely to have a significant effect on an existing or proposed European site (Special Area of Conservation or Special Protection Areas) and are not directly connected with or necessary to their conservation management are required to be subject to an "appropriate assessment" of the implications for the conservation objectives…*"

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Scotland's National Marine Plan (Scottish Government, 2015)	Scotland's National Marine Plan (NMP) sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 nautical miles (nm), whilst highlighting that marine mammals are a strategic priority. **The key references are:** **Policy GEN 9 Natural Heritage:** "*Development and use of the marine environment must: (a) Comply with legal requirements for protected areas and protected species (b) not result in significant impact on the national status of Priority Marine Features (c) Protect and, where appropriate, enhance the health of the marine area…*" **Paragraph 4.41:** "*A network of well managed marine protected areas is being established to meet national objectives and help deliver an ecologically coherent MPA network in the North East Atlantic, contributing to the protection and enhancement of the area to which this Plan applies. The network will comprise of newly designated Marine Protected Areas as well as Natura Sites and marine components of Sites of Special Scientific Interest and Ramsar sites. The management requirements of each of these designation types must be met. These sites, together with other protected areas will make a significant contribution to the protection, enhancement and health of the marine area. Improved health of the marine environment will also lead to increased resilience of ecosystems to climate change…*" **Paragraph 4.42:** "*Sites designated as Special Areas of Conservation and Special Protection Areas make up the Natura 2000 network of protected areas. Any plan or project likely to have a significant effect on these sites, which is not directly connected with or necessary to their conservation management, must be subject to an 'appropriate assessment' of their implications for the site in view of its conservation objectives...*" **Paragraph 4.46:** "*Marine Protected Areas are those designated under the Marine Acts to protect features of importance to Scotland [48] and which will contribute to an ecologically coherent network of sites. MPAs are identified according to the guidelines on the selection and development of the MPA network...*" **Paragraph 4.51:** "*The presence (or potential presence) of a legally protected species is an important consideration. If there is evidence to suggest that a protected species is present or may be affected by a proposed development, steps must be taken to establish their presence. The level of protection afforded by legislation must be factored into the planning and design of the development and any impacts must be fully considered prior to the determination of the application...*" **Paragraph 4.55:** "*Marine planning can deliver significant improvements to management of our seas by contributing to improvement in the status of Priority Marine Features and their associated habitats, species and ecosystems...*" **Note:** When published, Scotland's National Marine Plan (NMP2) will also be considered and is assumed to supersede the existing NMP.
Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020)	The Sectoral Marine Plan (SMP) for Offshore Wind Energy identifies sustainable areas for the future development of commercial scale offshore wind energy in Scotland, including a spatial strategy to inform the seabed leasing process for the purposes of offshore wind energy. The WDA is located in Plan Option W1, as identified in the SMP for Offshore Wind. Plan Options including W1 were subject to testing, refinement and area reduction through Strategic Environmental Assessment (SEA), Habitats Regulations Appraisal (HRA) and plan development processes. The SEA identified relevant characteristics of Plan Option W1 and identified key risks to be addressed in consenting applications. A key risk factor identified for the W1 area was potential impacts on marine mammal receptors.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
The Marine Policy Statement (UK Government, 2011)	**The key reference is:** 3.3.24: *"Renewable energy developments can potentially have adverse impacts on marine fish and mammals, primarily through construction noise …"*
Argyll and Bute Local Development Plan 2 (2024)	**The key references are:** **Policy 28: Supporting Sustainable Aquatic and Coastal Development –** *"Proposals for marine and freshwater aquaculture, marine and coastal developments will be supported where it can be demonstrated that there will be no significant adverse effects, directly, indirectly or cumulatively on…"* **Policy 73: Development Impact on Habitats, Species and Biodiversity –** *"When considering development proposals Argyll and Bute Council will give full consideration to the legislation, policies and conservation objectives, contained within the following…"* **Policy 74: Development Impact on Sites of International Importance –** *"Unless development is directly connected with or necessary to their conservation, proposals likely to have a significantly adverse effect, including cumulative, upon an existing or proposed Special Protection Area, existing or candidate Special Area of Conservation, or Ramsar Site (i.e. European Sites), including development outwith the site, shall require appropriate assessment…"*
Guidance	
The Protection of Marine European Protected Species from Injury and Disturbance – Guidance of Scottish Inshore Waters (Marine Scotland, 2020a)	This guidance provides advice for marine users who are planning to carry out an activity in the marine environment which has the potential to deliberately or recklessly kill, injure or disturb a marine European Protected Species (EPS). It also provides useful information on mitigation for marine mammals.
The Protection of Marine European Protected Species from Injury and Disturbance – Guidance for The Marine Area in England and Wales And The United Kingdom Offshore Marine Area (Joint Nature Conservation Committee et al., 2010)	The Joint Nature Conservation Committee (JNCC) guidance intends to provide a resource for marine users, regulators, advisors and the enforcement authorities when considering whether an offence of disturbing or injuring/killing a marine EPS is likely to occur or to have occurred as a result of an activity.
Marine mammal noise exposure criteria (Southall et al., 2019; National Marine Fisheries Service (NMFS), 2018; 2024)	The marine mammal noise exposure criteria provide thresholds for noise impacts on marine mammals using species hearing group criteria for both impulsive and non-impulsive sounds, providing Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) thresholds in Sound Exposure Level and Sound Pressure Level which is used for the underwater noise modelling.
Guidelines for Minimising the Risk of Disturbance and Injury to Marine Mammals Whilst Using Explosives (JNCC, 2010a)	These guidelines outline measures to minimise potential injury and disturbance from the use of explosives from activities such as harbour construction, well-head or platform decommissioning and unexploded ordinance clearance. The draft documents will be considered when developing the mitigation plans. However, as the documents are not yet finalised, the 2010 version is the most recent and current version and is referenced within the scoping document.
DRAFT Guidelines for Minimising the Risk of Injury to Marine Mammals from Unexploded Ordnance Clearance in the Marine Environment (JNCC, 2023)	

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Statutory Nature Conservation Agency Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise (JNCC, 2010b)	The JNCC guidelines for piling outline a protocol for the mitigation of potential underwater noise impacts arising from pile driving during the construction of an Offshore Windfarm (OWF).
Scottish Marine Wildlife Watching Code (Scottish Natural Heritage (SNH), 2017)	The Scottish Marine Wildlife Watching Code provides guidelines as to the best practice measures for reducing disturbance to marine mammals by all marine users.
Guidelines for Minimising the Risk of Injury to Marine Mammals from Geophysical Surveys (Seismic Survey Guidelines) (JNCC, 2017)	The JNCC guidelines for geophysical surveys outline a protocol for the mitigation of potential underwater noise impacts due to geophysical surveys.
Marine Environment: Unexploded Ordnance Clearance Joint Interim Position Statement (Defra, 2021)	Outlines the preferred approach to Unexploded Ordnance (UXO) clearance.

10.3 CONSULTATION

467. This marine mammals chapter has been informed by engagement with stakeholders, including those listed below:

- Argyll and Bute Council;
- Clyde Marine Planning Partnership;
- Department of Agriculture, Environment and Rural Affairs (Northern Ireland);
- Marine Directorate - Licensing Operations Team; and
- NatureScot.

468. As part of the consultation process, the Applicant presented the approach to assessment to stakeholders in order to offer transparency around the scoping methodology and rationale, capture stakeholder advice and guidance, and incorporate stakeholder feedback, where appropriate. A summary of the approach to stakeholder communication and consultation is outlined in **Chapter 5 Consultation and Stakeholder Engagement** with each engagement activity being listed within **Appendix L Stakeholder Engagement Log**.

469. The consultation outcomes in relation to marine mammals are outlined in **Table 10.2**, which summarises stakeholder feedback, outlines how the Applicant has responded to the feedback received, and details how it has been considered within this chapter and/or will be used to inform the EIA process and preparation of the EIAR.

470. In addition to the engagement outlined in **Table 10.2**, the points of agreement between the Applicant and NatureScot are listed below:

- There is no requirement to re-calculate the Waggit et al. (2019) and Carter et al. (2022) densities for a minor amendment to the WDA boundary as the densities will be recalculated and presented in the EIAR;
- The proposed outline approach to underwater noise modelling;
- The proposed approach to the impact assessment matrix; and
- Agreement on the potential impacts proposed to be screened in for Nature Conservation Marine Protected Areas (NCMPAs) (**Appendix H Nature Conservation Marine Protected Area Screening**).

471. Consultation relating to this topic will be ongoing throughout the EIA process. The Applicant welcomes the opportunity to work with stakeholders to deliver a proportionate and robust EIA.

Table 10.2 Summary of consultation relevant to marine mammals

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	04 December 2023: Expert Topic Group (ETG) Meeting 1	NatureScot suggested that additional existing data could be obtained from the Whale and Dolphin Conservation (WDC) Shorewatch, Marine Mammal Atlas and Orca survey data, which could be considered in scoping and the Environmental Impact Assessment Report (EIAR).	The Applicant has contacted WDC regarding their Shorewatch data, who confirmed that no surveys have been conducted in the vicinity of the WDA. In light of this, an updated trend analysis based on the work completed in Gutierrez-Munoz et al. (2021), which will incorporate Shorewatch effort and sightings through 2023, will be included in the marine mammal baseline. Organisation Cetacea (ORCA) data has been documented from the interactive map on ORCAs website. Information from the Marine Mammal Atlas will also be reviewed. The additional data sources have been included in **Table 10.3**.
		NatureScot agreed with the list of species proposed to be scoped into the assessment but requested that Long finned pilot whale and Humpback whale should also be scoped in.	Long finned pilot whale and Humpback whale have been scoped in for further assessment in the EIA, see **Section 10.7.1**.
Department of Agriculture, Environment and Rural Affairs (Northern Ireland)	04 December 2023: ETG Meeting 1	Department of Agriculture, Environment and Rural Affairs (DAERA) highlighted that in Northern Ireland there is a dedicated Management Unit (MU) for seals as well as a significant colony of grey seals with an expanding population on Rathlin Island.	The Northern Ireland seal MU will be included in the assessment as described in **Appendix F Marine Mammals and Turtles Baseline**.
NatureScot	04 December 2023: ETG Meeting 1 – Written feedback	NatureScot advised that they do not agree with the use of Temporary Threshold Shift (TTS) onset thresholds as a proxy for disturbance for impact piling, as it is understood that animals can be disturbed at lower levels than TTS thresholds.	TTS will not be used to inform the assessment of disturbance. The dose response curve using Graham et al. (2017), will be used to assess for potential disturbance across all cetaceans where a quantitative assessment can be carried out.
		For impacts during operation and maintenance (O&M), NatureScot confirmed that vessel interaction and presence of vessels needs to be separated.	Potential impacts, such as auditory injury or disturbance due to the presence of vessels, is scoped in and will be assessed separately (**see Table 10.7**). Vessel interaction (increased collision risk) is scoped in and described in **Table 10.7**.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		Electro-Magnetic Field (EMF) effects on marine mammals could be scoped out of the assessment with only the indirect effects of EMF on prey species being required to be assessed.	Direct EMF effects on marine mammals has been scoped out, however EMF effects on prey species is scoped in (see **Table 10.7**).
NatureScot	01 May 2024: Marine Mammals Scoping Workshop	For marine mammal densities, NatureScot confirmed: • Harbour porpoise - use SCANS IV estimate of 0.02/km^2 as more up to date than Waggit et al (2019) and more precautionary than Digital Aerial Surveys (DAS). • Risso's dolphin – use Project DAS estimate. • Long finned pilot whale – NatureScot content with use of CS-G (adjacent block) density estimate due to the sensitivity of pilot whales. • Leatherback turtle, use Project DAS and include in mammal scoping chapter and can be assessed qualitatively.	These densities will be taken forward for assessment.
		Regarding the data sources, NatureScot agree with those proposed, although National Marine Fisheries Service (NMFS) (2018) underwater noise modelling guidance should be added.	The Applicant notes that updated draft marine mammal underwater noise thresholds from NMFS have been published (NMFS, 2024), and is seeking NatureScot advice on whether to use these or the thresholds published in Southall et al. (2019).
		Regarding the potential impacts to be scoped in/out, auditory injury is proposed to be scoped in for operational noise, other construction activities and vessel noise however if noise modelling indicates no potential for this, then it can be scoped out. These noise impact pathways should be scoped in for disturbance.	Detail on the approach to the impact assessment is presented in **Appendix G Marine Mammals and Turtles Approach to Assessment**. Underwater noise modelling will be undertaken to assess the potential risk of auditory injury from operational noise, other construction activities and vessel noise to identify the need to scope these in or out of the EIA. Regardless of the modelling output, these noise impact pathways will be assessed for disturbance.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		TTS can be used as a proxy for Unexploded Ordnance (UXO) disturbance but for all other non-impulsive noise impact pathways, dose response curves should be used for assessment.	TTS will be considered as a proxy for UXO disturbance. However, for all other non-impulsive noise impact pathways, dose response curves will be used to inform the assessment.
		NatureScot do not agree with 26 km Effective Deterrent Range (EDR) for Scottish projects. Suggested that the Applicant consults with Ireland. For Scottish waters, NatureScot expect dose response for disturbance.	The Applicant will consult with transboundary stakeholders, including those in the Republic of Ireland (see **Section 10.11**). Dose response approach will be used for consideration of disturbance in Scottish waters. In addition to dose response, the 26 km EDR will be used for the behavioural disturbance assessment of harbour porpoise in Irish waters.
		The proposed approach to Interim Population Consequence of Disturbance modelling is appropriate. NatureScot request presentation of Natural Resources Wales (NRW) advice that a significant effect would occur if a decline of >1% per year (versus a modelled unimpacted reference population) over a set period of time (e.g., the first 6 years, based on the former Favourable Conservation Status (FCS) reporting period (NRW, 2023)) alongside NatureScot advice to consider this over a 25-year period.	The Applicant confirms that both approaches will be presented in the EIAR and Report to Inform Appropriate Assessment, to look at results from the first six-year period, in line with NRW guidance (NRW, 2023) and to present results over a 25-year period to determine how the population may change over time (Sinclair et al, 2020).
		Regarding the proposed approach to cumulative effects / in-combination assessments, NatureScot is generally content but geophysical surveys should be added.	Geophysical surveys will be included in cumulative / in-combination assessments as appropriate. It should also be noted that, as described in **Appendix G Marine Mammals and Turtles Approach to Assessment**, for any development projects such as offshore windfarms on the east coast of Scotland that have offshore construction periods overlapping with construction activities in the WDA, an assumption will be made that the sound from loud impulsive sources, such as pile driving, will not propagate into waters surrounding the WDA, and these projects will therefore be excluded from the cumulative / in-combination assessments.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	23 May 2024: Marine Mammals Scoping Workshop - Written feedback	Regarding use of UK versus total reference populations, NatureScot advise using UK populations, however NatureScot welcome use of MUs for characterising the baseline, wider Study Area and cumulative impacts.	The UK population will be used for the assessment; however, both the UK and wider reference populations are presented in **Appendix F Marine Mammals and Turtles Baseline**. The wider population will be used for the cumulative assessments.
		Regarding Nature Conservation Marine Protected Area (NCMPA) Assessment, NatureScot advised that any noise related impact from the WDA should be scoped in depending on the results of the underwater noise modelling, and if the outputs predict that noise could occur across the NCMPA boundary itself. Given that decisions have yet to be made around the ports / harbours to be used, NatureScot advised that project alone and cumulative collision and disturbance (from vessel noise and presence) impacts are scoped in.	The Applicant is undertaking a Ports and Harbours Feasibility Study and will share the summary report with stakeholders in due course. Detail on the approach to assessment for NCMPAs is presented in **Appendix H Nature Conservation Marine Protected Area Screening**. Potential impacts from vessels are screened in for the appropriate NCMPAs.
		In relation to dose response curves, NatureScot agree that Graham et al. (2017) and Graham et al. (2019) are acceptable, however the 2017 reference is preferred as it is more precautionary. In relation to discounting sound levels below 140 dB in dose response curves for seals, NatureScot advise against this in the scoping report. However, once the rationale / justification for this has been provided, NatureScot will provide advice prior to submission of the EIAR.	Dose response curves from Graham et al. (2017) will be used for all cetaceans. Regarding dose response curves for seals (Whyte et al, 2020), sound levels below 140 dB will be included in the EIAR, or further rationale can be provided at future ETG meetings to seek to agree to disregard these.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	04 June 2024: the Marine Directorate - Licensing Operations Team (MD-LOT)/ NatureScot Quarterly Update Meeting	NatureScot advised that European Protected Species (EPS) and basking shark should be considered at EIA stage together with likely mitigation options. This is necessary to provide sufficient confidence, should the project receive Section 36 consent, that the likely worst-case scenario (impact) is able to be addressed through a subsequent derogation under EPS licensing. Leaving this entirely to the post-consent stage has led to substantial difficulties and delays.	As described in **Section 2.8.3**, all cetacean species are listed as EPS under Annex IV of the Habitats Directive and are therefore protected from the deliberate killing (or injury), capture and disturbance throughout their range. An EPS risk assessment will be undertaken prior to any activity that has the potential to disturb or injure marine mammals such as geophysical surveys, UXO clearance, piling and O&M activities. An EPS risk assessment will be carried out to support each marine licence application during the post-consent period, at which point the project design envelope will have been further refined through detailed design and procurement activities and further detail will be available on the techniques selected for construction, as well as the mitigation measures that will be in place following the development of Marine Mammal Mitigation Protocols (MMMPs) for piling and UXO clearance. Mitigation measures relevant to EPS are included in **Table 10.6** and further detail on mitigation measures to prevent auditory injury will be provided in a draft MMMP to be submitted with the Section 36 application. Further consideration of the EPS licensing process and mitigation measures will be provided in the EIAR. Regarding the approach for basking shark see **Table 9.2**.

10.4 EXISTING DATA SOURCES

472. **Table 10.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA.

Table 10.3 Summary of key datasets and information sources

Dataset	Description	Author
Hebridean Whale and Dolphin Trust marine mammal survey data	Visual and Passive Acoustic Monitoring (PAM) data in the Inner and Outer Hebrides – 30 km buffer around the Windfarm Development Area (WDA) undertaken from 2018 to 2023. Note the Applicant has submitted a data request form to the Hebridean Whale and Dolphin Trust (HWDT), requesting raw effort and sightings / PAM data within the Option Agreement Area (OAA), with a view to include information on basking sharks within the EIAR.	HWDT, 2023
Sea Watch Foundation (public sightings)	Public sightings data, from onshore and offshore points, that is freely available online and which covers the Inner and Outer Hebrides. Datasets have been ongoing since the 1970s, with annual sea watch events since 2002.	Sea Watch Foundation, 2024
Whale and Dolphin Conservation Shorewatch	A report with an updated trend analysis based on the work completed in Gutierrez-Munoz et al. 2021. This will incorporate Shorewatch effort and sightings through 2023 and be reviewed alongside the National Biodiversity Network Atlas. Additionally, the Project has requested raw effort and sightings/PAM data within the OAA plus a 30 km buffer over a five-year period, 2018 to 2023, from both boat and land surveys. At the time of writing the data has not been provided however it is anticipated to be available for the EIA.	WDC
Small cetacean in the European Atlantic and the North Sea-III Aerial and Shipboard Surveys	Small Cetaceans in European Atlantic Waters and the North Sea (SCANS)-III surveys undertaken from aerial and ship-based viewpoints. SCANS-IV was undertaken in 2016 with a primary aim to provide robust large-scale estimates of cetacean abundance to inform the upcoming Marine Strategy Framework Directive assessment of good environmental status in European Atlantic waters. Report describes the density surface modelling for those cetacean species for which sufficient data were obtained during SCANS-III.	Lacey et al., 2022
Small cetacean in the European Atlantic and the North Sea (SCANS)-IV Aerial and Shipboard Surveys	Small Cetaceans in European Atlantic Waters and the North Sea (SCANS)-IV surveys undertaken from aerial and ship-based viewpoints. SCANS-IV was undertaken in 2022 with a primary aim to provide robust large-scale estimates of cetacean abundance to inform the upcoming Marine Strategy Framework Directive assessment of good environmental status in European Atlantic waters in 2024.	Gilles et al., 2023
ObSERVE surveys	Extensive aerial surveys of Ireland's offshore waters were conducted in the summer and winter of 2015 and 2016 to investigate the occurrence, distribution and abundance of key marine species. Additional surveys were conducted in inshore/coastal areas in the summer and winter of 2016. Density estimates for the assessment can be derived from these surveys. ObSERVE II Surveys are ongoing from Summer 2021 to Summer 2025 and will be included in the EIA if available.	Rogan et al, 2018

Dataset	Description	Author
Revised Phase III data analysis of Joint Cetacean Protocol data resources	Data, collected from 1994 to 2011, on cetacean abundances and distribution in the United Kingdom (UK) Exclusive Economic Zone from which density estimates for the assessment can be derived within the Inner and Outer Hebrides.	Paxton et al., 2016
Distribution and abundance maps for cetacean species around Europe	Desk based distribution and abundance data, from 1980 to 2018, for the northeast Atlantic that will be used to calculate marine mammal densities within the WDA, as well as to characterise the marine mammal baseline.	Waggitt et al., 2019)
Persistent areas of high harbour porpoise densities	Datasets from 1994 to 2011 identifying areas of high harbour porpoise densities in UK waters that will be used to characterise the marine mammal baseline with a focus on the Inner Hebrides.	Heinanen & Skov, 2015
Joint Cetacean Data Programme	The Joint Cetacean Data Programme is a collaborative international initiative, led by the Joint Nature Conservation Committee (JNCC) which aims reduce the barriers to accessing cetacean (whale, dolphin and porpoise) data and support mobilisation of the growing evidence collected via multiple means. This will be used to inform marine mammal baseline characterisation, focussing on data for relevant species in the Inner and Outer Hebrides.	JNCC, 2024
Sea of Hebrides proposed Marine Protected Area Digital Aerial Survey	This report presents the results of a pilot study to trial the suitability of digital aerial surveys for collecting data on basking sharks and minke whales for the purposes of assessing distribution and abundance in the Sea of the Hebrides Marine Protected Area (MPA) proposal.	Webb et al. 2018
COMPASS Data Portal	Array of passive acoustic monitoring data in western Scotland and Northern Ireland waters or published findings use for MPA Management and Monitoring and Collaborative Oceanography and Monitoring for Protected Areas and Species projects which will be used to characterise the marine mammal baseline.	Compass, 2024
Identification of MPAs	Identification of MPAs for minke whale (*Balaenoptera acutorostrata*), Risso's dolphin (*Grampus griseus*), white-beaked dolphin (*Lagenorhynchus albirostris*) and basking shark (*Cetorhinus maximus*). Report used a combined data set of marine megafaunal surveys, from 1994 to 2012, to create a spatially indexed set of adjusted densities. Spatial models were fitted to these data sets for the four species above. These models were then used to make seasonal and annual predictions of relative density over the entire Scottish territorial waters which could inform MPA decision making. Desk based data will be used for marine mammal baseline characterisation and has informed **Appendix H Nature Conservation Marine Protected Area Screening**.	Paxton et al., 2014
Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters	Data sources include visual (aerial, land-based and vessel-based) surveys, static and towed acoustic monitoring and animal-borne telemetry. Data originates from published and unpublished sources. The report covers all species of marine mammal commonly occurring in Scottish waters (17 species in total) and will provide important baseline information to inform marine spatial planning in Scottish waters. Data will be examined for relevant marine mammal species in Scottish waters (West coast).	Hague et al., 2020

Dataset	Description	Author
Scotland's Marine Atlas	Web based data source which will be used to inform marine mammal baseline characterisation. Regarding relevant species in the Inner and Outer Hebrides.	Marine Scotland, 2024
Management Units for cetaceans in UK waters	In 2015, the Inter-Agency Marine Mammal Working Group (IAMMWG) defined Management Units for the seven most common cetacean species found in UK waters. This report provides a review of the supporting evidence on population structure and where necessary, updates Management Unit (MU) boundaries to reflect new evidence. Reference populations for the assessments in UK waters.	IAMMWG, 2023
Estimated at-sea Distribution of Grey and Harbour Seals	Latest updates of figures using seal telemetry data were combined with haul-out specific population data to generate usage maps for both grey and harbour seals around the UK. Tagged seal data will be used for seal baseline characterisation.	Carter et al., 2020
DAS of seals in Scotland	Digital Aerial Surveys (DAS) of seals in Scotland during the harbour seal moult, 2016-2019. Data will be used for the harbour seal baseline characterisation.	Morris, et al., 2021
Seals at-sea relative density maps	Sympatric seals, satellite tracking and protected areas: habitat-based distribution estimates for conservation and management. Data will be used to provide imagery of seal densities within the WDA.	Carter et al., 2022
Special Committee on Seals annual reporting	Special Committee on Seals (SCOS) annual reporting of scientific advice on matters related to the management of seal populations. Data will be used for seal counts and pupping locations.	SCOS, 2023
Organisation Cetacea	Organisation Cetacea (ORCA) Whale & Dolphin Sightings. Desk-based data from the interactive map will be documented within the Inner and Outer Hebrides for the marine mammal baseline.	ORCA, 2023

10.5 SITE-SPECIFIC SURVEY DATA

473. In addition to the existing data sources identified in **Section 10.4**, the project has undertaken site specific surveys to inform the EIA (**Table 10.4**).

Table 10.4 Site-specific survey data

Dataset	Year(s)	Description
Third-party Digital Aerial Survey	2020 to 2022	Digital Aerial Surveys (DAS) undertaken by APEM on behalf of a third-party developer across a portion of the Option Agreement Area (OAA), including a 6 km buffer (**Figure 10.2**). Monthly surveys were actioned over 16 months from October 2020 to January 2022 inclusive.
Project's Digital Aerial Survey	2021 to 2023	DAS undertaken by APEM for the Project across the full OAA, including a 4 km buffer (analysed) and 6 km buffers, extending to 10 km during the survey (banked) (**Figure 10.1**). Monthly surveys were actioned over 30 months from April 2021 to September 2023 inclusive.
Project's Marine Mammal Monitoring	2023	Visual and acoustic detections undertaken by the Project. Observations were taken from trained Marine Mammal Observers / Passive Acoustic Monitoring operators during the Project's site investigation geophysical surveys, undertaken from August to November 2023 (**Figure 10.3**).

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680000
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Windfarm Development Area (WDA) / Marine Mammal Study Area

Option Agreement Area (OAA)

MachairWind OAA 4km Buffer

MachairWind OAA 6km Buffer

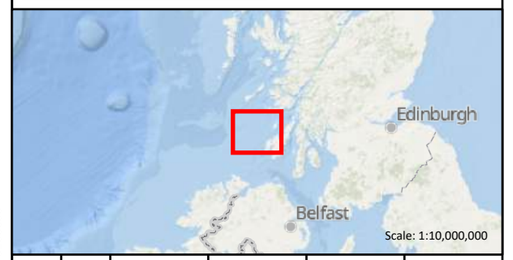
MachairWind OAA 10km Buffer

MachairWind Banked Data

Survey Transect Lines

N

0 5 10 Kilometres



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	19/08/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000073		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:250,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 10.1: OAA and WDA: Digital Aerial Survey Areas and Transect Lines

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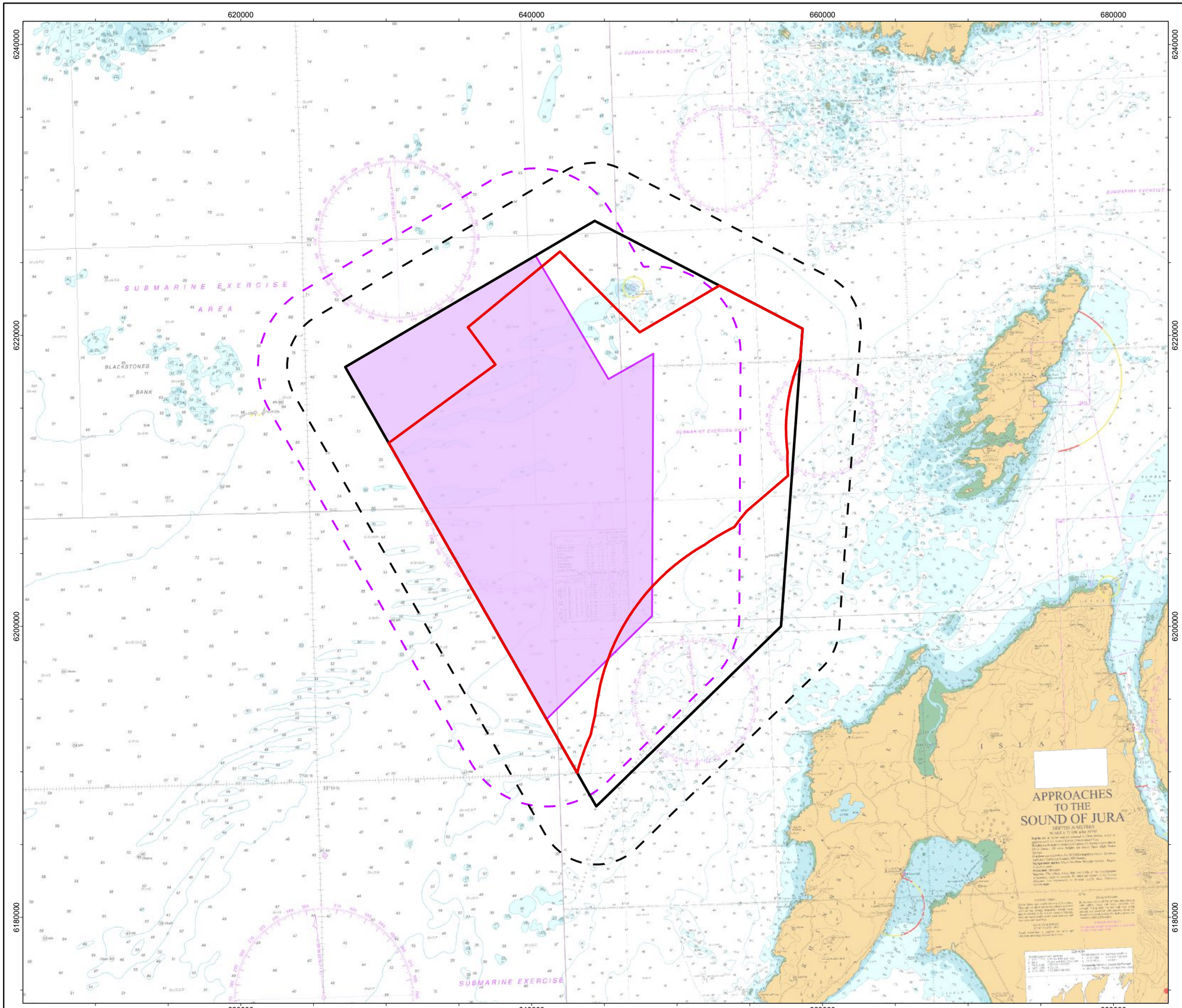
Name: MCW-GEN-GIS-MAP-RHS-000073_ThirdPartyDigitalSurveyArea



Windfarm Development Area (WDA)

Option Agreement Area (OAA)

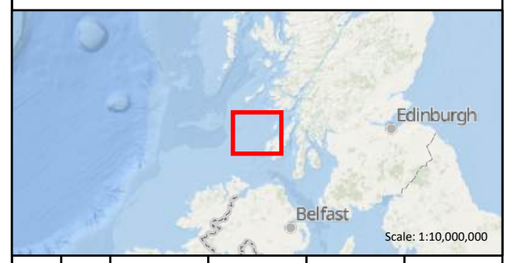
Option Agreement Area (4km Buffer)

Third Party Boundary

Third Party Boundary (6km Buffer)

N

0 5 10 Kilometres



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
3	19/08/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000072		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:250,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 10.2: Third-Party Digital Aerial Survey Area and Buffer

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Name: MCW-GEN-GIS-MAP-RHS-000072_DigitalAerialSurveyLines

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SUBMARINE EXERCISE AREA
BLACKSTONES BANK
SUBMARINE EXERCISE
APPROACHES TO THE SOUND OF JURA
DEPTHS IN METRES
ISLAY
COLONSAY

Windfarm Development Area (WDA)
Option Agreement Area (OAA)
Survey Transect Lines
Survey Block A
Survey Block B
Survey Block C
Survey Block D

N

0 5 10
Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	19/08/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000085		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:250,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 10.3: Geophysical and Environmental Survey Blocks and Line Plan for Option Agreement Area

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10.6 MARINE MAMMALS STUDY AREA

474. This section describes the marine mammals Study Area and how it has been defined. The purpose of this Study Area is to set the geographical boundary within which the existing environment is described (**Section 9.7**) and within which the EIA will be conducted.

475. The marine mammal Study Area is defined as the WDA (**Figure 10.1**). However, as highly mobile marine species, the status and activity of marine mammals known to occur within or adjacent to the WDA will be considered in the context of their Management Unit (MU) population for each species described in **Appendix F Marine Mammals and Turtles Baseline**. Therefore, the Study Area will focus on the WDA with wider consideration of the surrounding area. This is particularly focused on the Inner Hebrides, but a wider area of the Outer Hebrides will also be considered, in line with consultation responses, where appropriate.

10.7 EXISTING ENVIRONMENT

476. This section characterises the marine mammal receptors, using publicly available data sources (**Section 10.4**) alongside site-specific survey data (**Section 10.5**), deemed of relevance to the Study Area (**Section 10.6**). This sets the context for the identification of mitigation measures (**Section 10.8**) and scoping of potential impacts (**Section 10.9**) which then feeds into the consideration of cumulative effects (**Section 10.10**) and potential transboundary impacts (**Section 10.11**).

10.7.1 Review of Marine Mammals

477. This section provides a summary of all marine mammals scoped into the EIA. **Appendix F Marine Mammals and Turtles Baseline** presents a full review of all marine mammals and turtles occurring in the Study Area, alongside a review of density estimates and criteria for how each species was scoped in or out.

478. Within the WDA, the Hebrides and west coast of Scotland, the occurrence of 17 different marine mammal species has been identified (Paxton et al., 2016; Gilles et al., 2023; Waggitt et al., 2019; SCOS, 2023, HWDT, 2023; Hague et al., 2020):

- Toothed whales:
  - Harbour porpoise (*Phocena phocena)*;
  - Bottlenose dolphin *(Tursiops truncates)*;
  - Short-beaked common dolphin *(Delphinus delphis);*
  - Striped dolphin *(Stenella coeruleoalba)*;
  - White-beaked dolphin (*Lagenorhynchus albirostris)*;
  - Atlantic white-sided dolphin (*Lagenorhynchus acutus)*;
  - Risso's dolphin (*Grampus griseus);*
  - Long-finned pilot whale (*Globicephala melaena);*
  - Killer whale *(Orcinus orca);*
  - Cuvier's beaked whale (*Ziphius cavirostris);* and
  - Northern bottlenose whale (*Hyperoodon ampullatus).*
- Baleen whales:
  - Minke whale (*Balaenoptera acutorostrata);*
  - Fin whale (*Balaenoptera physalus);*
  - Sei whale (*Balaenoptera boreali);* and
  - Humpback whale (*Megaptera novaeanglia).*
- Pinnipeds:
  - Grey seal (*Halichoerus grypus)*; and
  - Harbour seal (*Phoca vitulina)*.

479. Of these, common dolphin was the most abundant marine mammal species recorded in the Project's Digital Aerial Surveys (DAS) as well as during the geophysical surveys. Harbour porpoise, common dolphin, Risso's dolphin, white-beaked dolphin, grey seal and harbour seal are expected to be relatively common while minke whale are seasonal visitors and are commonly seen in the summer months (June to August). All these are therefore scoped into the EIA.

480. Bottlenose dolphin, Atlantic white-sided dolphin, killer whale, long-finned pilot and humpback whale are also present in the area, but in lower numbers and are therefore considered rare in the vicinity of the WDA. These are scoped into the EIA.

481. Other cetaceans such as striped dolphin, northern bottlenose whale, Cuvier's beaked whale, fin whale and sei whale could potentially occur in the area. However, these species are found in deeper offshore waters, and sightings in coastal waters of the west coast of Scotland are rare (HWDT, 2023). An initial desk-based review of these cetaceans indicates that there would be a low presence in the WDA and therefore these species are scoped out of the EIA (see **Appendix F Marine Mammals and Turtles Baseline**).

482. NatureScot approved the list of species to be scoped in that was presented during the 01 May 2024 scoping workshop and recommended that long-finned pilot whale be scoped in as three individuals were recorded within the Option Agreement Area (OAA) during the Project's site investigation surveys (**Table 10.2**). In addition, NatureScot advised humpback whale is scoped in because sightings are becoming more frequent in the Inner Hebrides, even though no density estimates have been derived for humpback whale, to date (**Table 10.2**). Further information will be considered for the EIA, and potentially more density estimates can be derived from the HWDT, in particular for killer whale, long-finned pilot whale and humpback whale. If a density estimate cannot be derived for long-finned pilot whale or humpback whale, assessments will be carried out qualitatively rather than quantitatively.

10.7.2 Protected Seal Haul-out Sites

483. Seal haul-out sites are coastal locations that seals use to breed, moult and rest. Almost 200 seal haul-out sites have been designated through 'The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014', with 26 protected seal haul-out sites being within the vicinity of the WDA. The closest are Nave Island and Oronsay, approximately 14 km from the WDA.

484. The protected seal haul-out sites that are in close proximity to the WDA, are listed in **Appendix F Marine Mammals and Turtles Baseline**.

10.7.3 Review of Turtle Data

485. A single leatherback turtle (*Dermochelys coriacea*) was detected during the Project's DAS in September 2022, which equates to a density estimate of 0.01 turtles per km^2. Leatherback turtle is listed as 'Vulnerable' by the International Union for Conservation of Nature, (2022) and is the only species of marine reptile to be considered a regular member of the UK marine fauna and has therefore been scoped in.

10.7.4 Density and Population Estimates

486. **Table 10.5** provides the density and population estimates which will inform the EIA. For all species except harbour porpoise, the most precautionary densities are proposed to be used. This will be updated during preparation of EIAR where new information becomes available. For harbour porpoise, as recommended by NatureScot (**Table 10.2**), the SCANS-IV estimate will be used instead of the most precautionary, as it is the most recent desk-based source and is a higher density estimate compared to the results from the Project's DAS.

Table 10.5 A summary of proposed marine mammal densities to be used for the assessment

Species	Density (no. / km^2)	Density Data Source	Reference Population	Reference Population Data Source
Harbour porpoise	0.2010	Gilles et al. (2023)	West Scotland Management Unit (MU) United Kingdom (UK): 24,305	Inter-Agency Marine Mammal Working Group (IAMMWG) (2023)
Bottlenose dolphin	0.0532	Gilles et al. (2023)	Coastal West Scotland and Hebrides MU UK: 45 Oceanic Waters (OW) MU UK: 1,299	IAMMWG (2023)
Common dolphin	0.627 (winter average)	Project's Digital Aerial Surveys (DAS) (common dolphin only)	Celtic Great North Sea (CGNS) MU UK: 57,417	IAMMWG (2023)
White-beaked dolphin	0.2543	Gilles et al. (2023)	CGNS MU UK: 34,025	IAMMWG (2023)
Atlantic white-sided dolphin	0.0224	Gilles et al. (2023)	CGNS MU UK: 12,293	IAMMWG (2023)
Risso's dolphin	0.01	Project DAS (Risso's dolphin only)	CGNS MU UK: 8,687	IAMMWG (2023)
Killer whale	0.0008	Waggitt et al. (2019)	15,014 (Northeast Atlantic)	North Atlantic Marine Mammal Commission (NAMMCO) (2023)
			8 (West Coast community)	Hebridean Whale and Dolphin Trust (HWDT), 2023
Long-finned pilot whale	0.0326	Waggitt et al. (2019)	152,071	Rogan et al., 2017
Minke whale	0.075	Project DAS (minke whale only)	CGNS MU UK: 10,288	IAMMWG (2023)
Humpback whale*	-	-	-	-
Grey seal	0.529	Carter et al. (2022)	West Scotland MU: 16,596 Wider population: 51,471	Special Committee on Seals (SCOS) (2023)
Harbour seal	0.068	Carter et al. (2022)	West Scotland MU: 21,667 Wider population: 31,627	SCOS (2023)
Leatherback turtle	0.01	Project DAS	North Atlantic population (34,000)	United States Fish and Wildlife Service, 2020.

** = to be assessed qualitatively due to a lack of data*

10.8 MITIGATION MEASURES

487. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on marine mammals. These measures described in **Table 10.6** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 10.6 Indicative embedded mitigation measures for marine mammals

ID	Parameter	Description of Mitigation Measure
M-4	Project Environmental Management Plan	Development of, and adherence to, a Project Environmental Management Plan (PEMP) which will be in accordance with an Outline PEMP to be submitted with the Section 36 Application. The PEMP will include measures to manage the environmental risks associated with the construction and operation of the offshore components of the Project.
M-6	Soft-Start and Ramp-Up for Piling	Implementation of soft-start and ramp-up procedure for piling. Each piling event would commence with a soft-start at a lower hammer energy followed by a gradual ramp-up for at least 20 minutes to the maximum hammer energy required. The soft-start and ramp-up allows mobile species to move away from the area before the maximum hammer energy with the greatest noise impact area is reached. The soft-start and ramp-up procedure, along with other mitigation measures for piling, will be detailed in the Marine Mammal Mitigation Protocol (MMMP).
M-7	Marine Pollution Contingency Plan	Development of, and adherence to, a Marine Pollution Contingency Plan (MPCP). The MPCP will provide guidance to the Project personnel, contractors and subcontractors on the actions and reporting requirements in the event of spills and collision incidents. The MPCP will also contain emergency plans and mitigation procedures for a range of potential marine pollution incidents.
M-8	Cable Plan	Development of, and adherence to, a Cable Plan (incorporating a Cable Burial Risk Assessment (CBRA)). The Cable Plan will confirm planned cable routeing, burial, and any additional external cable protection, and will set out methods for post-installation cable monitoring. Furthermore, this plan will detail environmental sensitivities and design consideration to mitigate, as far as practicable, the effects of inter-array cable laying and associated protection during installation and operation of the Windfarm Development Area (WDA) infrastructure.
M-11	Hierarchy of Unexploded Ordnance Clearance Methods	The current hierarchy of Unexploded Ordnance (UXO) clearance techniques, in order of preference, are: • Avoid (through micro-siting); • Move UXO without clearing it (if safe to do so); • Remove the UXO to an onshore facility without clearing it (if safe to do so); • Low-order clearance if above options not practicable; and • High-order clearance, if low-order clearance not possible, or in the unlikely event that low-order deflagration was unsuccessful.

ID	Parameter	Description of Mitigation Measure
M-12	Marine Mammal Mitigation Protocol	Development of, and adherence to, a Marine Mammal Mitigation Protocol (MMMP) for UXO and a MMMP for piling. A MMMP for piling will be developed based upon best available information, methodologies, industry best practice, latest scientific understanding, current guidance and detailed project design. The MMMP for piling will be developed in consultation with the Marine Directorate (MD) and other relevant Statutory Nature Conservation Bodies, detailing the proposed mitigation measures to reduce the risk of any physical effects or Permanent Threshold Shift (PTS) to marine mammals during all piling operations. This will include provision for soft-start and ramp-up for piling. A detailed MMMP will be prepared for UXO clearance. The MMMP for UXO clearance will ensure there are adequate mitigation measures to minimise the risk of any physical or permanent auditory injury to marine mammals as a result of UXO clearance. The MMMP for UXO clearance will be developed in the pre-construction period, when there is more detailed information on the UXO clearance which could be required and the most suitable mitigation measures, based upon best available information and methodologies at that time. The MMMP for UXO clearance will be prepared in consultation with the MD and relevant Statutory Nature Conservation Bodies. UXO clearance will be subject to a separate marine licence post-consent however an assessment will be provided within the Environmental Impact Assessment Report (EIAR) for information purposes. A Draft MMMP, covering UXO and piling, will be submitted with the Section 36 application.
M-13	Scottish Marine Wildlife Watching Code	The Scottish Marine Wildlife Watching Code (Scottish Natural Heritage, 2017) will be followed for all Project vessels where safe and appropriate to do so, to reduce the potential for vessel collision, by reducing vessel transit speeds and by maintaining speed and course when in the presence of marine mammal species. In the unlikely event that a collision event occurs, this will be reported on, and full information of the incident, including the marine mammal species, will be recorded. Vessel movements to and from any port will be incorporated within existing vessel routes where possible. In addition, all vessels will remain at least 600 metres (m) from land following the Scottish Marine Wildlife Watching Code, therefore 600 m will be maintained from any protected seal haul-out sites during transit to and from site, to limit any potential for disturbance at seal haul-out sites.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques to be implemented.

488. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to marine mammals will be assessed with this mitigation in place.

489. As described in **Table 10.2**, an EPS licence application will be submitted prior to the construction phase for the protection of cetacean species from injury or significant disturbance.

10.9 SCOPING OF POTENTIAL IMPACTS

490. A range of potential impacts on marine mammal receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

491. **Table 10.7** outlines the marine mammal impacts which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data become available.

Table 10.7 Potential impacts scoped in or scoped out for marine mammals

Potential Impact	Phase* Scoped In (✓) / Scoped Out (x)			Justification
	C	O&M	D	
Changes to water quality	✘	✘	✘	During the construction phase of the WDA, the potential changes in water quality could occur through: • Deterioration in water quality due to an increase in suspended sediment associated with seabed preparation for the installation of foundations and cables; • Deterioration in water quality due to an increase in Suspended Sediment Concentrations (SSCs) due to drill arisings for installation of piled foundations for Wind Turbine Generator (WTG) and platforms; and/ or • Deterioration in water quality associated with release of sediment bound contaminants. As described in **Chapter 6 Marine Physical Environment**, contaminants survey data collected across the Option Agreement Area (OAA) shows that the seabed sediments within the Windfarm Development Area (WDA) do not contain contaminants in concentrations that would pose a risk to water quality should the seabed sediments be suspended during construction, operation and maintenance (O&M) and decommissioning activities. Therefore, the potential impact and effect of changes to water quality has been **scoped out** of the Environmental Impact Assessment (EIA), for all phases.
Barrier effects from the presence of the WDA infrastructure during operation	✘	✘	✘	The presence of the WDA infrastructure could be perceived as having the potential to create a physical barrier, preventing movement or migration of marine mammals between important feeding and/or breeding areas, or potentially increasing swimming distances if marine mammals avoid the site and go round it. Tagged harbour seals have been recorded within two operational Offshore Windfarms (OWFs) (Alpha Ventus in Germany and Sheringham Shoal in United Kingdom (UK)), with the movement of several of the seals suggesting foraging behaviour around WTG fixed foundation structures (Russell et al., 2014). Therefore, the potential for a barrier effect from the physical presence of the WDA infrastructure has been **scoped out** of the EIA, for all phases.
Direct effects from Electro-magnetic Fields	N/A	✘	N/A	Subsea electrical cabling produces Electro-magnetic Fields (EMF) which have the potential to affect marine mammals both directly and indirectly (i.e. through prey interaction pathways). This particularly relates to non-buried cables (either dynamic Inter-Array Cables (IAC) in the water column, or cables laid directly on the seabed). The WDA will use fixed WTG foundations and therefore EMF from dynamic IAC in the water column would not occur. Additionally, unburied cables would very likely be covered with external cable protection which would attenuate EMF. Studies indicate that magnetic fields decrease rapidly with vertical and horizontal distance from subsea cables, and that the reduction is greater the deeper cables are buried (Normandeau et al., 2011). Although it is assumed that marine mammals are capable of detecting small differences in magnetic field strength, this is unproven and is based on circumstantial information. There is also, at present, no evidence to suggest that existing subsea cables influence cetacean movements, and there are no regulatory thresholds or guidelines that define acceptable levels of EMF emissions into the marine environment (Copping et al., 2020). With the advice from NatureScot (**Table 10.2**), the potential for direct effects from EMF on marine mammals has been **scoped out** of the EIA, for all phases. However, as a precautionary approach, the potential for EMF to impact marine mammals indirectly though prey interaction pathways has been scoped in (see changes to prey resources below).
Underwater noise during Unexploded Ordnance (UXO) clearance: auditory injury	✓	✘	✘	Prior to construction, there is the potential for UXO clearance to be required. The potential effects of UXO clearance on marine mammals include: • Physical injury from direct or indirect blast wave effect of the high amplitude shock waves and sound wave produced by underwater detonation, which could result in immediate or eventual mortality; • Auditory impairment (from exposure to the acoustic wave), resulting in a temporary or permanent hearing loss such as Temporary Threshold Shift (TTS) and Permanent Threshold Shift (PTS); or • Behavioural change, such as disturbance to feeding, mating, breeding, and resting (Richardson et al., 1995; Ketten, 2004; von Benda-Beckmann et al., 2015). Embedded mitigation as described in **Table 10.6** would reduce the impact of underwater noise on marine mammals during UXO clearance. The potential for underwater noise impacts and effects from UXO clearance is **scoped into** the EIA during the construction phase, although this will be provided for information purposes only, since UXO clearance will be the subject of a separate marine licence application post-consent.
Underwater noise during UXO clearance: behavioural impacts	✓	✘	✘	
Underwater noise during piling: auditory injury	✓	✘	✘	The potential impacts of underwater noise are dependent on the noise source characteristics, the receptor species, distance from the sound source and noise attenuation within the environment. A range of fixed foundation options are being considered for the WTGs including monopiles, jackets on pin piles, jackets on suction buckets and gravity base structures. Of these, monopiles and jackets on pin piles may require impact piling. Embedded mitigation as described in **Table 10.6** would reduce the impact of underwater noise on marine mammals during piling. Underwater noise can cause both physiological (e.g. lethal, physical injury and auditory injury) and behavioural (e.g. disturbance, behavioural response, and masking of communication) impacts on marine mammals (e.g. Bailey et al., 2010; Madsen et al., 2006; Thomsen et al., 2006). Impact piling has been established as a source of high-level underwater noise (Parvin et al., 2006; Thomsen et al., 2006; Nedwell et al., 2007; Robinson et al., 2012; Kastelein et al., 2015, 2016). Therefore, the potential for underwater noise impacts and effects from piling is **scoped into** the EIA, during the construction phase.
Underwater noise during piling: behavioural impacts	✓	✘	✘	

Potential Impact	Phase* Scoped In (✓) / Scoped Out (x)			Justification
	C	O&M	D	
Underwater noise from operational turbines: auditory injury	✘	✓	✘	The main sources of sound generated during the operation of WTGs are aerodynamic and mechanical. The mechanical noise is from the nacelle at the top of the WTG tower. As the WTG blades rotate, vibrations are generated that travel down the turbine tower and radiate into the surrounding water column and seabed (Tougaard et al., 2009; 2020; Nedwell et al., 2003). The resulting sound is described as continuous and non-impulsive and is characterised by one or more tonal components that are typically at frequencies below 1 kHz. The frequency content of the tonal signals is determined by the mechanical properties of the WTG and does not change with wind speed (Madsen et al., 2006). Noise levels generated above the water surface are low enough that no significant airborne sound will pass from the air to the water (Godin, 2008). The low-level noise generated during operation is likely to be detected by marine mammals only at short distances over background noise levels and below levels which would elicit a response (Madsen et al., 2006; Thomsen et al., 2006). The overall effect of the operational noise and the ability of marine mammals to perceive this noise will be largely dependent on ambient noise levels and wind speed. There is no indication of any disturbance or exclusion of cetaceans or seals around OWFs during operation (Tougaard et al., 2005; Scheidat et al., 2011). Data collected suggests that behavioural responses for harbour porpoise and seals may only occur up to a few hundred metres away (Touggard et al., 2009; McConnell et al., 2012). Tagged harbour seals have been recorded within operational OWFs and the movements of several of the seals suggest foraging behaviour around WTGs (Russell et al., 2014). Therefore, while the potential impact ranges are expected to be small, the potential for auditory injury and disturbance has been **scoped into** the EIA, for the O&M phase. However, the potential for auditory injury may be later ruled out on the basis of underwater noise modelling results.
Underwater noise from operational turbines: behavioural impacts	✘	✓	✘	
Underwater noise associated with other construction, operation and maintenance and decommissioning activities: auditory injury	✓	✓	✓	In addition to piling, other sources of underwater noise associated with OWF construction, O&M and decommissioning, include seabed preparation, rock placement and cable installation. Dredging and cable installation activities have the potential to generate underwater noise at sound levels and frequencies for sufficient durations to disturb marine mammals. There are no clear indications that underwater noise caused by the installation of sub-sea cables poses a high risk of harming marine fauna (OSPAR, 2009). However, behavioural responses of marine mammals to dredging, an activity emitting comparatively higher underwater noise levels, are predicted to be similar to those during cable installation (OSPAR, 2009). Based on reviews of published sources of underwater noise during dredging activity (e.g. Thomsen et al., 2006; CEDA, 2011; Theobald et al., 2011; Todd et al., 2014), sound levels that marine mammals may be exposed to during dredging activities are usually below auditory injury thresholds or PTS exposure criteria; TTS cannot be ruled out if marine mammals are exposed to noise for prolonged periods (Todd et al., 2014), however, marine mammals remaining in close proximity to such activities for long periods of time is unlikely. Therefore, the potential risk of PTS or TTS in marine mammals as a result of cable installation activity is highly unlikely. Underwater noise as a result of dredging activity has the potential to disturb marine mammals (Pirotta et al., 2013). Therefore, there is the potential for short-term behavioural reactions and disturbance to marine mammals in the area during dredging / cable installation activity. Therefore, the potential for auditory injury and disturbance from other construction, O&M and decommissioning activities has been **scoped into** the EIA, for all phases. However, it should be noted that the potential for auditory injury may be ruled out on the basis of underwater noise modelling results showing extremely localised areas of potential effect.
Underwater noise associated with other construction, operation and maintenance and decommissioning activities: behavioural impacts	✓	✓	✓	
Underwater noise due to the presence of vessels: auditory injury	✓	✓	✓	There will be an increase in the number of vessels associated with offshore construction, O&M and decommissioning activities. Vessel movements to and from any port will be incorporated within existing vessel routes as far as possible (**Table 10.6 M-13**) and therefore any increase in disturbance as a result of underwater noise from vessels during construction will be predominantly within the WDA. Large vessels, typically used in construction, are unlikely to cause any physical or auditory damage to marine mammals (Malme et al., 1989; Richardson et al., 1995). However, noise levels, within the immediate vicinity of the vessel, could cause disturbance to marine mammals, depending on ambient noise levels (Brandt et al., 2018; Graham et al., 2019). The presence of vessels is likely to cause displacement of marine mammals, however the disturbance would be short-lived and temporary. Therefore, marine mammals would be expected to return to the area once disturbance has ceased or they become habituated to the sound. Therefore, the potential for auditory injury and disturbance due to the presence of construction vessels has been **scoped into** the EIA. However, the potential for auditory injury may be later ruled out based on underwater noise modelling results showing extremely localised areas of potential effect.
Underwater noise due to the presence of vessels: behavioural impacts	✓	✓	✓	
Barrier effects due to underwater noise	✓	✓	✓	Underwater noise during construction, O&M and decommissioning could have the potential to create a barrier effect preventing movement or migration of marine mammals between important feeding and/or breeding areas, or potential increased swimming distances if marine mammals avoid the area and go around it. The marine mammal species that could potentially be most affected by barrier effects from underwater noise are harbour porpoise accessing foraging areas, baleen whales and dolphin species if they are moving between areas, and grey and harbour seal as they move to and from haul-out sites. Harbour porpoise have relatively high daily energy demands and need to capture enough prey to meet daily energy requirements. It has been estimated that, depending on the environmental conditions, harbour porpoise can rely on stored energy (primarily blubber) for three to five days, depending on body condition (Kastelein et al., 1997). Underwater noise during construction could have the potential to create a barrier effect, preventing movement or migration of grey and harbour seals between important feeding and / or breeding areas, or potentially increasing swimming distances if seals avoid the site and go around it. Therefore, the potential for barrier effects which could restrict access to foraging areas and could have implications for individual animals and has been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped In (✓) / Scoped Out (x)			Justification
	C	O&M	D	
Vessel interaction (increase in risk of collision)	✓	✓	✓	The additional vessel movements associated with construction, O&M and decommissioning could have the potential to increase collision risk to marine mammals. Despite the potential for marine mammals to detect and avoid vessels, strikes are known to occur, possibly due to distraction whilst foraging and socially interacting, or due to the mammals' inquisitive nature (Wilson et al., 2007). Therefore, this potential effect has been **scoped in** for further assessment. Embedded mitigation as described in **Table 10.6** would reduce the impact of vessel interaction with marine mammals. The increased risk for any vessel interaction will predominantly be within the WDA. Therefore, the impact and effect from vessel interaction (increase in risk of collision) has been **scoped into** the EIA, for all phases.
Disturbance at seal haul-out sites	✓	✓	✓	Increased activity near seal haul-out sites, and vessel transits to and from the WDA could have the potential to disturb seals. The Project's construction and O&M port(s) are not yet known, however, there is the potential for vessel transits to cause disturbance, depending on the location of the port(s). There is no potential for any direct disturbance as a result of activities within the WDA due to the distance to the nearest known seal haul-out sites. **Appendix F Marine Mammals and Turtles Baseline** provides distances to the nearest haul-out sites, with the closest being 14.3 km for grey seal and for harbour seal. In Scotland there are approximately 194 protected seal haul out sites, and 57 of them are within the Hebrides. There are 17 protected seal-haul out sites within 80 km of the WDA, some of which are a resting haul-out sites whilst seals are in transit and others are pupping sites. The closest pupping site being Oronsay which is 14.3 km from the WDA at its nearest point. The designated seal haul-out sites within 80 km of the WDA will be considered in the EIAR where more information will be provided such as whether it is a pupping site, to which seal species it is relevant, alongside other relevant details. Considering the proximity of shipping channels to and from existing ports, it is likely that seals hauled-out along these routes and in the area of the port(s) would be habituated to the noise, movements and presence of vessels, however there is potential for disturbance at seal haul-out sites from vessels transiting to and from the WDA. Therefore, the impact and effect from disturbance at seal haul-out sites has been **scoped into** the EIA, for all phases.
Changes to prey resources	✓	✓	✓	The potential to injure or displace prey species during construction, O&M and decommissioning can result from physical disturbance and temporary loss of seabed habitat; increased Suspended Sediment Concentrations (SSCs) and sediment re-deposition; changes in water quality and underwater noise (that could lead to mortality, physical injury, auditory injury or behavioural responses) as stated in **Chapter 9 Fish (Including Basking Shark) and Shellfish ecology**. Therefore, the potential impact and effects from changes to marine mammal prey resources has been **scoped into** the EIA, for all phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning respectively				

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10.10 POTENTIAL CUMULATIVE EFFECTS

492. There is potential for cumulative effects to arise as a result of the WDA and OfTDA in which other projects or plans could act collectively to affect marine mammal receptors. The potential for projects to act cumulatively on marine mammals will be considered in the context of the likely spatial and temporal extent of effects.

493. Potential impacts to be taken forward for consideration in the Cumulative Effects Assessment (CEA) will be in line with those described for the WDA-alone assessment and OfTDA appraisal. Impacts assessed as negligible adverse significance (or lower) will not be taken forward to CEA and it is possible that some will be screened out on the basis that the impacts are highly localised or the risk of effects occurring is reduced, given management measures will be in place for the Project and other plans and projects. The plans and projects that will be considered in the CEA are those that:

- Are located in the relevant marine mammal MU; and
- Have a potential cumulative effect pathway during the construction, O&M or decommissioning phases.

494. The marine mammal CEA will consider projects, plans and activities which have sufficient information available to undertake the assessment, following a tiered approach to the screening as set out in **Appendix G Marine Mammals and Turtles Approach to Assessment**.

495. There will be an inherent level of uncertainty associated with the CEA. It is important to note that in the case of any significant cumulative effects being identified, it may be the result of an overly precautionary worst-case (precaution built on precaution), and this will be highlighted within the EIAR and during discussions with stakeholders. Taking the worst-case for all aspects can result in an unrealistic scenario being assessed. Therefore, the assessment will be based on the most realistic worst-case scenario. The approach to the CEA is described in **Appendix G Marine Mammals and Turtles Approach to Assessment**.

10.11 POTENTIAL TRANSBOUNDARY IMPACTS

496. The highly mobile nature of marine mammal species means that there are potential transboundary impacts. The potential for transboundary impacts will be addressed by considering the reference populations and potential linkages to non-UK sites as identified through telemetry studies.

497. Transboundary effects will be assessed, as with the other cumulative effects, for the relevant marine mammal MU's. The potential for transboundary effects will be addressed by considering the reference populations and potential linkages to international designated sites as identified through telemetry studies for seals and ranges and movements of cetacean species.

498. The assessment of the effect on the integrity of the transboundary European sites as a result of impacts on the designated marine mammal populations will be undertaken in the Report to Inform Appropriate Assessment.

10.12 APPROACH TO IMPACT ASSESSMENT

499. The impact assessment for marine mammals will follow the methodology and approach set out in **Section 10.12.1**. Additionally, **Appendix G Marine Mammals and Turtles Approach to Assessment** sets out the proposed approach to assessment for the marine mammal impacts scoped in.

10.12.1 Impact Assessment Methodology

500. The EIA will use a matrix approach to assess the potential impacts and effects on marine mammals following best practice and relevant EIA guidance. The identification of each potential impact and effect has been determined based on experience and using expert judgement.

501. An assessment of the significance of effects will be made based on the sensitivity, value and magnitude of impact, the definitions of which are outlined below. Where possible, the magnitude of impact will be quantified.

502. The assessments will be undertaken in accordance with the relevant standards, legislation and guidance.

10.12.2 Magnitude of Impact

503. The thresholds for defining the potential magnitude of impact that could occur from a particular impact will be determined using expert judgement, current scientific understanding of marine mammal population biology, and JNCC et al., (2010) draft guidance on disturbance to EPS. The JNCC et al., (2010) EPS draft guidance suggests definitions for a 'significant group' of individuals or proportion of the population for EPS.

504. The JNCC et al. (2010) draft guidance provides some indication on how many animals may be removed from a population without causing detrimental effects to the population at Favourable Conservation Status. The JNCC et al., (2010) draft guidance also provides limited consideration of temporary effects, with guidance reflecting consideration of permanent displacement.

505. Temporary impacts are considered to be of medium magnitude at greater than 5% of the reference population (**Table 10.8**). The JNCC et al. (2010) draft guidance considered 4% as the maximum potential growth rate in harbour porpoise, and the 'default' rate for cetaceans. Therefore, beyond natural mortality, up to 4% of the population could theoretically be permanently removed before population growth could be halted. In assigning 5% to a temporary impact in this assessment, consideration is given to uncertainty of the individual consequences of temporary disturbance (**Table 10.8**).

506. Permanent impacts with a greater than 1% of the reference population being affected within a single year are considered to be high in magnitude in this assessment (**Table 10.8**). This is based on Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) (2015) and Department for Environment, Food and Rural Affairs (Defra) advice (Defra, 2003) relating to impacts from fisheries bycatch (i.e. a permanent effect) on harbour porpoise. A threshold of 1.7% of the relevant harbour porpoise population above which a population decline is inevitable has been agreed with ASCOBANS, with an intermediate precautionary objective of reducing the impact to less than 1% of the population (Defra, 2003; ASCOBANS, 2015).

Table 10.8 Definitions of levels of magnitude for marine mammals

Magnitude	Definition
High	• Permanent irreversible change to exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. • Assessment indicates that more than 1% of the reference population are anticipated to be exposed to the impact. OR • Long-term impact for 10 years or more, but not permanent (e.g. limited to operational phase of the Project). • Assessment indicates that more than 5% of the reference population are anticipated to be exposed to the impact. OR • Temporary impact (e.g. limited to the construction phase of development) to the exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. • Assessment indicates that more than 10% of the reference population are anticipated to be exposed to the impact.
Medium	• Permanent irreversible change to exposed receptors or feature(s) of the habitat of particular importance to the receptor. • Assessment indicates that between 0.01% and 1% of the reference population anticipated to be exposed to impact. OR • Long-term impact for 10 years or more, but not permanent (e.g. limited to operational phase of the Project). • Assessment indicates that between 1% and 5% of the reference population are anticipated to be exposed to the impact. OR • Temporary impact (e.g. limited to the construction phase of development) to the exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. • Assessment indicates that between 5% and 10% of the reference population anticipated to be exposed to impact.
Low	• Permanent irreversible change to exposed receptors or feature(s) of the habitat of particular importance to the receptor. • Assessment indicates that between 0.001% and 0.01% of the reference population anticipated to be exposed to impact. OR • Long-term impact for 10 years or more, but not permanent (e.g. limited to operational phase of the Project). • Assessment indicates that between 0.01% and 1% of the reference population are anticipated to be exposed to the impact. OR • Intermittent and temporary impact (e.g. limited to the construction phase of development) to the exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. • Assessment indicates that between 1% and 5% of the reference population anticipated to be exposed to impact.

Magnitude	Definition
Negligible	• Permanent irreversible change to exposed receptors or feature(s) of the habitat of particular importance to the receptor. • Assessment indicates that less than 0.001% of the reference population anticipated to be exposed to impact. OR • Long-term impact for 10 years or more (but not permanent, e.g. limited to lifetime of the Project). • Assessment indicates that less than 0.01% of the reference population are anticipated to be exposed to the impact. OR • Intermittent and temporary impact (limited to the construction phase of development or Project timeframe) to the exposed receptors or feature(s) of the habitat which are of particular importance to the receptor. • Assessment indicates that less than 1% of the reference population anticipated to be exposed to impact.

10.12.3 Sensitivity

507. The sensitivity of a receptor is determined through its ability to accommodate change and on its ability to recover if it is affected. The sensitivity level of marine mammals (**Table 10.9**) to each type of impact will be justified within the EIAR and is dependent on the following factors:

- Adaptability – The degree to which a receptor can avoid or adapt to an effect;
- Tolerance – The ability of a receptor to accommodate temporary or permanent change without a significant adverse effect;
- Recoverability – The temporal scale over and extent to which a receptor will recover following an Effect; and
- Value – A measure of the receptor importance, rarity and worth (as outlined in **Section 10.12.4**).

Table 10.9 Definitions of sensitivity levels for marine mammals

Sensitivity	Definition
High	Individual receptor has very limited capacity to avoid, adapt to, tolerate or recover from the anticipated impact.
Medium	Individual receptor has limited capacity to avoid, adapt to, tolerate or recover from the anticipated impact.
Low	Individual receptor has some tolerance to avoid, adapt to, tolerate or recover from the anticipated impact.
Negligible	Individual receptor is generally tolerant to and can tolerate or recover from the anticipated impact.

10.12.4 Value

508. In addition to sensitivity, for some assessments the ‘value’ of a receptor may also be an important element to add where relevant – for instance if the receptor is designated or has an economic value.

509. It is important to understand that high value and high sensitivity are not necessarily linked within a particular impact. A receptor could be of high value but have a low or negligible physical/ecological sensitivity to an effect. Similarly, low value does not equate to low sensitivity and is judged on a receptor-by-receptor basis.

510. In the case of marine mammals, most species are protected by several international commitments as well as European and UK law and policy.

511. All cetaceans in UK waters are listed as EPS and, therefore, are internationally important. Harbour porpoise, bottlenose dolphin, grey seal and harbour seal are also afforded international protection through the designation of Natura 2000 sites. As such, all species of marine mammal can be considered to be of high value.

512. **Table 10.10** provides definitions for the value afforded to a receptor based on its legislative importance. The value will be considered, where relevant, as a modifier for the sensitivity assigned to the receptor, based on expert judgement.

Table 10.10 Definitions of the different value levels for marine mammals

Value	Description	Definition
High	Internationally or nationally important.	Internationally protected species that are listed as a qualifying interest feature of an internationally protected site (i.e. Annex II protected species designated feature of a European designated site) and protected species (including European Protected Species (EPS)) that are not qualifying features of a European designated site.
Medium	Regionally important or internationally rare.	Protected species that are not qualifying features of a European designated site but are recognised as a Biodiversity Action Plan priority species either alone or under a grouped action plan and are listed on the local action plan relating to the marine mammal Study Area.
Low	Locally important or nationally rare.	Protected species that are not qualifying features of a European designated site and are occasionally recorded within the Study Area in low numbers compared to other regions.
Negligible	Not considered to be particularly important or rare.	Species that are not qualifying features of a European designated site and are never or infrequently recorded within the Study Area in very low numbers compared to other regions.

10.12.5 Effect Significance

513. Following the identification of receptor sensitivity and the magnitude of the impact, the effect significance will be determined using expert judgement. The probability of the impact occurring is also considered in the assessment process. If doubt exists concerning the likelihood of occurrence or the prediction of an impact, the precautionary approach is taken to assign a higher level of probability to adverse effects.

514. The matrix provided in **Table 10.11** will be used as a framework to aid determination of the impact assessment. Definitions of significance of effect are provided in **Table 10.12**. For the purposes of the EIA and specifically the marine mammal assessment, ‘major’ and ‘moderate’ effects are deemed to be significant. However, whilst ‘minor’ effects would not be deemed significant in their own right, they may contribute to significant effects cumulatively or through inter-relationships.

Table 10.11 Effect significance matrix

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Table 10.12 Effect significance definitions

Significance	Definition
Major	Very large or large change in receptor, either adverse or beneficial, which are important at a population (national or international) level because they contribute to achieving national or regional objectives, or, expected to result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate or large change in receptor, which may to be important considerations at national or regional population level. Potential to result in exceedance of statutory objectives and / or breaches of legislation.
Minor	Small change in receptor, which may be raised as local issues but are unlikely to be important at a regional population level.
Negligible	No discernible change in receptor.

10.12.6 Consideration of Mitigation and Residual Effects

515. Following initial assessment, if the effect does not require additional mitigation (or none is possible) the residual effect will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual effect.

10.13 SCOPING QUESTIONS TO CONSULTEES

516. The following questions are posed to consultees to help them frame and focus their response to the marine mammals chapter which will in turn inform the Scoping Opinion. As described in **Table 10.2**, responses to a number of these questions were provided by NatureScot and Argyll and Bute Council following the Scoping Workshop however these have been retained in case other stakeholders wish to provide further feedback that can be used to inform the Scoping Opinion:

- Do agree with the proposed data sources? Are there any further data sources to be aware of?
- Do you agree with the marine mammal species to be scoped in, the reference populations, and the densities to be used for assessments?
- Do you agree with the potential impacts scoped in and out?
- Do you advise to use the updated draft marine mammal underwater noise thresholds from National Marine Fisheries Service (NMFS) (2024), or the thresholds published in Southall et al., (2019)?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on marine mammal receptors?
- Do you agree with the approach to underwater noise modelling, and the thresholds to be used (see **Appendix G Marine Mammals and Turtles Approach to Assessment**)?
- Do you agree with the proposed approaches to assess the potential for disturbance due to underwater noise?

- Do you agree with the approach to cumulative assessments, and the use of population modelling?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

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11 OFFSHORE ORNITHOLOGY

11.1 INTRODUCTION

517. This chapter considers the scope of potential impacts and likely significant effects (LSE) on offshore ornithology receptors that may arise from the construction, operation and maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

518. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on offshore ornithology receptors in the WDA Environmental Impact Assessment (EIA).

519. This chapter is supported by, and should be read in conjunction with, **Appendix I Offshore Ornithology Methods Statement** and **Appendix J Ornithology Design-Based Analyses Results**.

520. In addition, this chapter should be read in conjunction with the following chapters of the Scoping Report:

- **Chapter 9 Fish (Including Basking Shark) and Shellfish Ecology** – potential impacts on fish and shellfish ecology receptors have the potential to cause indirect effects (e.g. through changes to prey resources) on offshore ornithology receptors;
- **Chapter 12 Commercial Fisheries** – potential impacts on commercial fisheries receptors have the potential to cause indirect effects (e.g. through changes to prey resources) on offshore ornithology receptors.

521. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

522. The EIA for the WDA will follow the advice set out in the suite of offshore ornithology Guidance Notes published by NatureScot[17]. Further details of the approach and specific reference to each of these documents is provided in **Appendix I Offshore Ornithology Methods Statement**.

[17] https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development

11.2 LEGISLATION, POLICY AND GUIDANCE

523. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 11.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for offshore ornithology.

Table 11.1 Summary of relevant legislation, policy and guidance for offshore ornithology

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Legislation	
European Commission Directive 2009/147/EC (codified version of 79/409/EC) on the Conservation of Wild Birds (the 'Birds Directive') (2009)	The Birds Directive provides legal protection for all naturally occurring wild bird species present in the European Union (EU) and their most important habitats. The Birds Directive requires all Member States to protect all wild bird species and protect and restore their habitats. The Birds Directive was implemented in Scotland by the Nature Conservation (Scotland) Act (2004) and the Offshore Regulations (2017). Potentially negative effects on birds protected under the Birds Directive will be included in the Environmental Impact Assessment (EIA).
European Commission Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') (1992)	The Habitats Directive aims to protect over a thousand species, including mammals, reptiles, amphibians, fish, invertebrates, and plants, and 230 characteristic habitat types. The overall objective is to ensure that these species and habitat types are maintained, or restored, to a favourable conservation status within the EU. In addition to halting the further decline or disappearance of these species and habitats, the Directive aims to allow them to recover and thrive over the long-term. The Birds Directive was implemented in Scotland by the Nature Conservation (Scotland) Act (2004) and the Offshore Regulations (2017). Potentially negative effects on birds protected under the Birds Directive will be included in the EIA. Following the United Kingdom's (UK's) exit from the EU, the implementation of the European Habitats Directive and European Birds Directive has changed. Post-Brexit, the UK has its own framework for protecting habitats and wildlife. In summary, the EU directives have been integrated into UK law through domestic legislation (see below), and the UK government is responsible for enforcing and further developing policies for habitat and species protection post-Brexit. The changes reflect a shift to a UK-specific legal framework while maintaining the objectives of the original EU Directives.
The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)	These Regulations apply on land in Scotland, and in Scottish inshore waters (the area of sea adjacent to Scotland from 0 to 12 nautical miles (nm)). Potentially negative effects on birds protected under the Habitats Regulations will be included in the EIA.
The Conservation of Offshore Marine Habitats and Species Regulations (2017)	These Regulations apply on land in Scotland, and in Scottish inshore waters (the area of sea adjacent to Scotland from 0 to 12 nm). Potentially negative effects on birds protected under the Habitats Regulations will be included in the Report to Inform Appropriate Assessment (RIAA) and are considered in the **HRA Screening Report**.
Ramsar Convention on Wetlands of International Importance (1971)	Ramsar Sites are wetlands of international importance that have been designated under the criteria of the Ramsar Convention on Wetlands for containing representative, rare or unique wetland types or for their importance in conserving biological diversity. Potentially negative effects on Ramsar sites will be included in the EIA. UK and Scottish Government policy is to treat Ramsar sites and species in the same manner as Special Protection Areas (SPA) and so will be considered in this way in the EIA.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
The Convention on the Conservation of Migratory Species of Wild Animals (the 'Bonn Convention') (1979)	As an environmental treaty under the aegis of the United Nations Environment Programme, the Bonn Convention provides a global platform for the conservation and sustainable use of migratory animals and their habitats. The Bonn Convention brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. Potentially negative effects on migratory species populations will be included in the EIA and RIAA.
The Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') (1979)	The Bern Convention aims to conserve wild flora and fauna and their natural habitats, promote co-operation between states, and give particular attention to endangered and vulnerable species including endangered and vulnerable migratory species. The Convention sets out obligations for the protection of certain plants and animals, including prohibitions on certain methods of killing, capture or exploitation. An ecological network made up of Areas of Special Conservation Interest was established in 1989, becoming Special Areas of Conservation (SAC) or SPA under the Birds and Habitats Directives. Therefore, potentially negative effects on these sites for birds will be included in the EIA and RIAA.
The Wildlife and Countryside Act (as amended) (1981)	The Wildlife and Countryside Act 1981 was enacted primarily to implement the Birds Directive and Bern Convention in Great Britain. The Wildlife and Countryside Act provides protection to all birds, with increased protection afforded to those listed under Schedule 1 of the Act. Potentially negative effects on bird species protected by the Wildlife and Countryside Act will be included in the EIA.
Nature Conservation (Scotland) Act (2004)	Under the Nature Conservation (Scotland) Act 2004, all public bodies in Scotland are required to further the conservation of biodiversity when carrying out their responsibilities. Potentially negative effects on birds and their habitats protected by the Act will be included in the EIA. Also see **Appendix H Nature Conservation Marine Protected Area Screening**.
Marine (Scotland) Act (2010)	The Marine (Scotland) Act provides a framework to help balance competing demands on Scotland's seas. It introduced a duty to protect and enhance the marine environment. Potentially negative effects on birds and their habitats protected by the Act will be included in the EIA.
Policy	
Scotland's National Marine Plan (Scottish Government, 2015)	Scotland's National Marine Plan (NMP) sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 nm. **The key references are:** **GEN 9 Natural heritage**: *Development and use of the marine environment must: (a) Comply with legal requirements for protected areas and protected species…* '
National Planning Framework 4 (Scottish Government, 2023)	The National Planning Framework 4 (NPF4) is part of the Scottish Government Economic Strategy. NPF4 highlights the importance of sustainable development and the need to facilitate adaptation to climate change and lower greenhouse gas emissions. NPF4 creates stronger links between climate change and the biodiversity crisis. NPF4 highlights the need for developments to conserve, restore and enhance biodiversity. **Key references include:** **Policy 3: Biodiversity**– *"…d) Any potential adverse impacts, including cumulative impacts, of development proposals on biodiversity, nature networks and the natural environment will be minimised through careful planning and design. …'*

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Scottish Biodiversity Strategy to 2045	The Strategy sets out an ambition for Scotland to be Nature Positive by 2030, and to have restored and regenerated biodiversity across the country by 2045.
Sectoral Marine Plan – Offshore Wind Energy (Scottish Government, 2020)	The Sectoral Marine Plan (SMP) – Offshore Wind Energy (OWE) identified 15 Plan Options (POs) around Scotland's marine zone. Within these Options, the Sustainability Appraisal assessed a potential impact of up to 10 Gigawatts (GW). A key part of the Plan implementation includes the application of an Iterative Plan Review (IPR) process (identified as a plan-level mitigation measure within the Strategic Environmental Assessment and Habitats Regulations Appraisal reports (2019)). This process allows for new evidence through, for example, scientific research and/or monitoring programmes to be considered and incorporated into the Plan where appropriate. The IPR is currently being reviewed and updated with all ScotWind and INTOG sites and is expected to be published in 2025.
Sectoral Marine Plan – Roadmap of Actions (Scottish Government, 2022)	The Roadmap of Actions was required to address the evidence gaps identified in the Sectoral Marine Plan and its HRA to provide the evidence base to re-assess impacts to seabird populations within sites under the highest levels of ornithological constraint as part of the IPR process. Key outcomes included: • Reduced uncertainty over connectivity between plan options and designated features of SPAs in the breeding and non-breeding seasons; • Reduced uncertainty over collision, displacement, and barrier effects in each PO; • Understanding of population-level impacts on the populations concerned; and • Understanding the contribution of marine spatial planning and mitigation to reducing impacts and unlocking plan option potential for offshore windfarms.
The Marine Policy Statement (UK Government, 2011)	**The key reference is:** **3.3.24 -** *"Certain bird species may be displaced by offshore wind turbines, which also have the potential to form barriers to migration or present a collision risk for birds."* Scoping of potential impacts from the WDA on offshore ornithology receptors is provided in this chapter.
Argyll and Bute Local Development Plan 2 (Argyll and Bute Council, 2024)	**The key references are:** **Policy 28: Supporting Sustainable Aquatic and Coastal Development states** - *"Proposals for marine and freshwater aquaculture, marine and coastal developments will be supported where it can be demonstrated that there will be no significant adverse effects, directly, indirectly or cumulatively on i) Designated sites, habitats and species for nature conservation, (including Priority Marine Features, wild migratory salmonids, and European Protected Species)."* **Policy 73: Development Impact on Habitats, Species and Biodiversity – "***When considering development proposals Argyll and Bute Council will give full consideration to the legislation, policies and conservation objectives, contained within the following: i) Wildlife and Countryside Act 1981; (and as amended by the Nature Conservation (Scotland) Act 2004); Species listed on Schedules 1, 5, 7, 8, 9 and 14"* **Policy 74: Development Impact on Sites of International Importance –** *"Unless development is directly connected with or necessary to their conservation, proposals likely to have a significantly adverse effect, including cumulative, upon an existing or proposed Special Protection Area, existing or candidate Special Area of Conservation, or Ramsar Site (i.e. European Sites), including development outwith the site, shall require appropriate assessment"*
Guidance	
NatureScot Guidance Note 1	Guidance to support Offshore Wind Applications: Marine Ornithology – Overview.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
NatureScot Guidance Note 2	Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting.
NatureScot 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.
NatureScot 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.
NatureScot Guidance Note 5	Guidance to support Offshore Wind Applications: Recommendations for marine bird population estimates.
NatureScot Guidance Note 6	Guidance to support Offshore Wind Applications - Marine Ornithology Impact Pathways for Offshore Wind Developments.
NatureScot Guidance Note 7	Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds.
NatureScot 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 Guidance Note 9	Guidance to support Offshore Wind Applications: Seasonal periods for Birds in the Scottish Marine Environment.
NatureScot Guidance Note 11	Guidance to support Offshore Wind Applications: Marine Ornithology - Recommendations for Seabird Population Viability Analysis (PVA).
CIEEM (2022)	Guidelines For Ecological Impact Assessment in the UK And Ireland: Terrestrial, Freshwater, Coastal and Marine. Updated April 2022.
Furness et al. (2013)	Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management, 119, 56-66.
Furness (2015)	Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales. Natural England Commissioned Reports.

11.3 CONSULTATION

524. This offshore ornithology chapter has been informed by engagement with stakeholders, including those listed below:

- Department of Agriculture, Environment and Rural Affairs (DAERA);
- Marine Directorate - Licensing Operations Team (MD-LOT);
- NatureScot; and
- Royal Society for the Protection of Birds (RSPB) Scotland.

525. As part of the consultation process, the Applicant presented the approach to assessment to stakeholders in order to offer transparency around the scoping methodology and rationale, capture stakeholder advice and guidance, and incorporate stakeholder feedback, where appropriate. A summary of the approach to stakeholder communication and consultation is outlined in **Chapter 5 Consultation and Stakeholder Engagement** with each engagement activity being listed within **Appendix L Stakeholder Engagement Log**.

526. The consultation outcomes in relation to offshore ornithology are outlined in **Table 11.2**, which summarises stakeholder feedback, outlines how the Applicant has responded to the feedback received, and details how it has been considered within this chapter and/or will be used to inform the EIA process and preparation of the EIAR.

527. In addition to the engagement outlined in **Table 11.2,** the points of agreement between the Applicant and NatureScot are listed below:

- That all potential impacts for the WDA have been taken into account; and
- The impact assessment should be based only on the Project's Digital Aerial Surveys (DAS) data, and that Third-Party DAS data should be excluded from the impact assessment (i.e. third-party data should only be used to inform baseline characterisation).

528. Consultation with regard to this topic will be ongoing throughout the EIA process. The Applicant welcomes the opportunity to work with stakeholders to deliver a proportionate and robust EIA.

Table 11.2 Summary of consultation relevant to offshore ornithology

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	14 June 2023: Expert Topic Group (ETG) Meeting 1	In relation to NatureScot Guidance Note 2, it is acknowledged that the possible co-variates include the 'distance to coast', however NatureScot advised that this covariate is not relevant for MachairWind.	The Applicant notes that, as agreed by NatureScot, given the complex coastline in the region around the WDA it would likely be very challenging to include the 'distance to coast' co-variate in model-based analyses, as such it will not be used in the model-based (MRSea) analyses.
		In relation to potential collision mortality from the Project alone and cumulatively, NatureScot highlighted that the migratory route analysis of terrestrial migratory birds (including swans and geese) is going to be important for MachairWind due to the project being in close proximity to Islay which hosts known migratory species.	The Applicant has completed a screening of potential connectivity for terrestrial migratory birds that are features of SPAs (see the Habitats Regulations Appraisal Screening (Royal HaskoningDHV and MacArthur Green, 2024)).
		NatureScot queried whether there are similarities in the design of surveys undertaken by the Project and Third-Party data. NatureScot also highlighted that the addition of the third-party data is beneficial and that it would be useful for NatureScot to see both datasets.	The Applicant confirmed the survey methods were very similar and a full description of each will be provided in the EIAR. Both surveys were completed by APEM. The Applicant will provide a clear comparison of both datasets using both design-based and model-based analyses to stakeholders prior to the impact assessment being undertaken.
Royal Society for the Protection of Birds Scotland	14 June 2023: ETG Meeting 1	The Applicant has collected survey data from the Option Agreement Area (OAA) and a 4 km buffer. It has also obtained data from a third-party. RSPB queried whether a comparison has been undertaken of the species numbers identified in the Project's DAS and Third-Party DAS during the months where they overlap.	The Applicant will undertake this comparison and share the results with stakeholders, including RSPB, prior to the impact assessment being undertaken.
		In relation to the collating of available seabird colony count data from colonies within the recommended species-specific foraging ranges to inform baseline characterisation and impact assessment, RSPB highlighted that annual seabird counts are being undertaken on Colonsay and Rathlin Island.	The Applicant will consult the Seabird Monitoring Plan database for the most up to date colony count data prior to the impact assessment being undertaken.
NatureScot	23 January 2024: ETG Meeting 2	In relation to the Applicant's query regarding whether the Project DAS on 21 March 2022 could be used as a sample for February	The Applicant will use the 21 March 2022 data as a March sample, not a February sample, for impact assessment.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		2022, NatureScot advised that the data should not be used for February, given the date provided (21st) is too late into March.	
		In relation to the Applicant's query regarding whether the survey on 11 July 2022 could be used as the sample for Collision Risk Modelling (CRM) analysis for June 2022, NatureScot advised that the data point is not appropriate for use for June due to different behaviours between these months.	The Applicant will use the 11 July 2022 survey as a July sample, not a June sample, in the impact assessment.
		In relation to the Applicant's query regarding whether the survey on the 04 November 2022 can be used as the sample for CRM analysis for October 2022, NatureScot advised that the November 2022 survey is appropriate to use for the month of October since it was undertaken early in the month (4th).	The Applicant will use the 04 November 2022 sample as the October sample in the impact assessment.
		In relation to the Applicant's query regarding whether there is sufficient time between the surveys on 21 March 2022 and 28 March 2022 to consider these to be independent samples, NatureScot advised that there is a possibility that the two surveys are independent, and the two datasets should be explored to confirm this.	The Applicant confirmed that analyses of these data will explore the independence (or lack thereof) in the data.
		In relation to the Applicant's query regarding whether NatureScot had any concerns regarding survey 24, which was undertaken across two days (19 and 23 March 2023), NatureScot advised that the gap between the samples is too great for them to be considered together as a single sample.	The Applicant has checked the March 2023 data and proposes that it be used to inform baseline characterisation but not the impact assessment, given its exclusion has no material effect on predicted impacts. This matter will be discussed with NatureScot at the ETG 3 meeting on 02 October 2024.
		In relation to the Applicant's query regarding whether the two surveys on the 02 and 14 December 2022 would be considered representative of the season as December 2021 was missed, NatureScot advised the Applicant to consider using the third-party data to provide seasonal coverage.	The impact assessment will assess whether December is a peak month in the displacement assessment and the Applicant will consider using the third-party data if this is appropriate.
		In relation to the Applicant's query regarding whether the non-breeding season 2021/22 could be considered complete without	The Applicant will analyse these data and discuss the results with stakeholders prior to impact assessment.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		a December sample, NatureScot advised that the December 2021 third-party data should be reviewed to see if it represented the peak value. NatureScot would have an issue if it was the peak, there would not be an issue if it was not.	
		In relation to the Applicant's query regarding MRSea being unable to provide a sample within a month (for sCRM) or a complete season (for matrix displacement assessment), and whether design-based results should be used for all months/seasons, or if gaps should be filled with design-based results, NatureScot advised that a model-based approach is most suitable and that although advice is that MRSea should be used where possible, it may be that, because of the data held by the Applicant , other models could be more appropriate.	Following analyses of baseline data, the gaps in available model-based analysis results will be highlighted and the Applicant will share these with stakeholders prior to impact assessment being undertaken.
		Regarding the Applicant's query relating to the use of MRSea for birds in flight, and whether environmental covariates should be used, and if these should differ between seasons, NatureScot advised that MRSea should be used for birds in flight using environmental co-variates that best explain the variance in the model.	The Applicant confirmed that MRSea will be run for birds in flight with environmental co-variates.
		Regarding the NatureScot Guidance Note 8 recommendation that a "mean seasonal peak" population estimate is used in the assessment of potential displacement impacts using the "Matrix approach", NatureScot confirmed that the approach to calculation of the "mean seasonal peak" population estimates presented by the Applicant in its hypothetical example had been calculated correctly.	The approach to calculation of "mean seasonal peak" in NatureScot Guidance Note 8 can be interpreted in different ways. The Applicant will calculate mean seasonal peak estimates using the method presented in its hypothetical example to NatureScot and use these in the displacement assessment.
		Regarding the approach to apportioning raw observations from the Project DAS not identified to species level, NatureScot indicated they were content with the Applicant's approach to shearwater species however will provide further feedback in relation to tern and storm petrel species.	Eight unidentified shearwater species were observed. These are assigned to Manx shearwater as this was the only small shearwater recorded to species level (other small shearwaters are likely to be extremely rare). The Applicant is proposing to assign all storm petrel species to European storm petrel and to assign unidentified tern

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
			species as 'comic' tern since the only terns identified were common and Arctic terns. Birds not identified to species level will be assigned to a species based on the relative proportions of the positively identified species, where possible. The Applicant will seek further feedback and to agree on this approach with NatureScot at the ETG meeting on 02 October 2024.
NatureScot	01 May 2024: Offshore Ornithology Scoping workshop	NatureScot confirmed that the Project's DAS was sufficient to describe the baseline environment in relation to the Windfarm Development Area (WDA). However, the March 2023 survey data needs to be compared with other months to make sure it is consistent as surveys were split over two separate days.	The Applicant notes that NatureScot have confirmed the Project DAS data is sufficient to describe the baseline environment in relation to the WDA. As noted above, the Applicant has checked the March 2023 data and proposes that it be used to inform baseline characterisation but not the impact assessment given its exclusion has no material effect on predicted impacts. This matter will be discussed at the ETG 3 meeting on 02 October 2023.
		In relation to the existing data sources to be used to inform baseline characterisation in the Environmental Impact Assessment Report (EIAR) (see **Section 11.4**), NatureScot indicated that the Royal Society for the Protection of Birds (RSPB) Storm petrel *(Hydrobates pelagicus)* tagging study on the Treshnish Isles should be included. NatureScot also noted that the Joint Nature Conservation Committee (JNCC) seabird demographic parameters review report is due to be published.	The Applicant will summarise available information from the RSPB tracking of storm petrels, which will be used to inform baseline characterisation. Updated seabird demographic parameters will be used in the impact assessment and Population Viability Analysis (PVA).
		NatureScot confirmed agreement that the impact assessment should be based only on the Project's DAS data, and that Third-Party DAS data should be excluded from the impact assessment (i.e. third-party data should only be used to inform baseline characterisation).	The Applicant will base the impact assessment on the Project's DAS data only and clearly and transparently describe the use of Third-Party DAS data in the baseline characterisation.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		Regarding whether NatureScot has any guidance or advice on the assessment of the effects of Highly Pathogenic Avian Influenza (HPAI) in EIA, NatureScot advised that recent counts, by RSPB, from the relevant HPAI affected colonies are taken account of.	The Applicant confirmed that recent counts of relevant seabird colonies will be used in the qualitative assessment of the effects of HPAI on seabirds.
		NatureScot indicated ScotMER migratory package 3 will be in the public domain soon.	ScotMER migratory package 3 will be followed in the assessment if it is available in time for the application.
NatureScot	23 May 2024: Offshore Ornithology Scoping Workshop – Written feedback	In relation to the question posed in the Scoping Workshop *'Do you agree with the use of 30 samples of aerial bird densities being used in collision risk modelling or should aerial bird densities from incomplete seasons be excluded from the analyses?',* NatureScot guidance recommends that full seasons should be used, notably for distributional responses, to ensure that mean peaks are not skewed if the months with peak counts are not surveyed. For CRM this is of less concern, however due to the survey period coinciding with high environmental variability as a result of the ongoing HPAI outbreak and other mass mortality events, concerns remain in applying incomplete seasons. If the densities from months in incomplete seasons are significantly different to the same month in other years (i.e. comparing all July densities), or skew the mean density taken forward, then NatureScot would have concerns with these being used. NatureScot advise that this is looked at for the relevant species and months and only include the months where this is not the case.	Only complete seasons will be included in the assessment of impact, though all data collected will be used to inform the baseline conditions in the WDA. The decision making on which monthly density and/or abundance estimates are used in the impact assessment will be clearly and transparently shown. These will be discussed with NatureScot through the ETG meetings.
		In relation to the question posed in the Scoping Workshop *'Do you agree with the scoping out of the 16 migratory species listed?',* NatureScot stated they are largely content with these migratory species being scoped out, with the exception of red-necked phalarope as the WDA is within the migratory flyway. (NatureScot subsequently agreed to red-necked phalarope	Following agreement with NatureScot that the WDA is not within the migratory corridor used by red-necked phalarope, this species has been scoped out of the assessment.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		being screened out when presented with information on the WDA and migration routes – see stakeholder feedback received on 26 July 2024 below).	
		In relation to the question posed in the Scoping Workshop *'How should non-breeding season impacts using the NatureScot advised species specific non-breeding seasons be applied to the Biologically Defined Minimum Population Scales (BDMPS) season when more than one BDMPS season is available?',* NatureScot stated they have accepted Berwick Bank offshore wind farm's definitions of seasons (Berwick Bank Offshore EIA - Appendix 11.5 - Ornithology Apportioning Technical Report (incl. Annexes A and B)). NatureScot stated that breeding and non-breeding seasons are identified as follows: • Breeding season: birds are strongly associated with nest site – nesting, egg laying, provisioning young. • Non-breeding season: birds are more widely dispersed and not strongly associated with nest site. This period subsumes the 'breeding site attendance' periods defined in NatureScot seasonal definitions guidance. Non-breeding season apportioning is dependent on information within BDMPS (Furness 2015). Where Furness (2015) seasons overlap with NS breeding seasons, Furness (2015) seasons should be foreshortened. For some species Furness (2015) identifies a single non-breeding (winter) period, for others there are also autumn and spring migration BDMPS which should be used.	The approach taken will follow advice from NatureScot to adopt the approach taken by the Berwick Bank Offshore EIA. Breeding seasons will be based on NatureScot guidance and will not be modified. Non-breeding seasons will be based on Furness (2015) seasons modified so they do not overlap with NatureScot breeding seasons. Furness (2015) non-breeding seasons will be used to estimate impacts within those seasons (e.g. autumn and spring).
		In relation to the question posed in the Scoping Workshop *'Does the proposed approach meet NatureScot's expectation of how embedded mitigation and mitigation measures should be addressed in the HRA Screening Report?',* NatureScot stated they are content with this approach. NatureScot also noted that to clarify, examples of the intrinsic elements of a proposal which	Embedded mitigation measures are considered to be those incorporated into the scheme design and not those applied to reduce impacts to any SPA features, should any be necessary.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		would not be considered a 'measure' and could be taken into account in screening would usually be related to design, location, layout or standard conditions. Cases that would need to be considered at appropriate assessment would include measures specifically included in the proposal in order to mitigate potential impacts, such as conditions, caveats, strategies or other restrictions related to European site qualifiers.	
		In relation to the question posed in the Scoping Workshop *'Do you agree that the lesser black-backed gull feature of the Alde-Ore Estuary SPA and Forth Islands SPA should be screened out at the likely significant effect (LSE) stage, or do you advise that they should be screened into the appropriate assessment stage?',* NatureScot stated they are content that there is no theoretical connectivity for lesser black-backed gull from these two SPAs, therefore they can be screened out for the non-breeding season.	The lesser black-backed gull feature of the Alde-Ore Estuary SPA has been screened out during the breeding and non-breeding season. Additionally, the lesser black-backed gull feature of the Forth Islands SPA has been screened out in the non-breeding season (see HRA Screening (Royal HaskoningDHV and MacArthur Green, 2024)).
NatureScot	26 July 2024: Email correspondence	NatureScot highlighted that there is an overlap between the WDA and black-tailed godwit winter migration and thus advise the potential for connectivity. NatureScot advise this requires further consideration and justification for screening out potential impacts to black-tailed godwit.	Two subspecies of black-tailed godwits occur in SPAs in the UK. *Limosa limosa islandica* breeds in Iceland and winters on estuaries in the UK. This sub-species has connectivity with the WDA and the SPAs designated for this subspecies are screened into the assessment (see HRA Screening (Royal HaskoningDHV and MacArthur Green, 2024)). *Limosa limosa limosa* breeds in the south of England and some of these locations are designated for this sub-species as a breeding feature. Those SPAs have been scoped out of the assessment as there is no connectivity with the WDA (see Woodward et al. 2023).
NatureScot	12 August 2024: Email correspondence	Further to our advice in Guidance Note 11 on requirements for PVA, NatureScot advise that PVAs will be required for all sites and species where the combined breeding and non-breeding season threshold of 0.02 percent point change for adult annual survival rate is met or exceeded for project alone or in-	PVAs will be completed where the project alone impact exceeds a change in adult survival of 0.02% points. Where the predicted in-combination effect exceeds a change in adult survival of 0.02% points and the predicted effect from

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		combination impacts. To provide a pragmatic and proportionate approach, NatureScot advise a PVA of the in-combination effect is not required where the project alone impact is less than 0.2 birds per annum. In this instance a table should be provided that details by site and species what the point change in adult survival rates are and the number of birds impacted per annum.	the project alone is 0.2 birds per annum or fewer, a PVA will not be completed.

11.4 EXISTING DATA SOURCES

529. **Table 11.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA. Further descriptions of how these datasets will be used to inform the EIA are included in **Appendix I Offshore Ornithology Methods Statement**.

Table 11.3 Summary of key datasets and information sources

Dataset	Description	Author
An atlas of seabird distribution in north-west European waters	Data were collected from 1979 to 1994 and have been used to describe the seasonal distribution and abundance of over 50 species of seabird, including gulls, terns, sea ducks, skuas and divers. These are supplemented with detailed summaries of the methods used for the collection, processing and interpretation of the data.	Stone et al., 1995
Distribution maps of cetacean and seabird populations in the North-East Atlantic	Study provides the largest ever collation and standardization of diverse survey data for cetaceans and seabirds, and the most comprehensive distribution maps of these taxa in the North-East Atlantic.	Waggitt et al., 2020
Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species	Tracking of four species of seabirds, Kittiwakes, Guillemots, Razorbills and Shags, from multiple colonies around the coast of the UK since 2010.	Wakefield et al., 2017
Important at-sea areas for seabirds	Delineating high density sites for Kittiwakes, Guillemots, Razorbills and Shags, using seabird distribution models and hotspot mapping.	Cleasby et al., 2020
Islay offshore windfarm boat-based surveys	Boat based surveys to identify seabirds present at the proposed Islay offshore windfarm, undertaken from 2009 to 2012.	Institute of Estuarine and Coastal Studies, 2012
Argyll Array offshore windfarm boat-based surveys	Boat based surveys to identify seabirds present at the proposed Argyll Array Offshore Windfarm (OWF), undertaken from 2009 to 2011.	RPS, 2014
BirdLife seabird tracking database	The BirdLife International Seabird Tracking Database is the largest collection of seabird tracking data in existence. It serves as a central store for seabird tracking data from around the world and aims to help further seabird conservation work and support the tracking community. Relevant datasets will be consulted.	BirdLife International, 2023
Study of collision risk for birds	Review of the availability of data to inform key parameters for the assessment of collision risk to migrating birds.	Woodward et al., 2023
Multi-colony tracking study of two sympatric seabirds	Tracking of Guillemot and Razorbill colonies, based around the northern UK, across two non-breeding seasons.	Buckingham et al. 2022
Breeding seabird census	A census of breeding seabirds in Britain and Ireland from 2015 to 2021.	Burnell et al., 2023

Dataset	Description	Author
Seabird Monitoring Programme Database	Breeding season regional population scale as identified by the Seabird Monitoring Programme Database ran by the Joint Nature Conservation Committee (JNCC) up to 2022 and now operated by the British Trust for Ornithology. The most up to date report is currently published by the JNCC from 1986 to 2019. See **Appendix I Offshore Ornithology Methods Statement**.	British Trust Ornithology, 2024; JNCC, 2021

11.5 SITE-SPECIFIC SURVEY DATA

530. In addition to the existing data sources identified in **Section 11.4**, the project has undertaken site specific surveys to inform the EIA (**Table 11.4**).

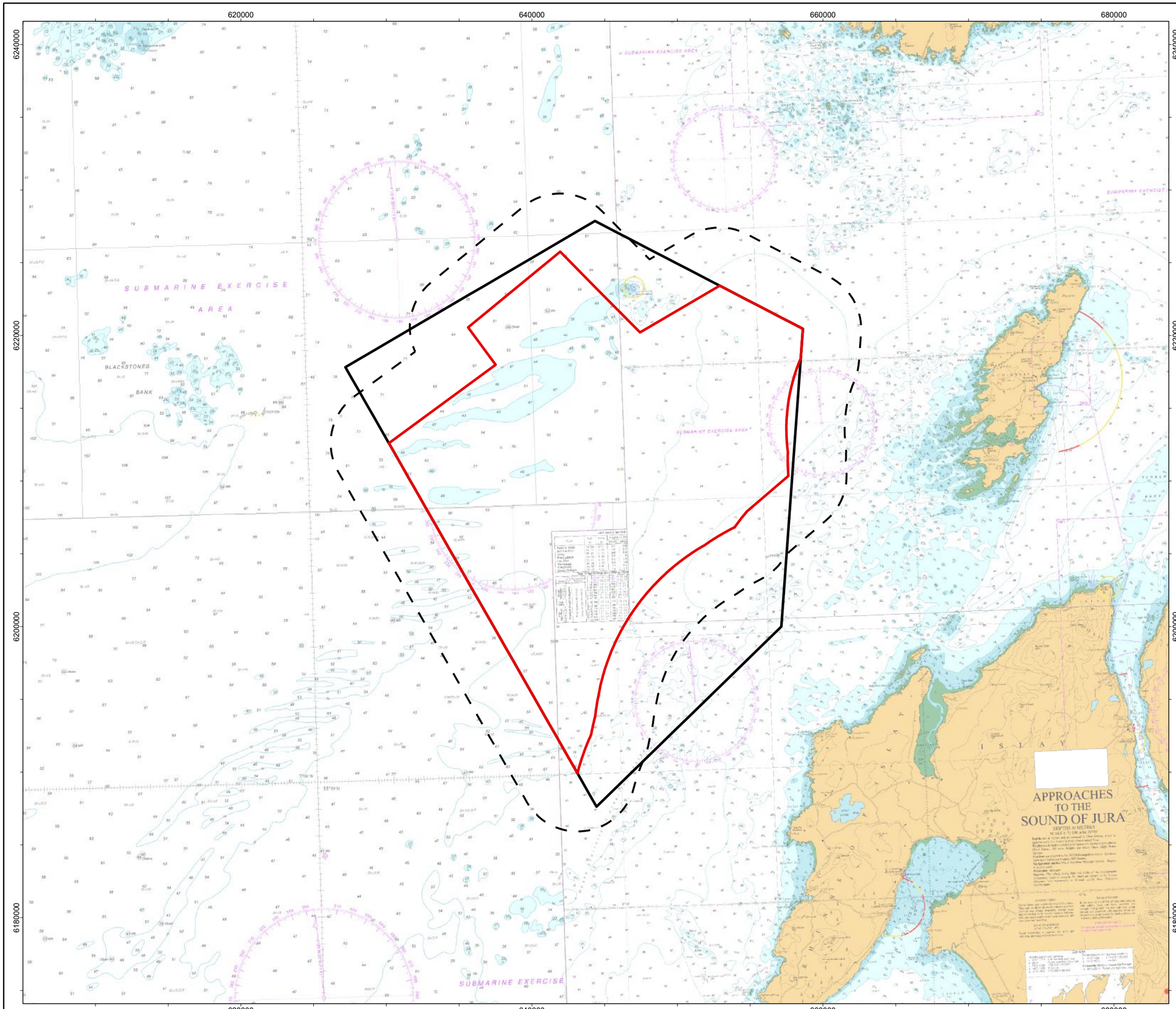
Table 11.4 Site-specific survey data

Dataset	Year(s)	Description
Third-party Digital Aerial Survey	2020 to 2022	Digital Aerial Surveys (DAS) undertaken by APEM on behalf of a third-party developer across a portion of the Option Agreement Area (OAA), including a 6 km buffer (**Figure 10.2**). Monthly surveys were actioned over 16 months from October 2020 to January 2022 inclusive.
Project's Digital Aerial Survey	2021 to 2023	DAS undertaken by APEM for the Project across the full OAA, including a 4 km buffer (analysed) (see **Figure 10.1**). Monthly surveys were actioned over 30 months from April 2021 to September 2023 inclusive.

11.6 OFFSHORE ORNITHOLOGY STUDY AREA

531. This section describes the offshore ornithology Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 11.7**) and the ornithology impact assessment will be conducted.

532. The offshore ornithology Study Area (**Figure 11.1**) is defined as the spatial extent of the WDA and a 4 km buffer around this to meet the minimum buffer area recommended by NatureScot (2023a).



Windfarm Development Area (WDA)

Option Agreement Area (OAA)

Offshore Ornithology Study Area

N

0 5 10 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	04/09/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000086		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:250,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 11.1: Offshore Ornithology Study Area

NOT TO BE USED FOR NAVIGATION

Royal HaskoningDHV
Enhancing Society Together

ScottishPower Renewables

Project: C:\Users\304634\OneDrive - Royal HaskoningDHV\WIP\PC3479 Team\PC3479 - WIP\E02 GIS & Drawings\F02_Figures\02_Scoping\WindFarmSite\Chapter_11_OffshoreOrnithology\MCW_ScopingWFS_OffshoreOrnithology.aprx
Name: MCW-GEN-GIS-MAP-RHS-000086_OffshoreOrnithologyStudyArea

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11.7 EXISTING ENVIRONMENT

533. This section characterises the offshore ornithology receptors, using publicly available data sources (**Section 11.4**) alongside site-specific survey data (**Section 11.5**), deemed of relevance to the Study Area (**Section 11.6**). This sets the context for the identification of mitigation measures (**Section 11.8**) and scoping of potential impacts (**Section 11.9**) which then feeds into the consideration of cumulative effects (**Section 11.10**) and potential transboundary impacts (**Section 11.11**).

534. The WDA is located in waters off the west coast of Scotland approximately 15 km west of Islay with important seabird colonies to the north-east on the island of Colonsay and to the south on Rathlin Island. These colonies include important numbers of fulmar *(Fulmarus glacialis)*, kittiwake *(Rissa tridactyla)*, guillemot *(Uria aalge)* and puffin *(Fratercula arctica)*.

535. Smaller populations of shag *(Gulosus aristotelis*), cormorant *(Phalacrocorax carbo)*, great black-backed gull *(Larus marinus)*, herring gull *(Larus argentatus)*, Arctic tern *(Sterna paradisaea)* and black guillemot *(Cepphus grille)* also occur in the area.

536. Other breeding colonies of seabirds include Manx shearwater *(Puffinus puffinus)* colonies on Rum and Copeland Island and storm petrel *(Hydrobates pelagicus)* colonies on Lunga in the Treshnish Isles. The nearest gannet colony is on Ailsa Craig in the Firth of Clyde and is the most likely source of birds in the breeding season.

537. In the non-breeding season, nearshore waters are important for several species of wintering water birds, particularly common eider *(Somateria mollissima)* and great northern diver *(Gavia immer).*

538. Migratory ducks, geese, swans and shorebirds also pass through the region on passage between their breeding locations in Iceland, Greenland and Canada and wintering areas in Scotland and elsewhere in the UK. Internationally important numbers of Greenland white-fronted goose *(Anser albifrons flavirostris)* and Greenland barnacle goose *(Branta leucopsis)* winter on Islay, with important numbers of Canadian light-bellied brent goose *(Branta bernicla hrota)* stopping on passage.

539. Further details of the baseline and approach to the assessment is provided in the **Appendix I Offshore Ornithology Methods Statement**.

11.8 MITIGATION MEASURES

540. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on offshore ornithology receptors. These measures described in **Table 11.5** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 11.5 Indicative embedded mitigation measures relevant to offshore ornithology receptors

ID	Parameter	Description of Mitigation Measure
M-4	Project Environmental Management Plan	Development of, and adherence to, a Project Environmental Management Plan (PEMP) which will be in accordance with an Outline PEMP to be submitted with the Section 36 Application. The PEMP will include measures to manage the environmental risks associated with the construction and operation of the offshore components of the Project.
M-7	Marine Pollution Contingency Plan	Development of, and adherence to, a Marine Pollution Contingency Plan (MPCP). The MPCP will provide guidance to the Project personnel, contractors and subcontractors on the actions and reporting requirements in the event of spills and collision incidents. The MPCP will also contain emergency plans and mitigation procedures for a range of potential marine pollution incidents.

ID	Parameter	Description of Mitigation Measure
M-15	Wind Turbine Generator Selection	The smallest size of turbine considered has been selected at a minimum rating much higher than most currently operational turbines, reducing the number required to be installed to achieve the same capacity.
M-30	Blade Tip Clearance / Air Gap	Blade tip clearance height / Air Gap of at least 22 m above mean high water springs, has been incorporated into Wind Turbine Generator (WTG) design to reduce collision rates between seabirds and operational WTGs. Since most seabirds fly close to the sea surface, increasing the air gap between the lower blade tip and the sea surface reduces collision risk (flight height is a key input parameter to collision risk models). Technical and economic constraints will also influence the extent of this air gap. The adoption of such a mitigation measure will be kept under review during the assessment process.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each, whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

541. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to offshore ornithology receptors will be assessed with this mitigation in place.

11.9 SCOPING OF POTENTIAL IMPACTS

542. A range of potential impacts on offshore ornithology receptors may occur during the construction, O&M, and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

543. **Table 11.6** outlines the offshore ornithology impacts which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information and site-specific data become available.

544. Further information on how the advice from the specific NatureScot guidance notes will be addressed is provided in **Appendix I Offshore Ornithology Methods Statement**.

Table 11.6 Potential impacts scoped in or scoped out for offshore ornithology

Potential Impact	Phase* Scoped In (✓) / Scoped Out (x)			Justification
	C	O&M	D	
Collisions with operational Wind Turbine Generators	✘	✓	✘	Collision with operational Wind Turbine Generators (WTGs) has been identified as a primary impact pathway within the NatureScot Guidance Note 7 (2023b). Further details of proposed assessment are provided in **Appendix I Offshore Ornithology Methods Statement**. Therefore, the potential impact and effect of collisions with operational WTGs has been **scoped into** the Environmental Impact Assessment (EIA), for the O&M phase.
Displacement from the physical presence of WDA infrastructure	✘	✓	✘	Seabird populations are at risk from displacement due to the presence of WDA infrastructure**.** Therefore, the potential impact and effect of displacement from the physical presence of WDA infrastructure has been **scoped into** the EIA, for the O&M phase.
Barrier effects from the physical presence of the WDA infrastructure	✘	✓	✘	Seabird populations are at risk from barrier effects from the physical presence of the WDA infrastructure**.** Therefore, the potential impacts and effect of barrier effects from the physical presence of the WDA infrastructure has been **scoped into** the EIA, for the O&M phase.
Temporary disturbance and displacement	✓	✓	✓	Seabird populations are at risk of temporary disturbance and displacement from construction (and decommissioning) activities and O&M activities (e.g. vessel disturbance). Further details of proposed assessment are provided in **Appendix I Offshore Ornithology Methods Statement**. Therefore, the potential impact and effect of temporary disturbance and displacement has been **scoped into** the EIA, for all phases.
Indirect effects on marine bird species prey and their habitats	✓	✓	✓	Seabird populations at risk from negative impacts on key prey species, Further details of proposed assessment are provided in **Appendix I Offshore Ornithology Methods Statement.** Therefore, the potential impact and effect of indirect effects on marine bird species prey and their habitats has been **scoped into** the EIA, for all phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning respectively.				

11.10 POTENTIAL CUMULATIVE EFFECTS

545. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA and OfTDA to affect offshore ornithology receptors. The Marine Scotland Cumulative Effects Framework tool is not available at the time of writing. However, it is understood that this tool will become available in November 2024 which should provide sufficient time for it to be considered in the EIAR. Once published, the Applicant will discuss its use for the Project with stakeholders through the offshore ornithology Expert Topic Group (ETG)); and provided that advice from Marine Directorate and NatureScot is that it should be used, it will be applied to the cumulative assessments.

546. The assessment of cumulative impacts within the same regional area as the WDA will follow two approaches: quantitative and qualitative, both for the breeding and non-breeding seasons:

- The quantitative assessment will be focused on other operational Offshore Windfarms (OWFs); and
- The qualitative assessment will be focused on OWFs that have submitted their scoping report and other projects in the vicinity of the WDA.

11.10.1 Quantitative Assessment

11.10.1.1 Breeding Season

547. Screening of predicted impacts from consented or operational OWFs within the regional population scales in the breeding season will be undertaken. This is not scoped at this stage, noting that projects' status may change between scoping and submission of the EIAR. At present, breeding season OWF projects would likely include West of Orkney (application submitted) and Robin Rigg (operational) but may include other operational projects in the Irish Sea. Among other ScotWind projects in the West of Scotland, Spiorad na Mara submitted a scoping report on 29 September 2023 so will need to be considered. The other two ScotWind North region projects (Talisk and Havbredey) have not submitted a scoping report at the time of writing but may have reached this stage by the time the WDA EIAR is submitted.

548. Other offshore wind projects that may need to be included are the Pentland Floating Offshore Windfarm and the Malin Sea Offshore Wind INTOG site 5, located between Islay and Northern Ireland. The latter project has not submitted a scoping report at the time of writing.

549. A full list of projects scoped into the breeding season quantitative assessment will be discussed with stakeholders as the Project develops.

11.10.1.2 Non-Breeding Season

550. A search for predicted impacts from consented or operational OWFs within the relevant Biologically Defined Minimum Population Scales (BDMPS) region in the non-breeding season will be undertaken. This will include operational projects in the UK waters of the Irish Sea and any projects within the Celtic Sea that reach the scoping stage prior to the submission of the EIA.

551. It should be noted that OWF projects within the waters of the Republic of Ireland will be considered in the Transboundary Impact Assessment and not the cumulative impact assessment.

11.10.2 Qualitative Assessment

552. Other relevant projects from other industries will be considered qualitatively. These will include onshore projects as well as projects in the marine environment. A search will be made of other projects with potential connectivity using FeAST to establish which pressures from which sources have the potential to impact seabird populations in the breeding and non-breeding regional seasons

defined above. These are likely to include onshore windfarms, port and harbour developments, fish farms, oil and gas projects, and significant capital marine dredging projects.

11.11 POTENTIAL TRANSBOUNDARY IMPACTS

553. Transboundary impacts are defined as those that have the potential to impact protected bird populations in other European nations. Thus, impacts within the UK are not considered transboundary impacts.

554. The ornithology assessment will consider impacts to bird populations outside the UK including seabirds and migratory birds. These impacts will be to populations within the seasonal regional population scales described above. Thus, the regional population scales outside the UK boundary will need to be considered.

555. For breeding season seabirds, the SMP database will be used to assess the population scales in the Republic of Ireland only. In the non-breeding season, the BDMPS approach will be used to summarise the potential impacts on populations of seabirds occurring within the relevant species-specific population scale.

556. For non-breeding terrestrial migratory birds, the relative national population scales within the bio-geographic population of each species assessed will be summarised and considered.

11.12 APPROACH TO IMPACT ASSESSMENT

557. This section summarises the overall approach to impact assessment for offshore ornithology. The approach is described in more detail in **Appendix I Offshore Ornithology Methods Statement**.

558. The EIA will follow the industry standard guidance from Chartered Institute for Ecology and Environmental Management (CIEEM) (2022). The baseline will be established using existing data and data gathered by the Applicant (see **Appendix I Offshore Ornithology Methods Statement**).

559. The importance of ornithology features will be described in relation to the geographic context of the species occurring within the Zone of Influence (ZoI) of the Project. This will describe the context of the importance of the ZoI relative to International and/or European population scales, National (Great Britain or UK) population scales and regional population scales. The International and National population scales will be determined from published sources and the regional scale will be determined following the approach set out in **Appendix I Offshore Ornithology Methods Statement**. The importance of ornithology features will also be used to determine importance through consideration of the designation of sites to protect the populations of birds being assessed. The importance of populations with the potential to be impacted will be considered relative to protections through international designations, national designations, and legal protection. Those with higher levels of protection will be assigned a higher level of importance in the EIA.

560. The impact assessment process will follow the CIEEM (2018) guidelines to:

- Identify and characterise impacts and their effects;
- Incorporate measures to avoid and mitigate negative impacts and effects;
- Assess the significance of any residual effects after mitigation;
- Identify appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

561. Impacts and effects will be characterised relative to their:

- Positive or negative nature;
- Extent;
- Magnitude;

- Duration;
- Frequency and timing; and
- Reversibility.

562. Effects will be determined and where these may be significant, additional mitigation will be applied to reduce impacts to non-significant levels. The final assessment of significance will be undertaken on these residual impacts.

563. While the CIEEM (2018) guidelines specifically discourage the use of matrices in assessing the significance of impacts, this approach will be applied to the assessment of potential impacts to bird populations in the WDA EIAR to ensure consistency with other OWF EIAs in Scotland. However, the CIEEM (2018) approach to assessing significance will be considered alongside the matrix, to ensure any erroneous outputs from the matrix are not followed where there is good ecological evidence to show that the significance is different to outputs from the matrix.

564. One key output in the assessment of the predicted impacts from the Project is the application of Population Viability Analysis (PVA). Following NatureScot guidance will result in seasonally predicted impacts. These impacts will need to be compared to relevant regional population scales which will differ between seasons. In the breeding season, regional populations will be defined based on their foraging range and breeding season impacts will be compared with them. Additionally, NatureScot guidance is to undertake non-breeding season impacts relative to BDMPS population scales. For most seabird species, the BDMPS populations are based on multiple non-breeding season temporal scales. It is unclear how NatureScot advise these scales to be resolved into a single non-breeding season impact assessment. The population scales are not additive, so it is not possible to simply add BDMPS non-breeding seasons together. NatureScot guidance states that, *"monthly (or seasonal) impacts should be summed to create an overall annual effect value."*. While this can be undertaken for Habitats Regulations Appraisal (HRA) (as the starting population size is the SPA population size), it is not possible to compare summed monthly or seasonal annual impacts with a single annual population size. It is therefore proposed that the impacts in the breeding season will be run as annual impacts with the breeding season regional population used at the starting population size. Additionally, the smallest BDMPS seasonal population (where more than one non-breeding season population estimate is provided by Furness (2015)) will be used as the starting population size and the non-breeding season predicted impacts used in the PVA as annual impacts. While these approaches are not an ideal approach to using a PVA, the absence of suitable guidance suggests that this is the only approach to follow NatureScot guidance most closely.

565. Appendix I Offshore Ornithology Methods Statement sets out the detailed approach to assessment of effects on offshore ornithology receptors. In summary the following methods and analytical tools will be used:

- Quantification of the offshore ornithology baseline using design-based density estimates and model-based density estimates and spatial distributions (Section 2.1.5 of **Appendix I**);
- Both stochastic and deterministic CRMs will be run using Caneco (2022) sCRM (Section 2.3 of **Appendix I**);
- For migratory collision risk assessments it is expected that the migratory CRM tool will follow the results of Work Package 3 from the ScotMER *"Strategic study of collision risk for birds on migration and further development of the stochastic collision risk modelling tool"* project. If this project is not completed in time for inclusion in the EIA and HRA, a bespoke migratory CRM of the Project will be completed using WWT and MacArthur Green (2014) (Section 2.3.3 of **Appendix I**);
- For the assessment of distributional responses, displacement and barrier effects, the matrix approach will be applied to all species considered susceptible to disturbance, while SeabORD is limited to kittiwake, guillemot, razorbill and puffin (Section 2.4 of **Appendix I**);

- Predicted total impacts from the Project alone and cumulatively will be compared against the relevant population scale, resulting in a predicted change in adult survival; and
- PVA as described above and in Section 2.5 of **Appendix I**.

11.13 SCOPING QUESTIONS TO CONSULTEES

566. The following questions are posed to consultees to help them frame and focus their response to the offshore ornithology chapter and supporting information which will in turn *inform* the Scoping Opinion.

- Do you agree that the existing data available to describe the offshore ornithology baseline remains sufficient to describe the baseline environment in relation to the WDA?
- Are there any further desktop datasets which you would recommend are included?
- Do you agree that all potential impacts have been identified for offshore ornithology?
- Do you agree with the potential impacts scoped in and out for the EIA?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on offshore ornithology receptors?
- Do you agree that the impact assessment should be based only on the Project's DAS and that the third-party DAS data should be excluded (i.e. third-party data should only be used to inform the baseline characterisation)?
- Do you agree with the use of 30 samples of aerial bird densities being used in collision risk modelling, or should aerial bird densities from incomplete seasons be excluded from the analyses?
- Do you agree with the scoping out of the migratory species listed in **Appendix I Offshore Ornithology Methods Statement**?
- Do you have any other matters or information sources that you wish to present?

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Human Environment

- Chapter 12: Commercial Fisheries
- Chapter 13: Shipping and Navigation
- Chapter 14: Offshore Archaeology and Cultural Heritage
- Chapter 15: Military and Civil Aviation
- Chapter 16: Seascape, Landscape and Visual Impacts
- Chapter 17: Infrastructure and Other Marine Users
- Chapter 18: Socio-economics
- Chapter 19: Climate Change
- Chapter 20: Major Accidents and Disasters

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12 COMMERCIAL FISHERIES

12.1 INTRODUCTION

567. This chapter considers the scope of potential impacts and likely significant effects (LSE) on commercial fisheries that may arise from the construction, operation and maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

568. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on commercial fisheries in the WDA Environmental Impact Assessment (EIA).

569. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 9 Fish (Including Basking Shark) and Shellfish Ecology** - which details potential impacts on fish and shellfish resources, including for commercially targeted species;
- **Chapter 13 Shipping and Navigation** - which considers potential impacts on fishing vessels in transit (and not actively fishing); and
- **Chapter 17 Infrastructure and Other Marine Users** - which considers potential impacts on aquaculture and recreational charter angling.

570. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

12.2 LEGISLATION, POLICY AND GUIDANCE

571. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 12.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for commercial fisheries.

Table 12.1 Summary of relevant legislation, policy and guidance for commercial fisheries

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Policy	
National Marine Plan (Scottish Government, 2015)	Contains sector-specific policies relevant to offshore wind and commercial fisheries. **The key references are:** **GEN 4 Co-existence**: *"Proposals which enable coexistence with other development sectors and activities within the Scottish marine area are encouraged in planning and decision-making processes, when consistent with policies and objectives of this plan"*. **Fisheries 1:** *"Taking account of the EU's Common Fisheries Policy, Habitats Directive, Birds Directive and Marine Strategy Framework Directive, marine planners and decision makers should aim to ensure: • Existing fishing opportunities and activities are safeguarded wherever possible…"* **Fisheries 2:** *"The following key factors should be taken into account when deciding on uses of the marine environment and the potential impact on fishing: • The cultural and economic importance of fishing, in particular to vulnerable coastal communities…"* **Fisheries 3:** *"Where existing fishing opportunities or activity cannot be safeguarded, a Fisheries Management and Mitigation Strategy should be prepared by the proposer of development or use, involving full engagement with local fishing interests (and other interests as appropriate) in the development of the Strategy…"* **Paragraph 6.22: "***There are some key emerging issues concerning the interactions between the fishing industry and other interests which should be borne in mind in any proposed marine development and factored into marine planning processes. These include":* **Paragraph 6.23:** *"Development: Energy developments can displace fishing. The cabling arrays associated with energy and telecoms developments, and other physical infrastructure associated with development, have the potential for short-term displacement of fishing activity during the installation phase."* **Paragraph 6.24:** *"There is also potential for damage to occur to both infrastructure and fishing equipment as a result of interactions, with obvious safety implications. New developments should take into account the intensity of fishing activity in the proposed development area and any likely displacement which the development and associated activity could precipitate, with resultant increased pressure on remaining, often adjacent, fishing grounds".* **Paragraph 6.25:** *"There may be potential for some infrastructure or development areas to act as nursery grounds for fish and, if appropriately protected, these may lead to an increase in fish stocks in the surrounding areas. This possibility should be considered on a case by case basis".* **Paragraph 6.26:** *"Where relevant, Fisheries Liaison with Offshore Wind and Wet renewables (FLOWW) Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison69 should be followed."*

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Sectoral Marine Plan – Offshore Wind Energy (Scottish Government, 2020)	The Sectoral Marine Plan (SMP) for Offshore Wind Energy identifies sustainable areas for the future development of commercial scale offshore wind energy in Scotland, including a spatial strategy to inform the seabed leasing process for the purposes of offshore wind energy. The WDA is located in Plan Option W1. A key risk factor identified in the SMP for the W1 area is potential impacts on commercial fishing.
Regional Marine Plan (in progress)	Will focus on regional marine planning and conservation issues and will be developed in line with the National Marine Plan and SMP.
The Marine Policy Statement (UK Government, 2011)	**The key references are:** **3.8.7:** *"Fishing activity is sensitive to changes in other sea uses. Marine developments have the potential to prevent, displace or encourage fishing activities. There are potential social, economic and environmental impacts of displacement of fishing activity caused by other sea uses, particularly if from well established fishing grounds. In addition to marine fish stocks associated with commercial sea fishing, the coastal environment is important as a corridor for migrating Atlantic salmon and European eel, and in providing the marine feeding ground for sea trout. These important species that support coastal and inland commercial fishing and recreational angling could be vulnerable to a wide range of coastal activities..."* **3.8.10:** "*Marine plan authorities should consider the potential social and economic impacts of other developments on fishing activity, as well as potential environmental impacts…"*
Argyll and Bute Local Development Plan 2 (Argyll and Bute Council, 2024)	Contains policies relevant to commercial fisheries and the effect of developments on economic activity. See **Chapter 18 Socio-economics**.
Guidance	
Good Practice Guidance for assessing fisheries displacement by other licensed marine activities (Xodus, 2022)	In addition to the general approach and guidance outlined in **Chapter 4 Approach to Scoping and EIA**, the assessment of potential impacts on commercial fisheries receptors will also comply with the listed guidance documents where they are specific to this topic.
Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (United Kingdom Fisheries Economic Network and Seafish, 2012)	
Fisheries Liaison with Offshore Wind and Wet Renewables group. Recommendations for Fisheries Liaison: Best Practice guidance for offshore renewable developers (FLOWW, 2014 and noted to be currently in the process of being updated)	
Fisheries Liaison with Offshore Wind and Wet Renewables group Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015)	

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010a)	
Developing guidance on fisheries Cumulative Impact Assessment for wind farm developers (Blyth-Skyrme, 2010b)	
Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403 (Cefas, 2012)	
Fisheries Liaison Guidelines - Issue 6 (UK Oil and Gas, 2015)	
Fishing and Submarine Cables - Working Together (International Cable Protection Committee, 2009)	
Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in respect of Food and Environmental Protection Act and Coast Protection Act Requirements (Cefas, 2004)	

12.3 CONSULTATION

572. This commercial fisheries chapter has been informed by engagement with stakeholders, including those listed below:

- Clyde Fishermen's Association (CFA);
- Communities Inshore Fisheries Alliance (CIFA);
- Marine Directorate - Licensing Operations Team (MD-LOT);
- Marine Directorate - Science, Evidence, Digital and Data (MD-SEDD);
- Scottish Fishermen's Federation (SFF);
- Scottish Pelagic Fishermen's Association (SPFA); and
- Scottish White Fish Producers Association (SWFPA).

573. As part of the consultation process, the Applicant presented the approach to assessment to stakeholders in order to offer transparency around the scoping methodology and rationale, capture stakeholder advice and guidance, and incorporate stakeholder feedback, where appropriate. A summary of the approach to stakeholder communication and consultation is outlined in **Chapter 5 Consultation and Stakeholder Engagement** with each engagement activity being listed within **Appendix L Stakeholder Engagement Log**.

574. The consultation outcomes in relation to commercial fisheries are outlined in **Table 12.2**, which summarises stakeholder feedback, outlines how the Applicant has responded to the feedback received, and details how it has been considered within this chapter and/or will be used to inform the EIA process and preparation of the EIAR.

575. In addition to the engagement outlined in **Table 12.2,** the points of agreement between the Applicant and all scoping workshop stakeholders are listed below:

- Agreement on the baseline data sources.

576. Additionally, the Applicant reached agreement with SFF, SPFA and SWFPA in relation to:

- Additional steaming time being scoped out as a potential impact; and
- An appropriate scale for the cumulative effects study area is the South West Coast Regional Inshore Fishery Group region.

577. Consultation relating to this topic will be ongoing throughout the EIA process. The Applicant welcomes the opportunity to work with stakeholders to deliver a proportionate and robust EIA.

Table 12.2 Summary of consultation relevant to commercial fisheries

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
Scottish White Fish Producers Association	25 March 2024: Email Correspondence	Scottish White Fish Producers Association provided scallop fishing tracking data in relation to the Project.	The Applicant confirmed receipt of the scallop fishing tracking data, which has been used to inform identification of commercial fisheries activity in relation to the Project.
Scottish Fishermen's Federation	03 June 2024: Commercial Fisheries Scoping Workshop	Scottish Fishermen's Federation (SFF) enquired whether a vessel traffic survey will be undertaken in the summer months to record the increase in fisheries vessel activity due to more favourable weather conditions.	The Applicant has undertaken a summer vessel traffic survey, as this is a requirement for the navigational risk assessment. This vessel traffic survey informs the shipping and navigation assessment, which includes fishing vessels in transit. Further information on the vessel traffic survey and navigational risk assessment is provided in **Chapter 13 Shipping and Navigation**.
		SFF requested that the Project considers extending data collection before the United Kingdom's exit from the European Union (i.e., pre-2016).	The Applicant confirmed that data collected before the United Kingdom's exit from the European Union would be considered.
		SFF requested to be consulted on, and included in preparation of, the Project's Fisheries Management and Mitigation Strategy (FMMS) prior to submission of the consent application.	The Applicant confirmed that the draft outline FMMS will be submitted with the Section 36 application and that the FMMS is typically finalised at least six months before construction commences. The Applicant confirmed that SFF will be consulted on and included in the preparation on the FMMS.
		SFF enquired about the magnitude of impact and requested that the Project provide further clarifications on what constituted a 'substantial loss'. SFF stated their preference would be for the Project to assess individual fishermen in comparison to fishing fleets as the development's impact on a single fisherman could be significant.	The Applicant highlighted that the magnitude of impact is analysed for the fishing fleet that is active across the Project and that individual fishing operations are not analysed during the Environmental Impact Assessment (EIA) process due to data confidentiality at an individual business scale. The Applicant confirmed that further context will be provided in the EIA methodology with specific examples provided relative to the magnitude assessment.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		A review by SFF of the fishing vessel traffic data in the steaming areas would need to be completed before SFF could provide feedback on scoping out additional steaming as a potential impact.	The Applicant confirmed that fishing vessel transits are considered in **Chapter 13 Shipping and Navigation** and that **Chapter 12 Commercial Fisheries** only assesses the active fishing locations.
Scottish Pelagic Fisheries Association, Clyde Fishermen's Association, Communities Inshore Fisheries Alliance	03 June 2024: Commercial Fisheries Scoping Workshop	The Scottish Pelagic Fisheries Association (SPFA) enquired about whether the geophysical survey results from the Project's 2023 site investigation campaign indicated gravel conditions across any of the Windfarm Development Area due to the risks infrastructure could pose to spawning areas. The representative from Clyde Fishermen's Association and Communities Inshore Fisheries Alliance agreed with this comment.	Figure 4.3 of **Appendix D MachairWind 2023 Benthic Characterisation Report** shows that sediments across the Option Agreement Area are likely to primarily comprise sand. Based on the Folk sediment classification system, of the 58 samples, 53 stations are described as 'sand', two stations as 'gravelly sand', one station as 'muddy sand', one station as 'sandy gravel' and one station as 'gravel'. Further detail on potential fish spawning ground availability in the WDA will be provided in the fish and shellfish ecology chapter of the EIAR.
		The SPFA highlighted that the landings data showed catches of sprat and highlighted the presence of important seasonal sprat fisheries within sea lochs in the West Coast and within the study area.	The Applicant confirmed that the sprat fishery would be added to the list of receptors in the commercial fisheries assessment.
Clyde Fishermen's Association and Communities Inshore Fisheries Alliance	03 June 2024: Commercial Fisheries Scoping Workshop	The displacement of fishing vessels from offshore wind development activities has led to fishing operations being disrupted in adjacent areas where the displaced fishing operations have had to relocate to. The Project has been requested to consider this potential impact and acknowledge trawling across the gear types.	The Applicant confirmed that demersal otter trawling is included as a commercial fisheries receptor and that the effect of displacement on this fleet will be assessed.
		A particular fishing method could be displaced into an area where another fishing method is operating leading to a potential impact between the different fishing methods operating within the same area. The Project has been requested to consider this potential impact.	The Applicant confirmed that this potential impact will be considered further in the EIAR.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
Scottish Fishermen's Federation, Scottish Pelagic Fisheries Association, Scottish White Fish Producers Association	07 August 2024: Commercial Fisheries Meeting	The SFF, Scottish White Fish Producers Association (SWFPA) and SPFA enquired about the durations for defining short, medium, and long-term impacts.	The Applicant confirmed that a short-term duration has been defined as less than 2-years, which represents a decrease from the 5-year timescale presented at the Scoping Workshop. The decrease was made following stakeholder feedback at the Scoping Workshop (03 June 2024).
		SWFPA and SPFA confirm agreement to additional steaming impact being scoped out. Post-meeting, SFF confirmed that they have no objections to the scoping out of additional steaming time.	The Applicant confirmed that additional steaming time remains scoped out of the impact assessment.

12.4 EXISTING DATA SOURCES

578. **Table 12.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA.

Table 12.3 Summary of key datasets and information sources

Dataset	Description	Author
United Kingdom annual fisheries landings statistics.	Fisheries landings data for UK registered fishing vessels landing to UK and non-UK ports and non-UK registered fishing vessels landing to UK ports. Note that the most recent data has been presented in this Scoping Report, but that longer term datasets will be analysed during the Environmental Impact Assessment (EIA). Datasets used cover 2011 to 2022 cumulatively.	Marine Management Organisation (MMO), 2018 MMO, 2023a
UK Vessel Monitoring System data	Vessel Monitoring System (VMS) data for fishing vessels greater than 15 metres (m) in length. Note that UK vessels 12 m and over in length have VMS on board, however, to date, the MMO provide amalgamated VMS datasets for 15 m and over vessels only. VMS data sourced from MMO displays the first sales value (£) of catches. Note that the most recent data has been presented in this Scoping Report, but that longer term datasets will be analysed within the EIA.	MMO, 2023b
European Union annual fisheries landings statistics	Fisheries landings data for registered fishing vessels landing to their home nation ports from 2004 to 2016.	EU, 2020
European Union Vessel Monitoring System data	VMS data for fishing vessels greater than 12 m in length. From 2016 to 2020. VMS data sourced from ICES displays the surface swept area ratio of catches by different gear types and covers European Union (EU) (including UK) registered vessels 12 m and over in length. Surface swept area ratio indicates the number of times in an annual period that a demersal fishing gear makes contact with (or sweeps) the seabed surface. Surface swept area ratio provides a proxy for fishing intensity.	ICES, 2022
Fisheries datasets	Fisheries datasets available from the Marine Scotland National Marine Plan Interactive (NMPi), including ScotMap data and heatmaps for activity by small fishing boats (under 12 m in length).	MD, 2023
Fishing vessel route density data	Fishing vessel route density, based on vessel Automatic Identification System (AIS) positional data. AIS is required to be fitted on fishing vessels ≥15 m length. Note that the most recent data has been presented in this Scoping Report, but that longer term datasets will be analysed within the EIA.	European Maritime Safety Agency, 2023
Sectoral Marine Plan	Sectoral Marine Plan provides a description of regional commercial fisheries activity.	Scottish Government, 2020

579. It should be noted that the quantitative datasets identified in **Table 12.3** may not capture all commercial fisheries activity in the commercial fisheries Study Area as defined in **Section 12.6**. For instance, the Vessel Monitoring System (VMS) datasets only cover vessels ≥12 m (ICES data) or ≥15 m (Marine Management Organisation (MMO) data) in length. Note that UK vessels ≥12 m in length have VMS on board, however to date, the MMO provide amalgamated VMS datasets for ≥15 m vessels only.

580. However, in addition to VMS data, other published data does provide a useful insight into commercial fisheries activity undertaken in inshore areas and by smaller vessels not captured by VMS data (e.g., inshore fisheries mapping for small fishing boats, <12 m in length). This will be utilised where appropriate. Consultation with fisheries stakeholders and industry is expected to further inform the assessment in the EIA.

581. Consultation with representatives of fishermen's associations and organisations will be undertaken to seek to corroborate the findings of desk-based baseline data analysis and to provide insight into specific fishing grounds and activity of any vessels active in the area. Consultation will also be important to inform gear specifications for vessels active in the area, which will allow a full understanding of how different vessels and different gear configurations may be affected.

582. Variations and trends in commercial fisheries activity are an important aspect of the baseline assessment, and the principal reason for considering up to five years of key baseline data and longer timeseries where appropriate. Available landings data spans the period of the COVID-19 pandemic which is understood to have temporarily affected market demand and supply chains. Furthermore, changes in fishing patterns resulting from the withdrawal of the UK from the EU would also be reflected in datasets for 2021 onwards. Long term environmental and climatic changes may be expected to be detectable within the five-year time series but may benefit from longer-term analysis dependent on the target species. Inclusion of such longer-term analysis will be informed by stakeholder consultation.

12.5 SITE-SPECIFIC SURVEY DATA

583. It is considered that no additional baseline information needs to be gathered to inform this chapter, as there are sufficient existing data sources available to provide an environmental baseline to inform scoping and EIA.

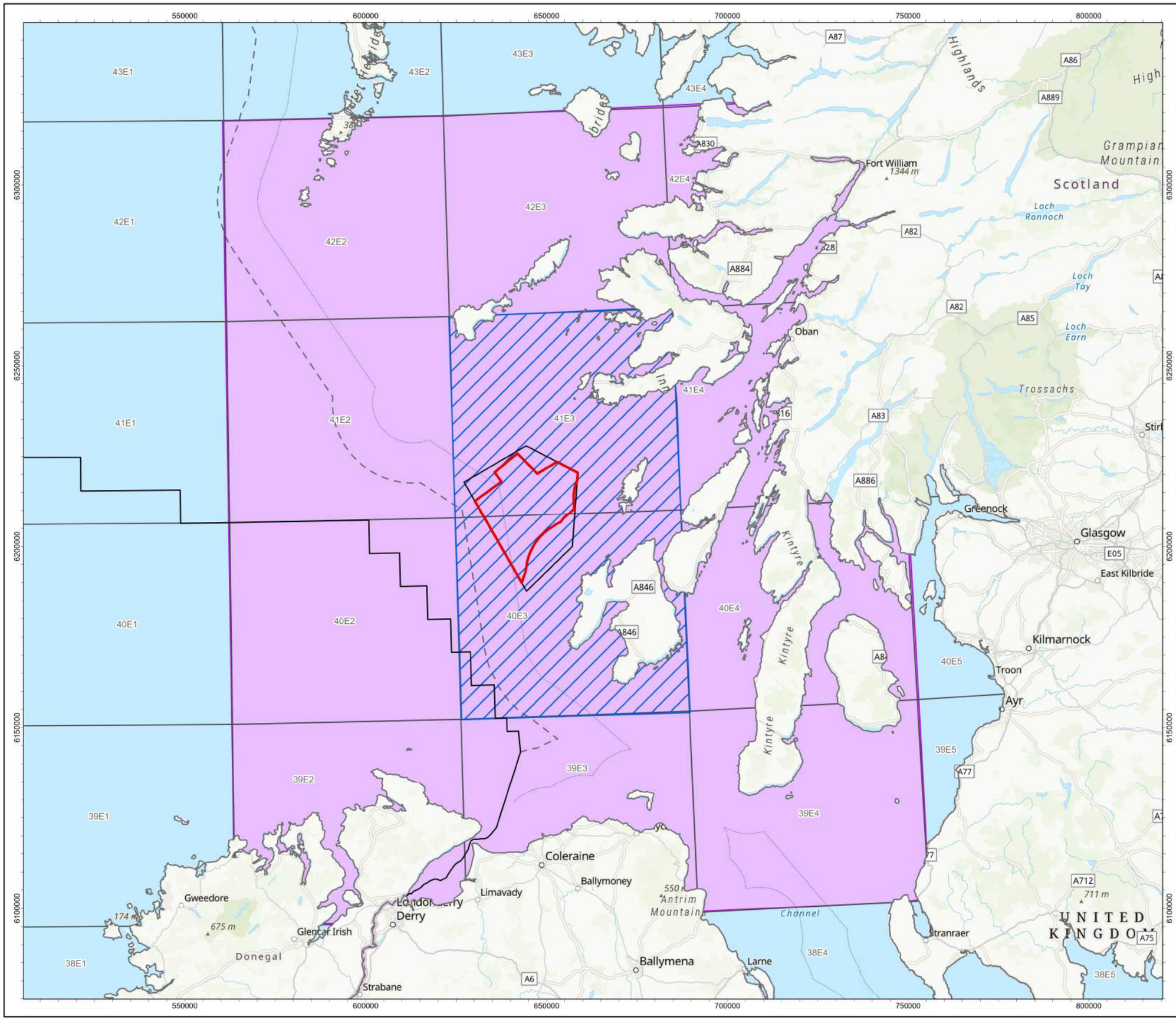
12.6 COMMERCIAL FISHERIES STUDY AREA

584. This section describes the commercial fisheries Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 12.7**) and the EIA will be conducted.

585. The International Council for the Exploration of the Sea (ICES) developed, in the 1970s, a gridded notation system covering the north-east Atlantic. The statistical rectangles are approximately 30 by 30 nautical miles (nm) and are used for simplified analysis and visualisation of spatial data. The WDA is located within the ICES Division 6a (West of Scotland) statistical area; within UK Exclusive Economic Zone waters. For the purpose of recording commercial fisheries landings, ICES Division 6a is divided into statistical rectangles, of which the WDA overlaps with 40E3 and 41E3.

586. For the purposes of this Scoping Report, two commercial fisheries study areas have been defined (**Figure 12.1**):

- The commercial fisheries Local Study Area comprising ICES rectangles 40E3 and 41E3; and
- A wider Regional Study Area based on the ICES rectangles immediately adjacent to the Local Study Area has been defined for consideration of displacement impacts within the EIA.



Windfarm Development Area

Option Agreement Area

ICES Statistical Rectangles

Local Study Area

Regional Study Area

6 nm Boundary

12 NM Territorial Sea Boundary

UK-Ireland EEZ

N

0 5 10 15 20 25 30 35 40 45 Kilometres

Scale: 1:12,207,031

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	01/05/2024	FN	SM	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-NIM-000074		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 12.1: Commercial Fisheries Study Areas

NOT TO BE USED FOR NAVIGATION

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ScottishPower Renewables

Project: D:\Projects 2024\1027 MachairWind\APRX files\V2\MachairWind_CF_13.1_StudyArea.aprx
Name: MCH_ETRS89_UTM29N_A3_Landscape_Template_Contractor_Consultant

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12.7 EXISTING ENVIRONMENT

587. This section describes the commercial fisheries receptors, using publicly available data sources (**Section 12.4**) of relevance to the Study Area (**Section 12.5**). A description of the commercial fish targeted by vessels registered in UK, Norway, Sweden, Denmark, and Ireland and landed into UK ports (for all vessels) and non-UK ports (for UK vessels only) is provided. The description of the existing environment receptors sets the context for the identification of mitigation measures (**Section 12.8**) and scoping of potential impacts (**Section 12.9**) which then feeds into the consideration of cumulative effects (**Section 12.10**) and potential transboundary impacts (**Section 12.11**).

12.7.1 Local Study Area

588. Landings from the commercial fisheries Local Study Area had an annual average landings value of approximately £6.4 million across the years 2018 to 2022 (MMO, 2023a), with landings values peaking in 2019 at £7.4 million. Over the same period, the annual average weight of landings from the Local Study Area was just under 2,048 tonnes, peaking at approximately 3,000 tonnes in 2019.

589. Landings of shellfish species dominated the catch from the Local Study Area, accounting for 99% of the total landed value and 93% of landed weight (based on 2018-2022 data from MMO, 2023a). Landings of pelagic fish species accounted for 7% of the total landed weight, and demersal species for less than 1%. Scottish vessels were responsible for the majority (83%) of landings by value, with landings also being made by vessels registered in Northern Ireland (16%) and to a much lesser extent vessels registered in England, Isle of Man, Wales, and Guernsey (1%). The main landing ports local to the WDA include (but are not limited to) Oban, Tiree, Fionnphort (Mull), Rathmullen (Ireland), Port Ellen (Islay), Port Askaig (Islay) and other ports on Islay.

590. **Figure 12.2** and **Figure 12.3** show the top ten species landed from the commercial fisheries Local Study Area by value and weight respectively, from 2018 to 2022 (MMO, 2023a) for UK and Manx vessels landing into UK, Manx and non-UK ports, and non-UK vessels landing into UK ports. **Figure 12.4** shows the landed value over the same period from the Local Study Area by nation of vessel registration and gear type for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports. The key species landed are brown crab *(Cancer pagurus)*, nephrops *(Nephrops norvegicus)*, lobster *(Homarus gammarus)*, king scallop *(Pecten maximus)*, razor clams *(Ensis siliqua)* and *(Ensis arcuatus)* and velvet crab *(Necora puber)*.

591. Over the five-year period analysed, the most commercially important species landed from the Local Study Area is brown crab, with an average first sales value of £2.4 million per annum. Landings of brown crab peaked in 2018 and 2019, dropped in 2020 and have been increasing from 2021 onwards. Brown crab are caught by pots/creels left on the seabed. First sales value and weight of nephrops landings have remained consistent across the time period, with the exception of a drop in 2020. Nephrops are caught by pots / creels and demersal otter trawl gear. The average annual landing of nephrops has a first sales value of £1.1 million and weight of 180 tonnes. Landings of lobster have remained consistent across the time period with an average annual value of £1 million and weight of 80 tonnes. King scallop landings have increased over the 2018 to 2022 period, with an annual landed value of £1.2 million in 2022 – landings from this fishery are known to take a cyclical pattern based on productivity of the grounds with peaks from every five to seven years. The razor clam fishery has shown a large increase in 2021 and 2022, with first sales value of £1 million in 2022, compared to £240,000 in 2019. While fishing and landing of razor clams in Scotland is restricted to hand caught techniques (UK Government, 2017), a trial exploring the use of electrofishing (and subsequent retrieval by hand) began in 2018 and has been recently extended to January 2025 (Scottish Government, 2023). This may explain the increased landings in 2021 and 2022 for this

emerging fishery in the local area, noting that the fishery is limited to trial areas that do not overlap with the WDA.

592. Landing statistics indicate that 67% of landings by value from the Local Study Area are made by vessels 12 m and under in length, with most landings by value being made by vessels between 8 m and 10 m in length.

593. Landing trends per month will be analysed within the EIA for individual species at both an ICES rectangle level, and by port of landing to identify which fleet and fishery operate at specific times of the year.

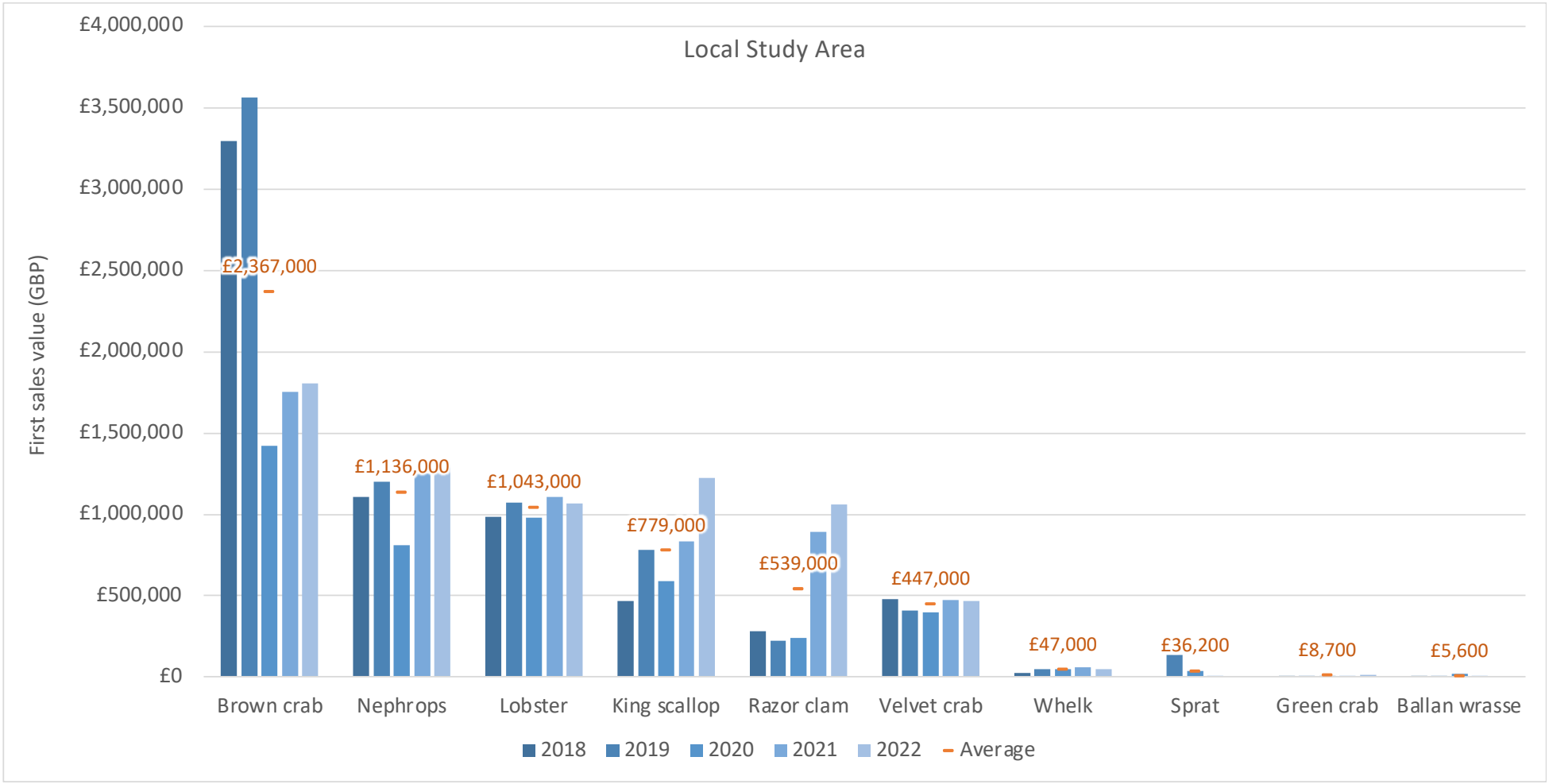


Figure 12.2 Top ten species by value from 2018 to 2022 landed from the commercial fisheries Local Study Area for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports

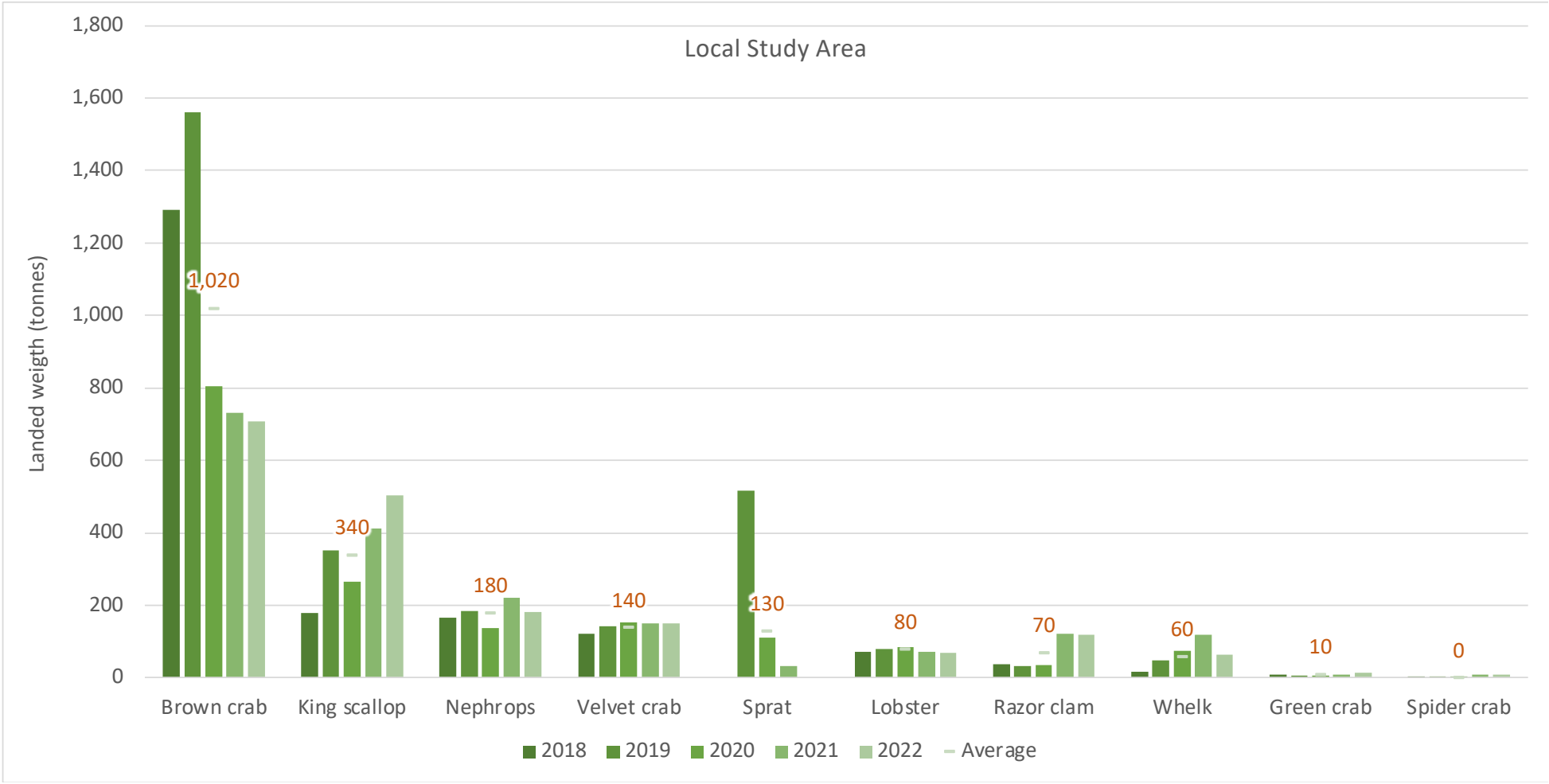


Figure 12.3 Top ten species by weight tonnes from 2018 to 2022 landed from the commercial fisheries Local Study Area for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports

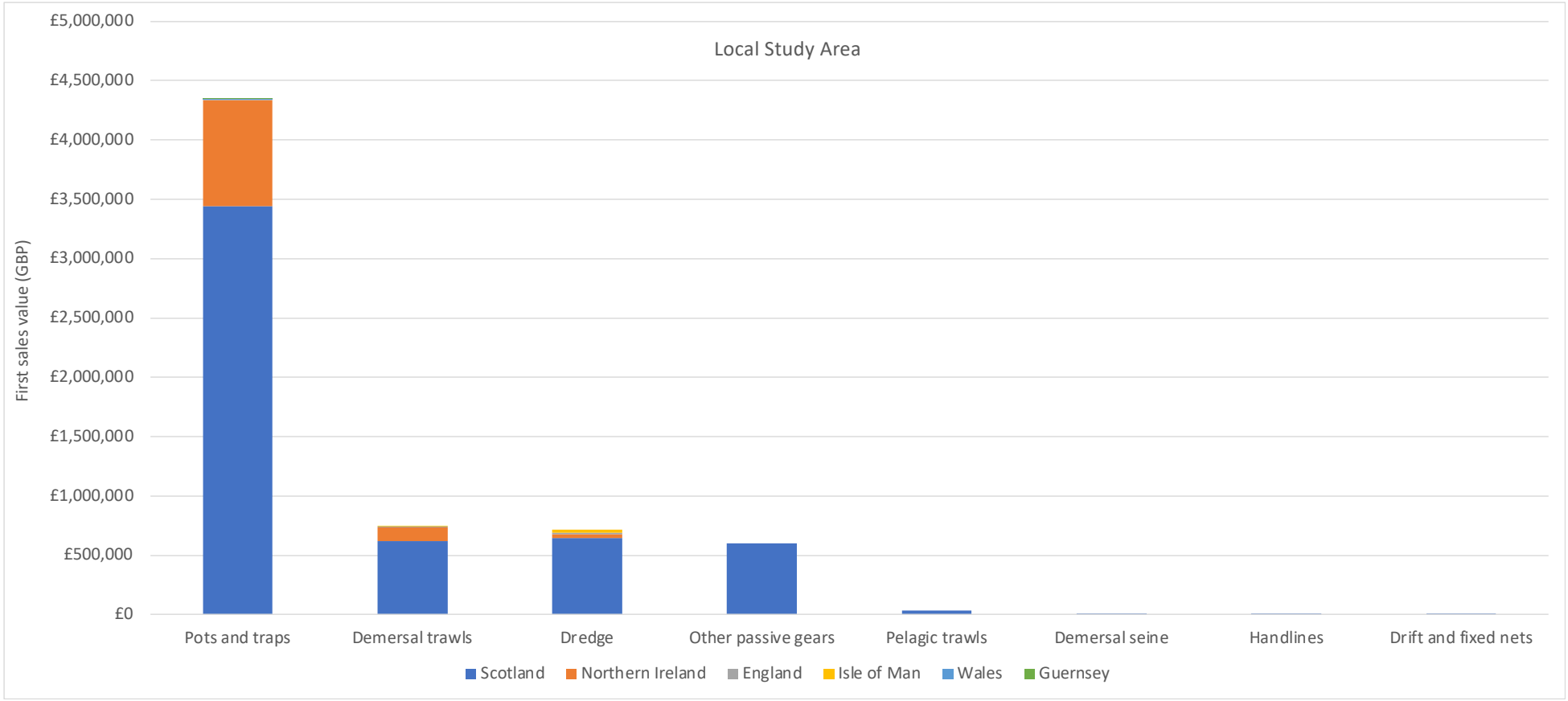


Figure 12.4 Average landed value from 2018 to 2022 from the commercial fisheries Local Study Area by nation and gear type for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports

12.7.2 Regional Study Area

594. **Figure 12.5** and **Figure 12.6** show the top ten species landed from the commercial fisheries Regional Study Area by value and weight respectively, from 2018 to 2022 (MMO, 2023a) for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports. **Figure 12.7** shows the landed value over the same period from the Regional Study Area by vessel nationality and gear type for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports. Key target species and active gear types are broadly aligned with those in the Local Study Area, with pots used to target brown crab, velvet crab and lobster, demersal otter trawl targeting nephrops and dredge targeting king scallop.

595. Landings data for non-UK vessels catching in the Regional Study Area and landing into UK ports indicates the potential for fishing activity by Isle of Man and Irish vessels. The majority of non-UK fleet activity is focused on dredge targeting king scallop. No landings are recorded for Norwegian, Danish and Swedish fishing vessels landing into the UK.

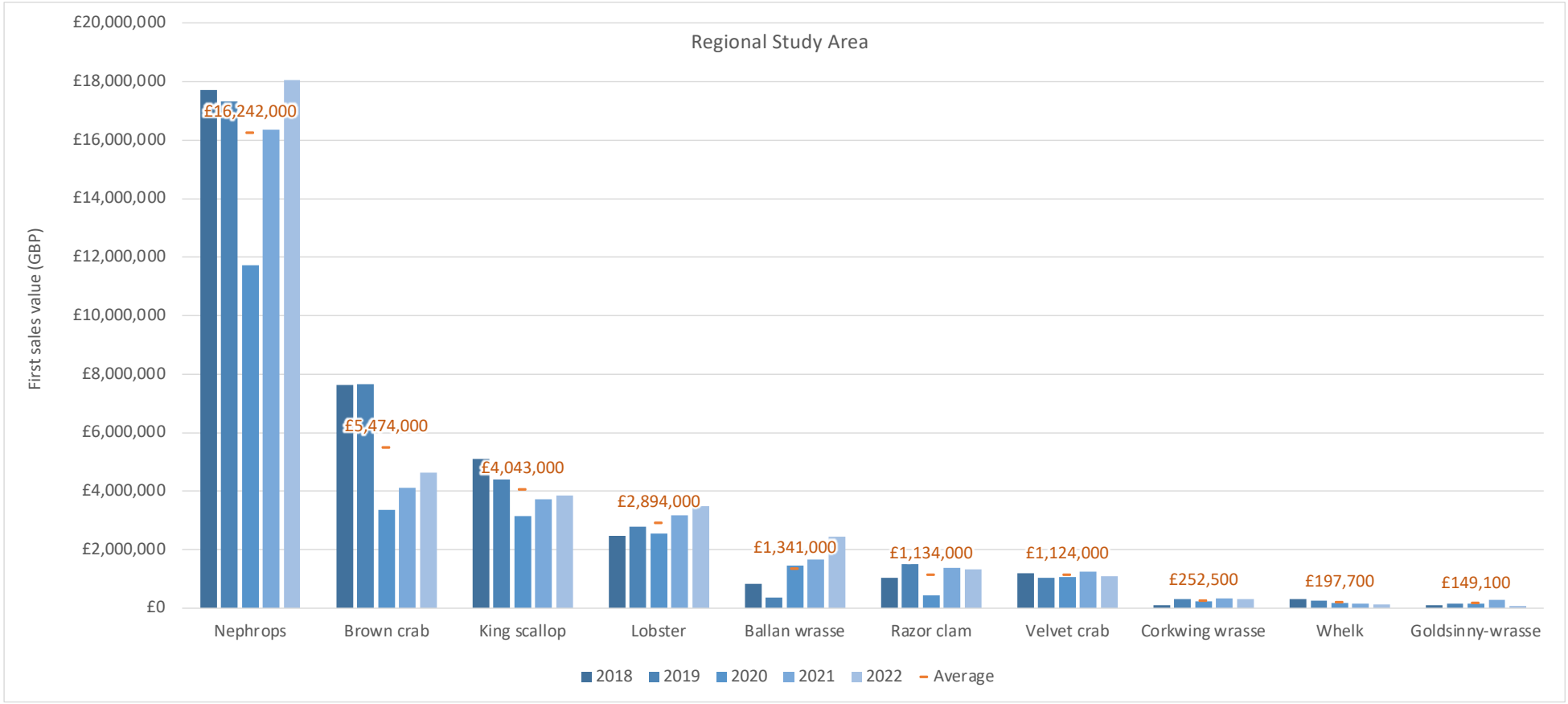


Figure 12.5 Top ten species by value from 2018 to 2022 landed from the commercial fisheries Regional Study Area for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports

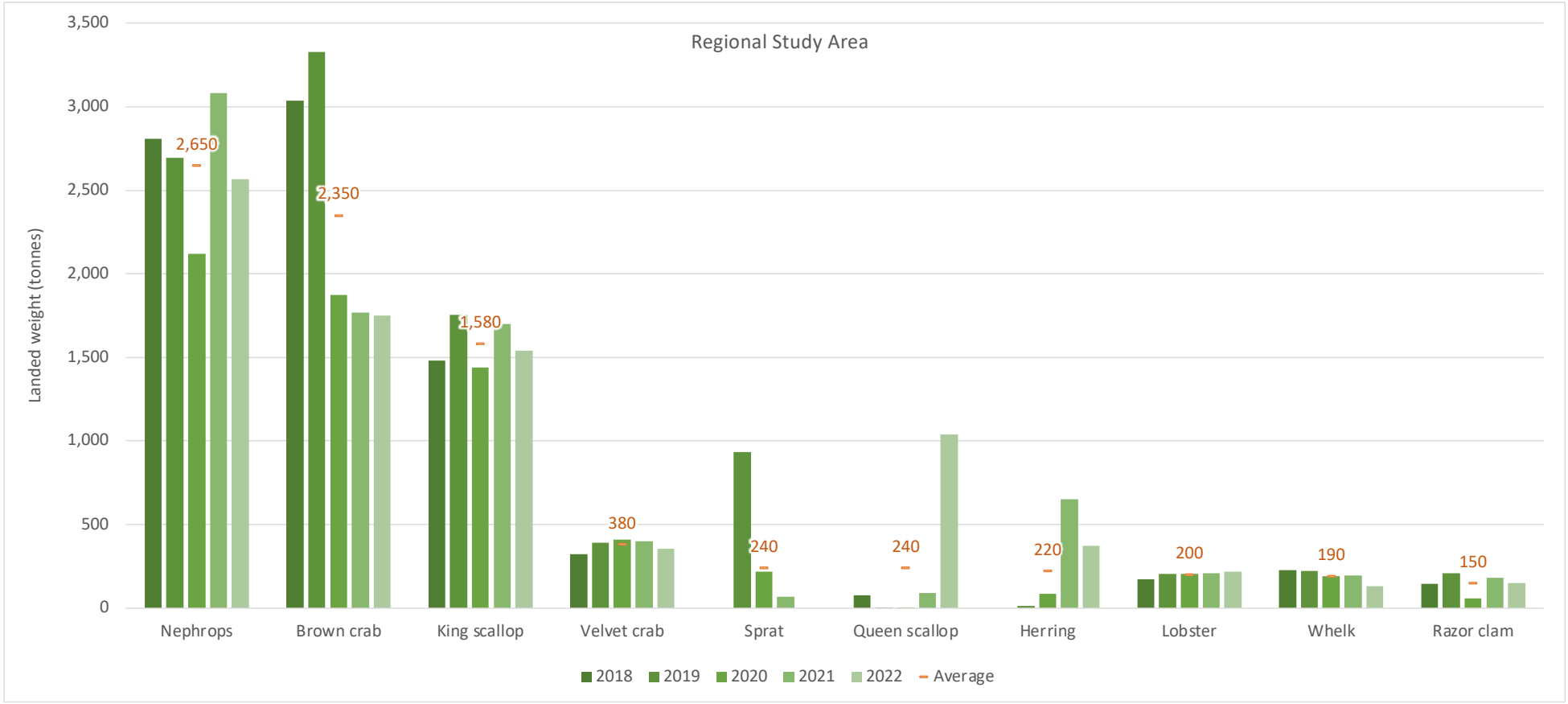


Figure 12.6 Top ten species by weight tonnes from 2018 to 2022 landed from the commercial fisheries Regional Study Area for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports

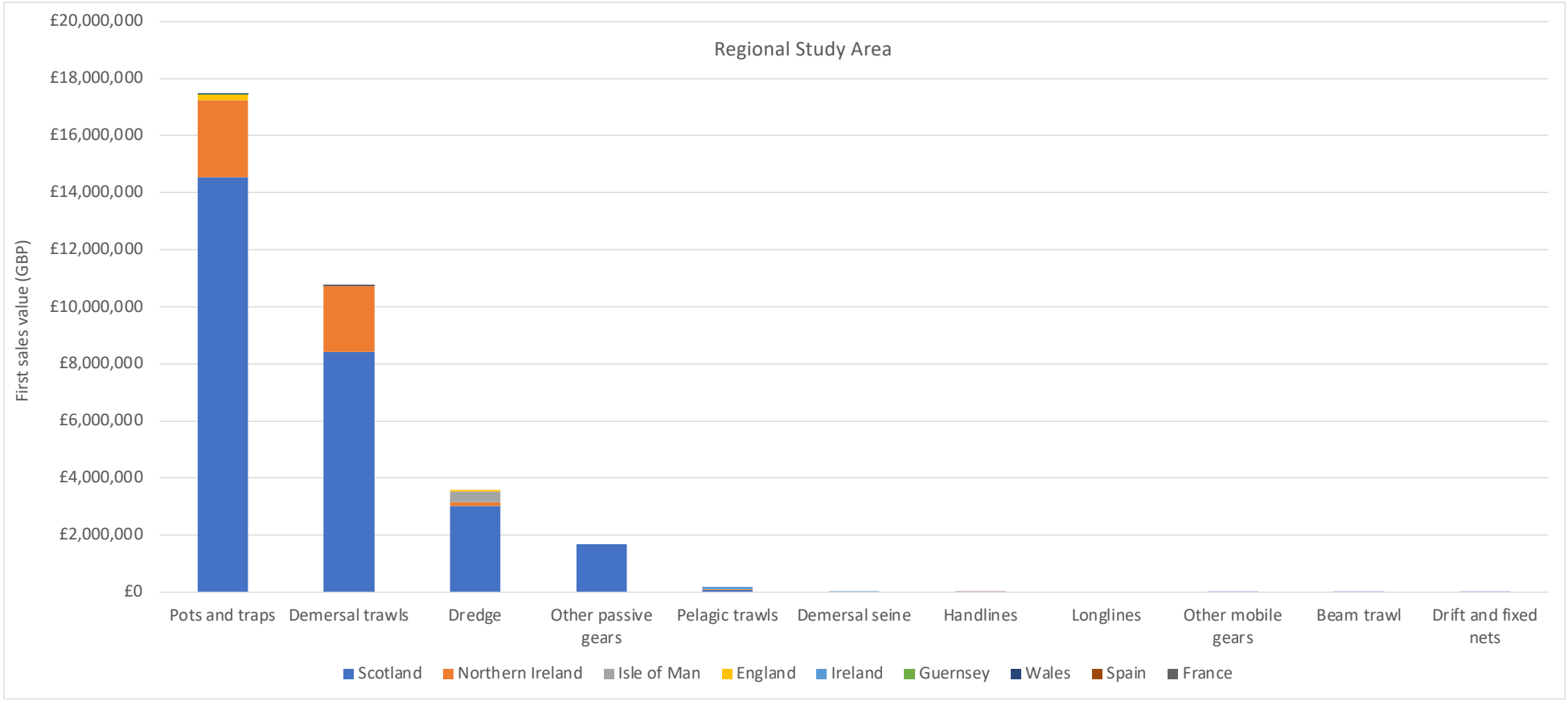


Figure 12.7 Average landed value 2018-2022 from the commercial fisheries Regional Study Area by nation and gear type for UK and Manx vessels landing into UK, Manx and non-UK ports and non-UK vessels landing into UK ports

12.7.3 Spatial Fishing Intensity

596. In addition to landings data, spatial data describing fishing activity is available, including Automatic Identification System (AIS) fishing vessel route density data. AIS is required to be fitted on fishing vessels 15 m and over in length. The data presented in **Figure 12.8** is specific to fishing vessels and indicates the route density per square km during 2022. This data does not distinguish between transiting vessels and active fishing but does provide a useful source to corroborate fishing grounds. Data indicates fishing vessel presence within the WDA, with sustained fishing vessel presence immediately north, west and east of the WDA. Activity is noted within the northern section of the WDA.

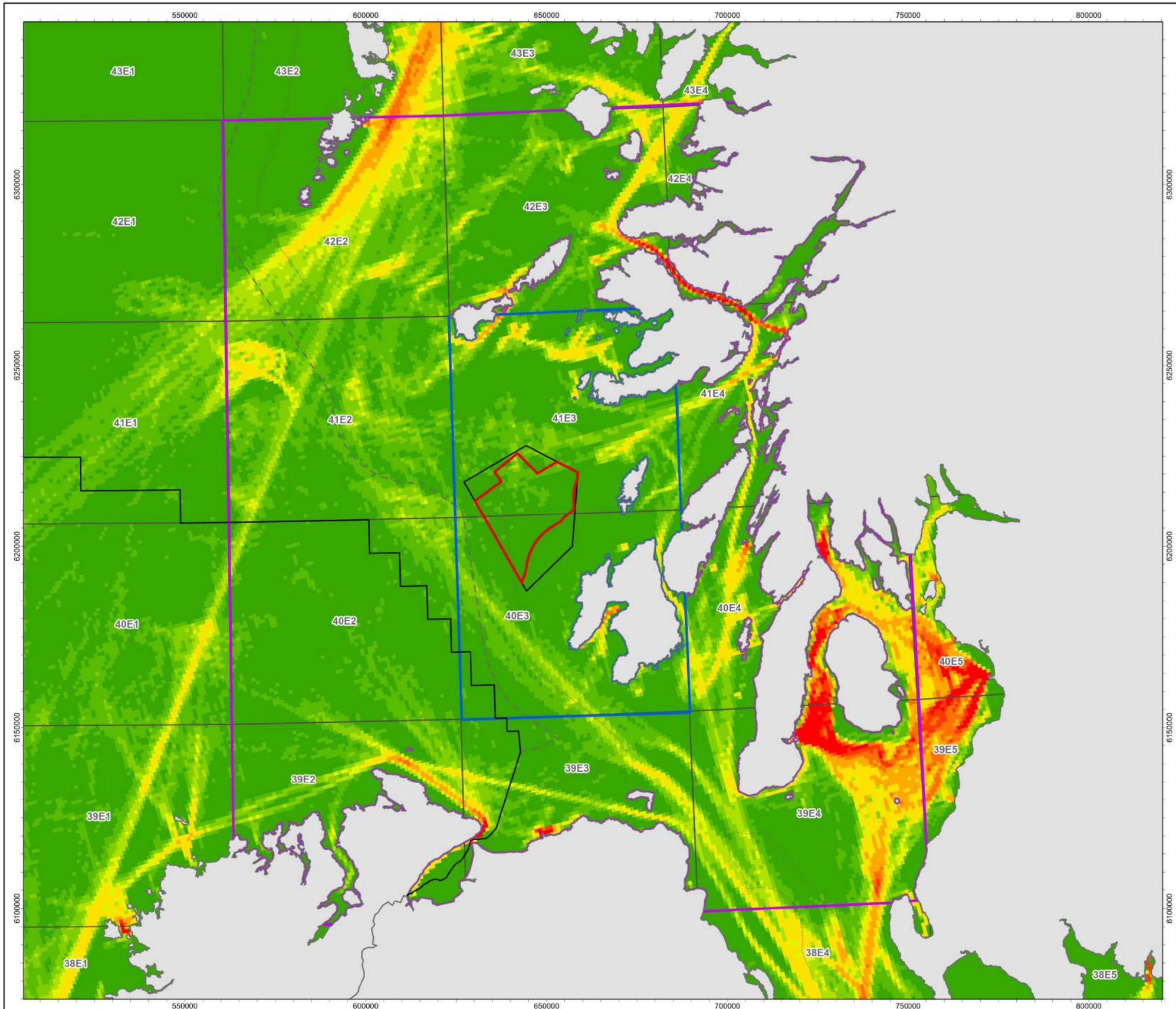
597. VMS data from the MMO is presented in **Figure 12.9** for the potting fleet, for vessels 15 m and over in length. Data from 2016 to 2020 (the latest available) was reviewed. Potting activity was notable by the 15 m and over fleet in 2017 and 2020 and is presented in **Figure 12.9**. In 2020 the potting activity occurred throughout the WDA and was most prominent in the northern half of the WDA.

598. Mapping for vessels 12 m and under is available for all Scottish vessels, without distinguishing gear type. This is mapped in **Figure 12.10** and shows high value in coastal locations, including the north of Islay (to the east of the WDA) and west of Mull (north of the WDA).

599. VMS data from the MMO is presented in **Figure 12.11** for UK demersal otter trawl vessels 15 m and over in length. This data indicates no activity within the WDA, but highlights hotspots of effort to the east of the WDA and to the southeast of Islay.

600. VMS data for the dredge fishery is presented in **Figure 12.12** for the annual period of 2020, because this represents one of the highest levels of activity in the 2016 to 2020 timeseries, noting the cyclical nature of scallop dredging. Dredge activity is primarily outside of the WDA and north (between Coll, Tiree and Mull) and south (along southern area of Islay).

601. VMS data for the pelagic trawl and beam trawl fleets has also been interrogated and indicates minimal effort by these gear types in the Regional Study Area.



Windfarm Development Area
Option Agreement Area
Local Study Area
Regional Study Area
ICES Statistical Rectangles
6 nm Boundary
12 NM Territorial Sea Boundary
UK-Ireland EEZ

Fishing Vessel Route Density (2022)

(Routes per Square km per year)

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 100
- 101 - 150
- 151 - 200
- 201 - 250
- 251 - 16,363

N

0 5 10 15 20 25 30 35 40 45 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	01/05/2024	FN	SM	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-NIM-000075		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 12.8: Commercial Fishing Vessel AIS Data Indicating Route Density for Transiting and Actively Fishing Vessels in 2022

NOT TO BE USED FOR NAVIGATION

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ScottishPower Renewables

Project: D:\Projects 2024\1027 MachairWind\APRX files\V2\MachairWind_CF_13.2_AIS2022.aprx
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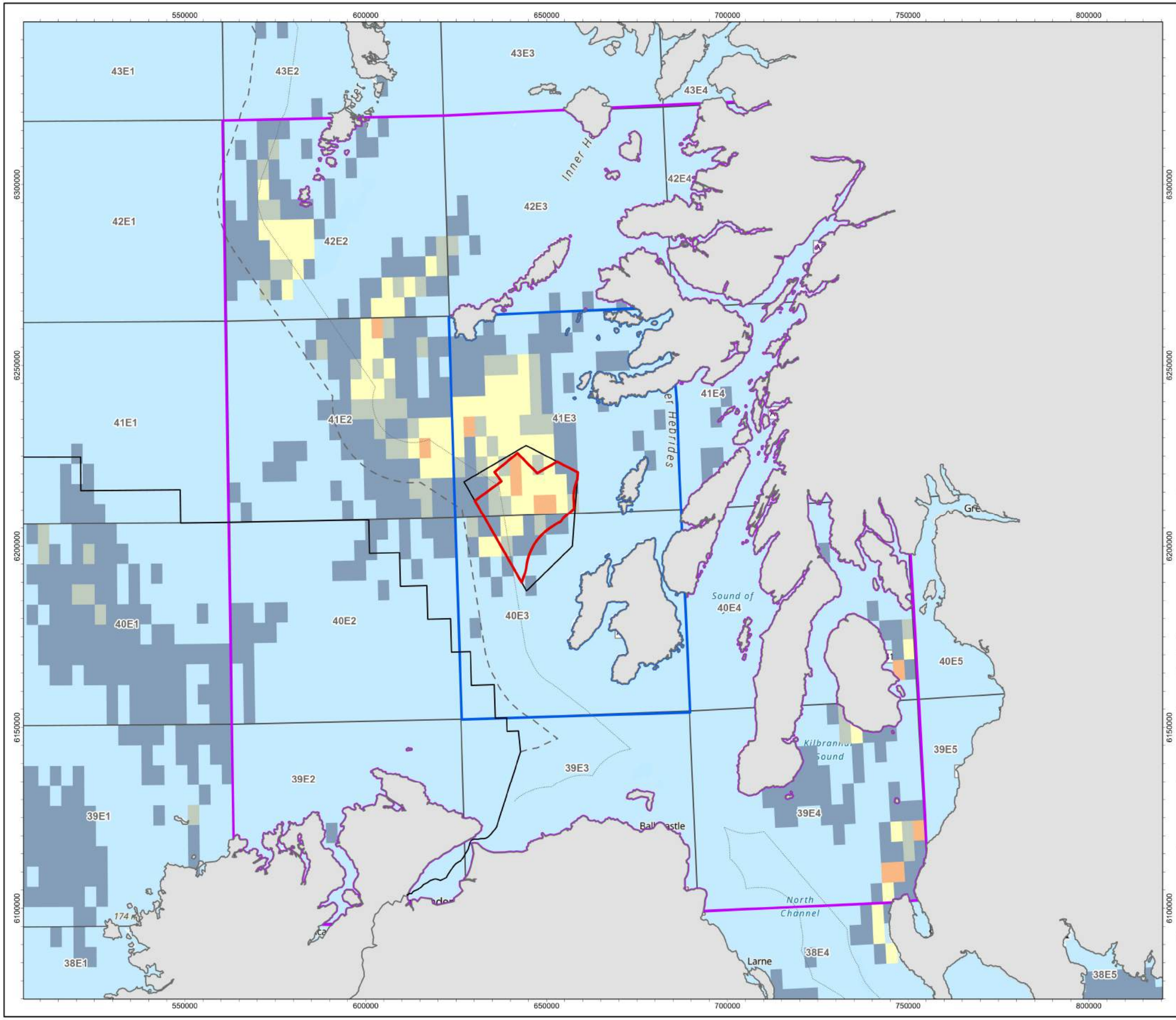


- Windfarm Development Area
- Option Agreement Area
- Local Study Area
- Regional Study Area
- ICES Statistical Rectangles
- 6 nm Boundary
- 12 NM Territorial Sea Boundary
- UK-Ireland EEZ

Potting 2020 (UK vessels ≥15m)

First Sales Value

Total value

- £0.01 - £5,000.00
- £5,000.01 - £10,000.00
- £10,000.01 - £25,000.00
- £25,000.01 - £50,000.00
- £50,000.01 - £75,000.00
- £75,000.01 - £145,000.00

N

0 5 10 15 20 25 30 35 40 45 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	01/05/2024	FN	SM	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-NIM-000076		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

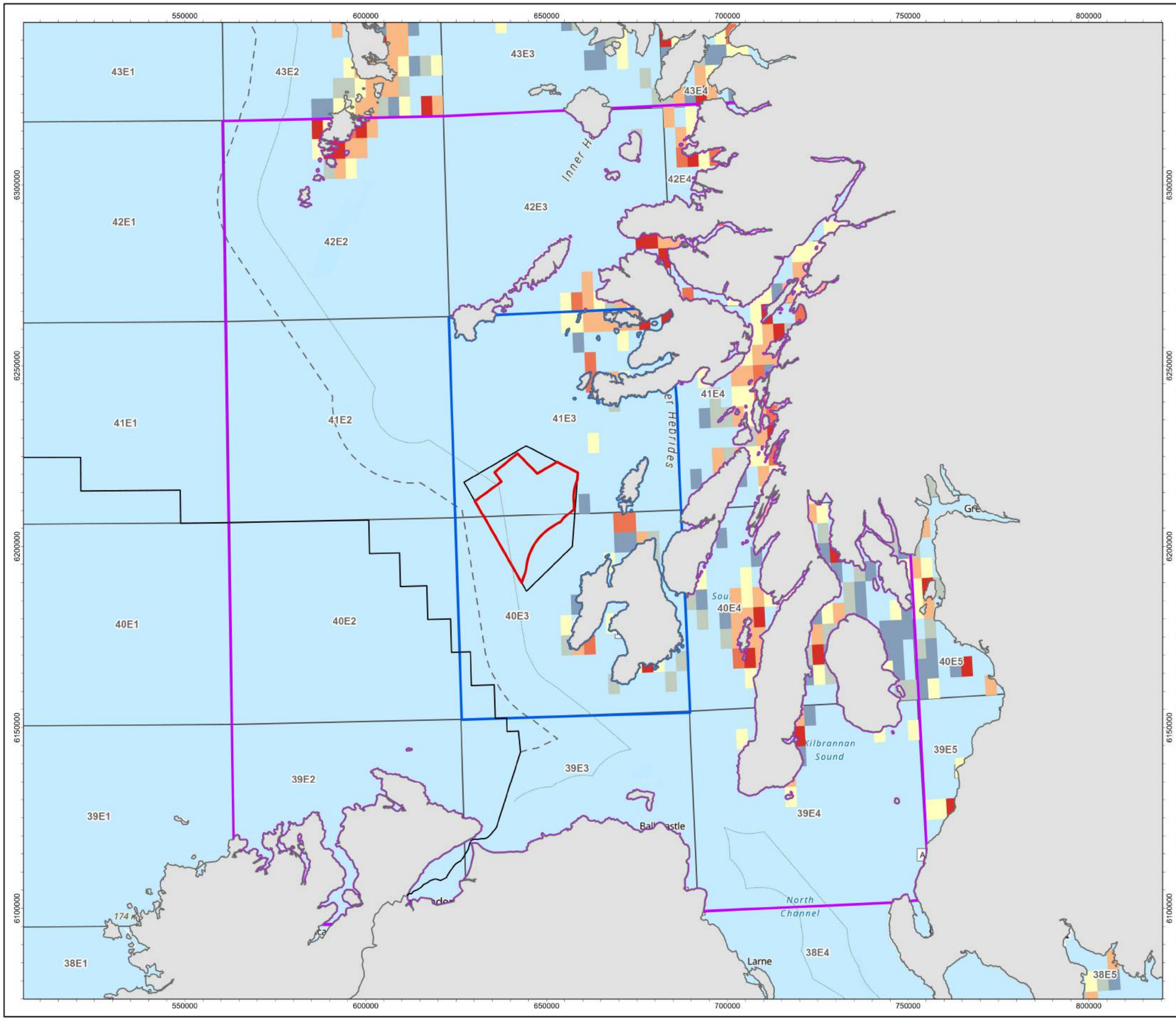
Figure 12.9: UK Potting Vessel VMS data indicating the First Sales Value of Vessels 15 m and over in 2020

NOT TO BE USED FOR NAVIGATION

nima CONSULTANTS

ScottishPower Renewables

Project: D:\Projects 2024\1027 MachairWind\APRX files\V2\MachairWind_CF_13.3_Potting2020.aprx
Name: MCH_ETRS89_UTM29N_A3_Landscape_Template_Contractor_Consultant



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	01/05/2024	FN	SM	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-NIM-000077		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 12.10: Scottish data indicating the Value Landed by all Vessels 12 m and Under

NOT TO BE USED FOR NAVIGATION

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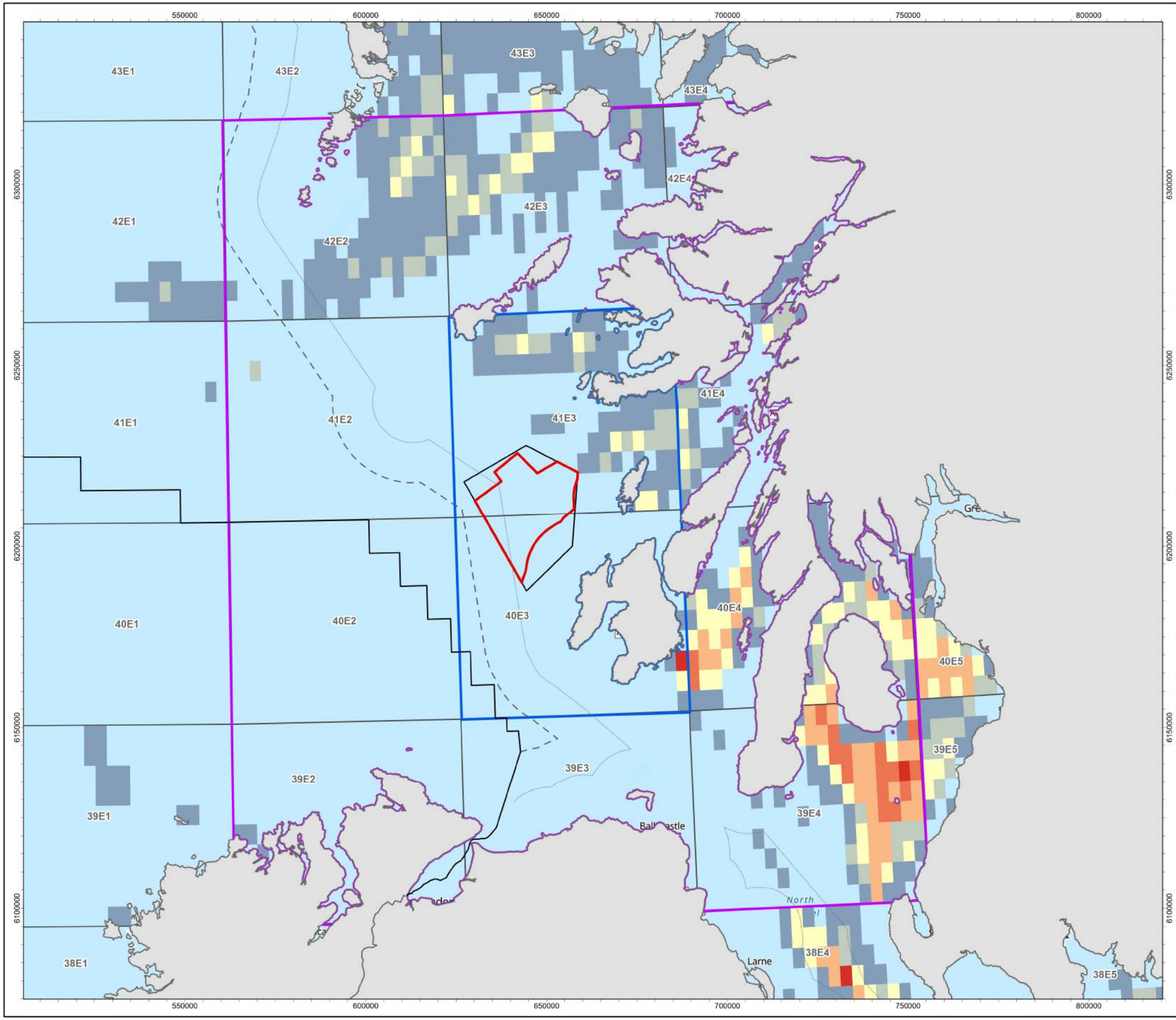
ScottishPower Renewables



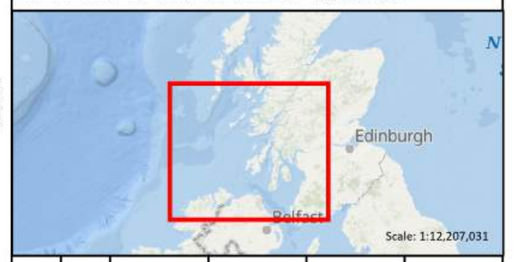
Windfarm Development Area
Option Agreement Area
Local Study Area
Regional Study Area
ICES Statistical Rectangles
6 nm Boundary
12 NM Territorial Sea Boundary
UK-Ireland EEZ

Demersal Otter Trawl 2020 (UK vessels ≥15m)

Total value
£0.02 - £5,000.00
£5,000.01 - £10,000.00
£10,000.01 - £25,000.00
£25,000.01 - £50,000.00
£50,000.01 - £75,000.00
£75,000.01 - £595,000.00

N

0 5 10 15 20 25 30 35 40 45 Kilometres



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	01/05/2024	FN	SM	CB	PB

DRAWING NUMBER MCW-GEN-GIS-MAP-NIM-000078

DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,000,000	PAGE SIZE	A3

PROJECT TITLE MachairWind

Figure 12.11: UK Demersal Otter Trawl Vessel VMS data indicating the First Sales Value of Vessels 15 m and over in 2020

NOT TO BE USED FOR NAVIGATION

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ScottishPower Renewables

Project: D:\Projects 2024\1027 MachairWind\APRX files\V2\MachairWind_CF_13.5_UKDemersal.aprx
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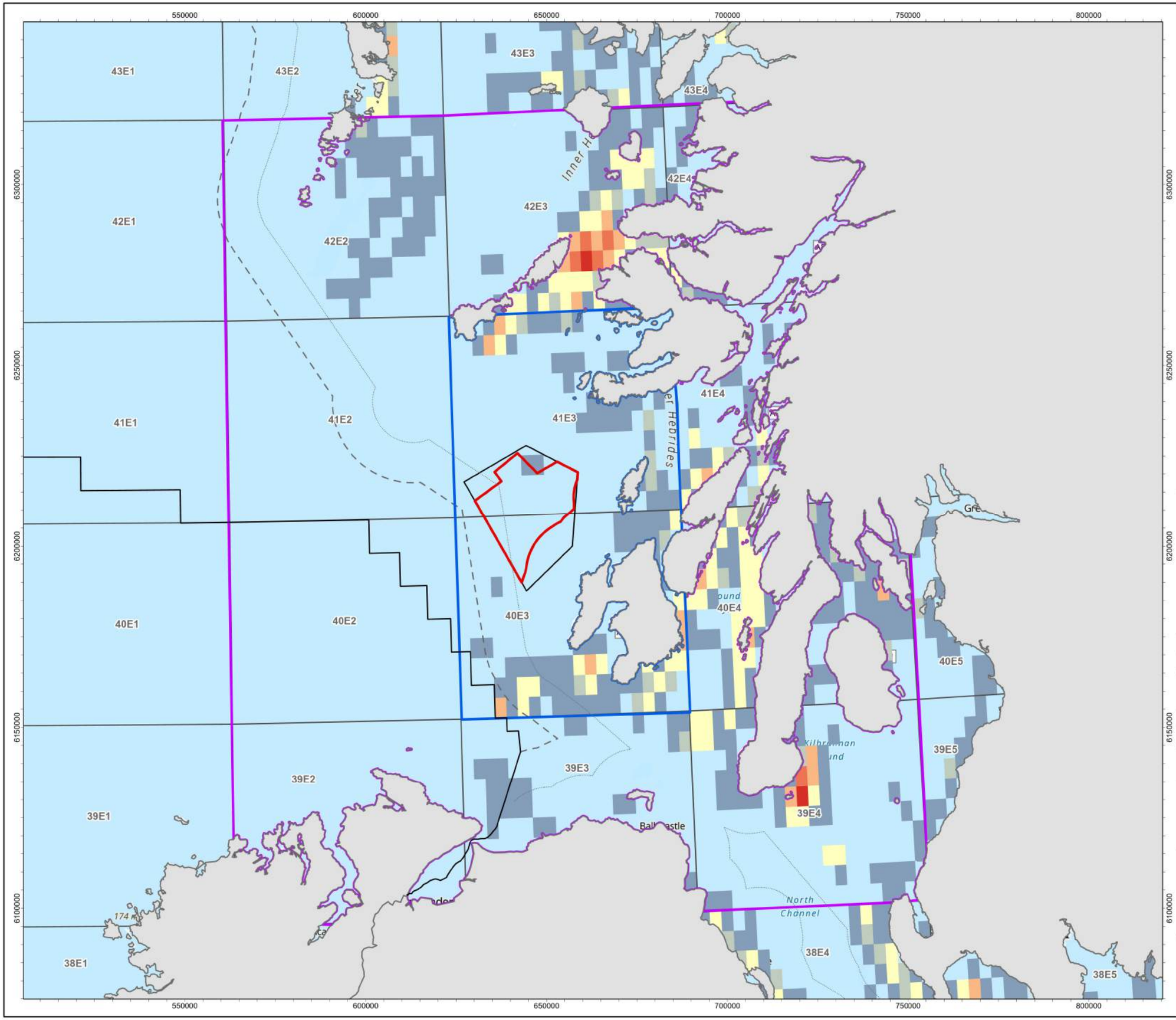

Windfarm Development Area
Option Agreement Area
Local Study Area
Regional Study Area
ICES Statistical Rectangles
6 nm Boundary
12 NM Territorial Sea Boundary
UK-Ireland EEZ

Dredge 2020 (UK vessels ≥15m)

Total value
£0.02 - £5,000.00
£5,000.01 - £10,000.00
£10,000.01 - £25,000.00
£25,000.01 - £50,000.00
£50,000.01 - £75,000.00
£75,000.01 - £232,000.00

N

0 5 10 15 20 25 30 35 40 45 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	01/05/2024	FN	SM	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-NIM-000079		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,000,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 12.12: UK Dredge Vessel VMS data indicating the First Sales Value of Vessels 15m and over in 2020

NOT TO BE USED FOR NAVIGATION

nima CONSULTANTS

ScottishPower Renewables

Project: D:\Projects 2024\1027 MachairWind\APRX files\V2\MachairWind_CF_13.6_UKDredge.aprx
Name: MCH_ETRS89_UTM29N_A3_Landscape_Template_Contractor_Consultant

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12.7.4 Commercial Fisheries Receptors

602. The key commercial fisheries receptors within the commercial fisheries Study Areas are identified as follows:

- UK potting vessels targeting brown crab and lobster, and nephrops;
- UK demersal otter trawl targeting nephrops;
- UK dredge targeting king scallop;
- UK passive fishing method (e.g., diving) targeting razor clam;
- Other fleets that may operate across the Regional Study Area include:
  - Isle of Man dredge targeting king scallop; and
  - Irish potters targeting brown crab (informed by the Fisheries Liaison Officer (FLO)).

12.8 MITIGATION MEASURES

603. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on commercial fisheries. These measures described in **Table 12.4** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 12.4 Indicative embedded mitigation measures for commercial fisheries

ID	Parameter	Description of Mitigation Measure
M-7	Marine Pollution Contingency Plan	Development of, and adherence to, a Marine Pollution Contingency Plan (MPCP). The MPCP will provide guidance to the Project personnel, contractors and subcontractors on the actions and reporting requirements in the event of spills and collision incidents. The MPCP will also contain emergency plans and mitigation procedures for a range of potential marine pollution incidents.
M-8	Cable Plan	Development of, and adherence to, a Cable Plan (incorporating a Cable Burial Risk Assessment). The Cable Plan will confirm planned cable routeing, burial, and any additional external cable protection, and will set out methods for post-installation cable monitoring. Furthermore, this plan will detail environmental sensitivities and design consideration to mitigate, as far as practicable, the effects of inter-array cable laying and associated protection during installation and operation of the Windfarm Development Area (WDA) infrastructure.
M-10	Unexploded Ordnance	Development of an Unexploded Ordnance Threat and Risk Assessment.
M-16	Fisheries Management and Mitigation Strategy	Development of, and adherence to, a Fisheries Management and Mitigation Strategy (FMMS). The FMMS will set out the means of ongoing fisheries liaison through construction and Operation and Maintenance (O&M) phases of the WDA and detail any mitigation measures to be put in place to limit effects on commercial fisheries activity. This plan will detail the approach to undertaking pre-construction, construction, and operational works in co-operation with existing commercial fisheries activities, developed in consultation with fishing representatives. The plan will be informed by engagement with relevant stakeholders, as appropriate.
M-17	Fisheries Liaison Officer.	Appointment of a Fisheries Liaison Officer (FLO) throughout the lifetime of the Project to ensure ongoing communication between the Project and commercial fisheries stakeholders.
M-18	Navigational Safety Plan	Development of, and adherence to, a Navigational Safety Plan (NSP). The NSP will describe measures put in place related to navigational safety, including information on safety zones, charting, construction buoyage, temporary lighting and marking, and means of notification of activities associated with the WDA to other sea users.

ID	Parameter	Description of Mitigation Measure
M-19	Notice to Mariners	Advanced warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher webpage. All notices will be uploaded to the Project website.
M-20	Lighting and Marking Plan	Development of, and adherence to, a Lighting and Marking Plan (LMP). This plan will set out the marine and aviation navigational lighting and marking measures to be applied during the construction and operation of the WDA, in line with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guidance G1162 (IALA, 2021) including a buoyed construction area.
M-21	Fisheries Best Practice	Adherence to best practice guidance with regards to fisheries liaison and procedures in the event of interactions between the WDA and fishing activities (e.g., Fisheries Liaison with Offshore Wind and Wet Renewables group (FLOWW), 2014; 2015).
M-22	Fisheries Working Group	If appropriate, fisheries working groups will be organised to encourage collaboration between the Project and fishing community and provide a forum to discuss shared issues, concerns, and suggestions to help inform the Project approach. Noting the confidential nature of some commercial fisheries information and areas of interest, one-to-one engagement will continue to be offered to fishers throughout the lifetime of the Project.
M-23	Safety Zones	Application for and use of Safety Zones of up to 500 metres (m) during construction, major repairs and decommissioning phases. Where appropriate, guard vessels, and an FLO as appropriate, will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation during construction, O&M, and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards. Safety zones during the operational phase are also being considered. The Environmental Impact Assessment (EIA) will include an assessment of the proposed approach to Safety Zones at the point of application.
M-24	Dropped Objects	Dropped objects on the seabed during works associated with the WDA which may pose a hazard will be reported in line with Marine Directorate – Licensing Operations Team procedures (Marine Scotland, 2020). Objects will be recovered where they pose a hazard to other marine users and where recovery is possible.
M-25	Marking	All WDA infrastructure will be appropriately marked on the United Kingdom Hydrographic Office Admiralty Charts.
M-27	Emergency Response and Cooperation Plan	Development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP). This plan ensures co-operation with the Maritime and Coastguard Agency (MCA) by detailing the design parameters of the WDA, emergency contact details, and processes to be followed.
M-28	Guard Vessels	Where appropriate, guard vessels will be used to ensure adherence with Safety Zones (M-23) or advisory passing distances.
M-29	Marine Coordination Centre	A marine coordination centre will be implemented to manage Project vessels throughout construction, O&M and decommissioning.
M-31	Vessel Marine Regulations	Compliance of all Project vessels with international marine regulations as adopted by the Flag State, notably Convention on International Regulations for Preventing Collisions at Sea (COLREGs) IMO, 1972/77) and International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974).

ID	Parameter	Description of Mitigation Measure
M-32	Vessel Management Plan	Development of, and adherence to, a Vessel Management Plan. This plan will provide the procedures for management and coordination of vessels to mitigate the impact of Project vessels.
M-35	Failures of Lighting and Marking	Failures of the lighting and marking in the WDA will be appropriately reported and rectified as soon as practicable. Interim hazard warnings (i.e. Notice to Mariners) (M-19) will be put in place as required.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

604. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to commercial fisheries will be assessed with this mitigation in place.

12.9 SCOPING OF POTENTIAL IMPACTS

605. A range of potential impacts on commercial fisheries receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

606. **Table 12.5** outlines the commercial fisheries impacts which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data becomes available.

Table 12.5 Potential impacts scoped in or scoped out for commercial fisheries

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the WDA	✘	✘	✘	This effect will be localised to Safety Zones associated with construction, decommissioning and temporary maintenance works on installed structures and advisory safe distances from infrastructure and therefore limited deviations to steaming routes are expected. Given adequate notification, it is expected that vessels, which typically have an operational range beyond that of the WDA (as indicated by Vessel Monitoring System (VMS) and inshore mapping presented above), will be in a position to avoid localised Safety Zones with no or minimal impact on their steaming times. Therefore, potential impacts and effects on additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Windfarm Development Area (WDA) has been **scoped out** of the Environmental Impacts Assessment (EIA), for all phases.
Reduction in access to, or exclusion from established fishing grounds	✓	✓	✓	Construction and decommissioning activities have potential to create loss of fishing opportunities. This effect is expected to be localised and short term; furthermore, the operational range of relevant fleets will not typically be limited to the WDA. During the operation and maintenance (O&M) phase, the presence of offshore infrastructure within the WDA may result in a loss of or restricted access to fishing grounds. Access to fishing grounds within the WDA will be dependent on turbine spacing, turbine layout, foundation type and cable protection. Therefore, potential impacts and effects on the reduction in access to, or exclusion from established fishing grounds has been **scoped into** the EIA, for all phases.
Displacement of fishing activity leading to gear conflict and increased fishing pressure on adjacent grounds	✓	✓	✓	Any reduced access to fishing grounds creates the potential for displacement of fishing activity. This effect is expected to be short to medium-term and the operational range of relevant fleets will not typically be limited to the WDA. Therefore, potential impacts and effects on the displacement of fishing activity leading to gear conflict and increased fishing pressure on adjacent grounds has been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity	✓	✓	✓	Construction and decommissioning activities may lead to disturbance of commercially important fish and shellfish resources, which in turn may result in displacement or disruption to a range of fishing activity. Assessment will be informed by the outcomes of the fish and shellfish ecology impact assessment, and it will be assumed that commercial fisheries will be affected as a result of any loss of resources. Therefore, potential impacts and effects on the disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity has been **scoped into** the EIA, for all phases.
Increased vessel traffic associated with the WDA within fishing grounds leading to interference with fishing activity	✓	✓	✓	Movement of Project vessels associated with the WDA adding to the existing volume of marine traffic in the area, may lead to interference of fishing activity. Assessment will be informed by the outcomes of the shipping and navigation impact assessment and Navigational Risk Assessment (NRA). Therefore, potential impacts and effects on increased vessel traffic associated with the WDA within fishing grounds leading to interference with fishing activity has been **scoped into** the EIA, for all phases.
Physical presence of infrastructure and potential exposure of that infrastructure leading to gear snagging	✓	✓	✓	The presence of partially constructed infrastructure and infrastructure associated with O&M (e.g. cable/scour protection) and other seabed obstacles, may pose a snagging risk to fishing vessels, which could result in loss or damage to fishing gear. The extent of impact may vary depending upon the Project design. Standard industry practice and protocol (e.g., seabed infrastructure will be buried and/or marked on nautical charts) will minimise the risk of gear snagging, but it remains likely to be an area of industry concern. Safety aspects associated with this impact, including damage to property and vessel stability, will be considered within the shipping and navigation impact assessment. Therefore, potential impacts and effects on the physical presence of infrastructure and potential exposure of that infrastructure leading to gear snagging has been **scoped into** the EIA, for all phases.
*C, O&M, D = Construction, Operation and Maintenance, and Decommissioning, respectively.				

12.10 POTENTIAL CUMULATIVE EFFECTS

607. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA and OfTDA to affect commercial fisheries receptors. The approach to assessment of potential cumulative impacts is set out in **Chapter 4 Approach to Scoping and EIA**.

608. The potential impacts to be taken forward for consideration in the Cumulative Effects Assessment (CEA) will be in line with those described for the WDA-alone assessment and OfTDA appraisal. Impacts assessed as negligible adverse significance (or lower) will not be taken forward to CEA and it is possible that some will be screened out on the basis that the impacts are highly localised or the risk of effects occurring is reduced, given management measures will be in place for the Project and other plans and projects.

609. The CEA for commercial fisheries will consider the maximum adverse design envelope for each of the projects, plans and activities in line with the methodology outlined in **Chapter 4 Approach to Scoping and EIA**. A Study Area of the boundary of the South West Coast Regional Inshore Fisheries Group will be used for the commercial fisheries CEA because this area is expected to be representative of the active fleets across the WDA.

12.11 POTENTIAL TRANSBOUNDARY IMPACTS

610. Transboundary impacts are scoped into the assessment and will be considered based on any potential displacement of fishing activity into the Irish and Isle of Man Exclusive Economic Zones.

12.12 APPROACH TO IMPACT ASSESSMENT

611. The EIA will follow the general approach outlined in **Chapter 4 Approach to Scoping and EIA** of this Scoping Report. Definitions specific to commercial fisheries in relation to assessing the magnitude of an impact are outlined in **Table 12.6** and the criteria for defining the sensitivity of the commercial fisheries receptor are outlined in **Table 12.7**.

612. The assessment will be undertaken on a fleet-by-fleet basis, based on the key commercial fishing receptors identified in the existing environment. Each fleet will be defined as the active fishing vessels across the local and regional Study Areas based on vessel nationality, gear type and target species.

613. The impact assessment will be informed by the outcomes of the fish and shellfish ecology assessment in relation to potential effects on commercial resources and the shipping and navigation assessment in relation to data and information on fishing vessel activity collected through marine traffic surveys and the Navigational Risk Assessment (NRA).

Table 12.6 Definition of terms relating to the magnitude of an impact

Magnitude category	Justification
High	**Adverse** Impact is expected to result in one or more of the following: • Substantial loss of target fish or shellfish biological resource (e.g., loss of substantial proportion of resource within project area); and • Substantial loss of ability to carry on fishing activities (e.g., substantial proportion of effort within project area). And/or: Impact is of long-term duration (e.g., greater than 12 years) and/or is of extended physical extent.

Magnitude category	Justification
	Beneficial Impact is expected to result in one or more of the following: • Large scale or major improvement of resource quality, measurable against biomass reference points; and • Extensive restoration or enhancement of habitats supporting commercial fisheries resources.
Medium	**Adverse** Impact is expected to result in one or more of the following: • Partial loss of target fish or shellfish biological resource (e.g., moderate loss of resource within project area); and • Partial loss of ability to carry on fishing activities (e.g., moderate reduction of fishing effort within project area). And/or: Impact is of medium-term duration (e.g., less than 12 years) and/or is of moderate physical extent.
	Beneficial Impact is expected to result in one or more of the following: • Moderate improvement of resource quality; and • Moderate restoration or enhancement of habitats supporting commercial fisheries resources.
Low	**Adverse** Impact is expected to result in one or more of the following: • Minor loss of target fish or shellfish biological resource (e.g., minor loss of resource within project area); and • Minor loss of ability to carry on fishing activities (e.g., minor reduction of fishing effort within project area). And/or: Impact is of short-term duration (e.g., less than 2 years) and/or is of limited physical extent.
	Beneficial Impact is expected to result in one or more of the following: • Minor benefit to or minor improvement of resource quality; and • Minor restoration or enhancement of habitats supporting commercial fisheries resources.
Negligible	Impact is expected to be undetectable compared to pre-project baseline conditions.

Table 12.7 Definition of terms relating to the sensitivity of the receptor

Sensitivity Category	Justification
High	Receptor is highly vulnerable to impacts that may arise from the project and recoverability is long term or not possible. And/or: No alternative fishing grounds are available.
Medium	Receptor is somewhat vulnerable to impacts that may arise from the project and has moderate levels of recoverability. And/or: Moderate levels of alternative fishing grounds are available and/or fishing fleet has moderate operational range.

Sensitivity Category	Justification
Low	Receptor is not generally vulnerable to impacts that may arise from the project and/or has high recoverability. And/or: High levels of alternative fishing grounds are available and/or fishing fleet has large to extensive operational range; fishing fleet is adaptive and resilient to change.
Negligible	Receptor is not vulnerable to impacts that may arise from the project and/or has high recoverability. And/or: Extensive alternative fishing grounds available and/or fishing fleet is highly adaptive and resilient to change.

614. The magnitude of the impact and the sensitivity of the receptor are combined when determining the significance of the effect upon commercial fisheries, as presented in **Table 12.8**.

Table 12.8 Significance of effect matrix

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

615. Where a significance of moderate or above is determined, further mitigation will be developed to mitigate the impact and lower the overall residual effect. For the purposes of the assessment, and after further mitigation is applied as appropriate:

- A level of residual effect of moderate or more will be considered a 'significant' effect in terms of the EIA Regulations; and
- A level of residual effect of minor or less will be considered 'not significant' in terms of the EIA Regulations.

12.13 SCOPING QUESTIONS TO CONSULTEES

616. The following questions are posed to consultees to help frame and focus their response to the commercial fisheries scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the Study Areas defined for commercial fisheries?
- Do you agree with the data sources to be used to characterise the commercial fisheries baseline within the EIA?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on commercial fisheries receptors?
- Do you agree with the scoping in and out of impact pathways in relation to commercial fisheries?
- Do you agree with the proposed assessment methodology for commercial fisheries?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

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month; vessel length category; country code; vessel/gear type; port of landing; species; live weight (tonnes); and value.

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13 SHIPPING AND NAVIGATION

13.1 INTRODUCTION

617. This chapter considers the scope of potential impacts and likely significant effects (LSE) on shipping and navigation that may arise from the construction, operation and maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

618. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on shipping and navigation in the Environmental Impact Assessment (EIA).

619. The general approach detailed for shipping and navigation in this chapter is as required by the Maritime and Coastguard Agency (MCA) under Marine Guidance Note (MGN) 654 (MCA, 2021). The MCA is a key stakeholder for shipping and navigation and MGN 654 is the primary guidance detailing how associated assessments for Offshore Windfarms (OWFs) should be undertaken.

620. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 12 Commercial Fisheries** – the shipping and navigation assessment includes consideration of navigational safety impacts to fishing vessels in transit, while the Commercial Fisheries chapter specifically provides detailed consideration of commercial impacts associated with active fishing.
- **Chapter 14 Offshore Archaeology and Cultural Heritage** – while wrecks shown on Admiralty charts are considered in the shipping and navigation assessment, these charted wrecks are not necessarily comprehensive of all wrecks in the area.

621. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

13.2 LEGISLATION, POLICY AND GUIDANCE

622. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 13.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for shipping and navigation.

Table 13.1 Summary of relevant legislation, policy and guidance for shipping and navigation

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Legislation	
United Nations Convention on the Law of the Sea (United Nations (UN), 1982)	Lays down a comprehensive regime of law and order in the world's oceans and seas establishing rules governing all uses of the oceans and their resources.
Convention on the International Regulations for Preventing Collisions at Sea (International Maritime Organization, 1972/77)	Establish the navigation rules which must be followed by vessels at sea to prevent a collision incident.

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
International Convention for the Safety of Life at Sea (IMO, 1974)	Specifies the minimum standards for the construction, equipment and operation of vessels, compatible with their safety.
Policy	
Scotland's National Marine Plan (Scottish Government, 2015)	The purpose of the Scotland's National Marine Plan (NMP) is to set out policies for the sustainable development of Scotland's marine resources out to 200 nautical miles (nm). It also provides a strategic framework for marine licensing decisions. The NMP outlines objectives relating to offshore wind and marine renewable energy which intend to maximise the sustainable development of offshore wind by creating economic benefits through increasing a domestically competitive supply chain whilst contributing to decarbonisation targets. **The key references are:** **Transport 1:** *"Navigational safety in relevant areas used by shipping now and in the future will be protected, adhering to the rights of innocent passage and freedom of navigation contained in UN Convention on the Law of the Sea (UNCLOS). The following factors will be taken into account when reaching decisions regarding development and use…"* **Transport 2:** *"Marine development and use should not be permitted where it will restrict access to, or future expansion of, major commercial ports or existing proposed ports and harbours which are identified as National Developments…"* **Transport 3:** *"Ferry routes and maritime transport to island and remote mainland areas provide essential connections and should be safeguarded from inappropriate marine development and use that would significantly interfere with their operation. Developments will not be consented where they will unacceptably interfere with lifeline ferry services…"* **Transport 6:** *"Marine planners and decision makers and developers should ensure displacement of shipping is avoided where possible to mitigate against potential increased journey lengths (and associated fuel costs, emissions and impact on journey frequency) and potential impacts on other users and ecologically sensitive areas…"*
Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020)	The Sectoral Marine Plan (SMP) for Offshore Wind Energy identifies sustainable areas for the future development of commercial scale offshore wind energy in Scotland, including a spatial strategy to inform the seabed leasing process for the purposes of offshore wind energy. The WDA is located in Plan Option W1, as identified in the SMP for Offshore Wind. Plan Options including W1 were subject to testing, refinement and area reduction through Strategic Environmental Assessment (SEA), Habitats Regulations Appraisal (HRA) and plan development processes. The SEA identified relevant characteristics of Plan Option W1 and identified key risks to be addressed in consenting applications. A key risk factor identified for the W1 area is potential impacts on commercial shipping and potential cost impacts and associated navigational risk from diverting key commercial shipping routes.

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Guidance	
Marine Guidance Note 654 Offshore Renewable Energy Installations – Guidance on United Kingdom Navigational Practice, Safety and Emergency Responses and its Annexes (MCA, 2021)	Highlights issues to consider when assessing navigational safety and emergency response, caused by Offshore Renewable Energy Installations (OREI).
Revised Guidelines for Formal Safety Assessment for Use in the Rule-Making Process. MSC-MEPCC.2/Circ.12/Rev.2 (IMO, 2018)	The Formal Safety Assessment (FSA) is a structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity as defined by the International Maritime Organisation (IMO).
International Association of Marine Aids to Navigation and Lighthouse Authorities Guideline G1162 on the Marking of Offshore Man-Made Structures (IALA, 2021)	Details International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance for the marking of different types of offshore structures including offshore windfarms.
Marine Guidance Note 372 Amendment 1 (M+F) – Safety of Navigation: Guidance to Mariners Operating in the Vicinity of United Kingdom Offshore Renewable Energy Installations (MCA, 2022)	Highlights the issues to be considered when planning and undertaking voyages in the vicinity of OREIs in United Kingdom (UK) waters.
The Royal Yachting Association Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2019a)	Provides the Royal Yachting Association (RYA) position on offshore windfarms in terms of impacts to recreational vessels.

13.3 CONSULTATION

623. **Table 13.2** describes the consultation relevant to shipping and navigation that has been undertaken to date.

Table 13.2 Consultation relevant to shipping and navigation

Consultee	Date / Engagement Activity	Comment	Applicant Response
Maritime and Coastguard Agency	11 October 2023	Agreement of vessel traffic survey strategy approach.	Approach is as per agreed with the MCA (see **Section 13.5**).
Ministry of Defence	16 November 2023	Notification of vessel traffic survey.	Confirmation from MoD of no objections to the vessel traffic survey.

624. Consultation with shipping and navigation stakeholders will be ongoing throughout the EIA process and will include engagement with:

- Maritime and Coastguard Agency (MCA);
- Ministry of Defence (MoD):
- Northern Lighthouse Board (NLB);
- CalMac Ferries; and
- RYA.

625. Initial consultation with some of the stakeholders listed above has commenced in relation to early data collection activities within the WDA and to establish communication processes for future activities associated with the WDA.

13.4 EXISTING DATA SOURCES

626. **Table 13.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA and, in particular, the Navigation Risk Assessment (NRA), which the MCA requires to be produced to assess shipping and navigation under MGN 654 (MCA, 2021). As described in **Section 13.12**, additional data sources will be considered as directed by the NRA.

Table 13.3 Summary of key datasets and information sources

Dataset	Description	Author
Admiralty Sailing Directions South-West Coast of Scotland Pilot NP66A 3rd Edition	Relevant pilot book for the local area published by the United Kingdom Hydrographic Office (UKHO).	UKHO, 2023
Admiralty charts	Admiralty charts 2168, 1770, 2723, 2724, 2635 covering the local area published by the UKHO.	UKHO, 2021/2023
14 days vessel traffic data recorded from onshore Automatic Identification System receivers during the period 18 July 2023 to 31 July 2023	Vessel traffic dataset comprising 14 days of onshore Automatic Identification System (AIS) data collected from 18 July 2023 to 31 July 2023 to inform the scoping report process.	Anatec, 2023
Marine Accident Investigation Branch Incident Data	A dataset created by the Marine Accident Investigation Branch (MAIB), comprising incident reports including positional information of local maritime incidents from 2012 to 2021.	MAIB, 2022
Royal National Lifeboat Institution Incident Data	A dataset comprising incidents that the Royal National Lifeboat Institution (RNLI) have mobilised a lifeboat to from 2013 to 2022	RNLI, 2023

13.5 SITE-SPECIFIC SURVEY DATA

627. In addition to the existing data sources identified in **Section 13.4**, the project has undertaken site specific surveys to inform the EIA (**Table 13.4**).

Table 13.4 Site-specific survey data

Dataset	Year(s)	Description
Winter Vessel Traffic Survey *	2023	A Vessel Traffic Survey undertaken by the Project across the full Option Agreement Area, plus a 10 nautical mile (nm) buffer, consisting of: • Automatic Identification System; • Radio detection and ranging; and • Visual observations. This survey was undertaken from 01 to 16 December 2023.
Summer Vessel Traffic Survey *	2024	A Vessel Traffic Survey undertaken by the Project across the full Option Agreement Area, plus a 10 nm buffer, consisting of: • Automatic Identification System; • Radio detection and ranging; and • Visual observations. This survey was undertaken from 16 August to 01 September 2024.
* The surveys listed were undertaken in line with MCA requirements under MGN 654 (MCA, 2021).		

13.6 SHIPPING AND NAVIGATION STUDY AREA

628. This section describes the shipping and navigation Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 13.7)**.

629. The shipping and navigation Study Area (**Figure 13.1**) is defined as the Option Agreement Area (OAA) plus a 10 nautical mile (nm) buffer, noting this allows for a minimum 10 nm radius from the WDA. This radius is standard for shipping and navigation assessments as it is typically large enough to capture relevant navigational features and passing vessel traffic whilst remaining site-specific.

630. This Study Area may be refined for the NRA depending on changes to the spatial boundary of the WDA. The NRA Study Area will be agreed with the MCA and NLB in advance of the NRA.

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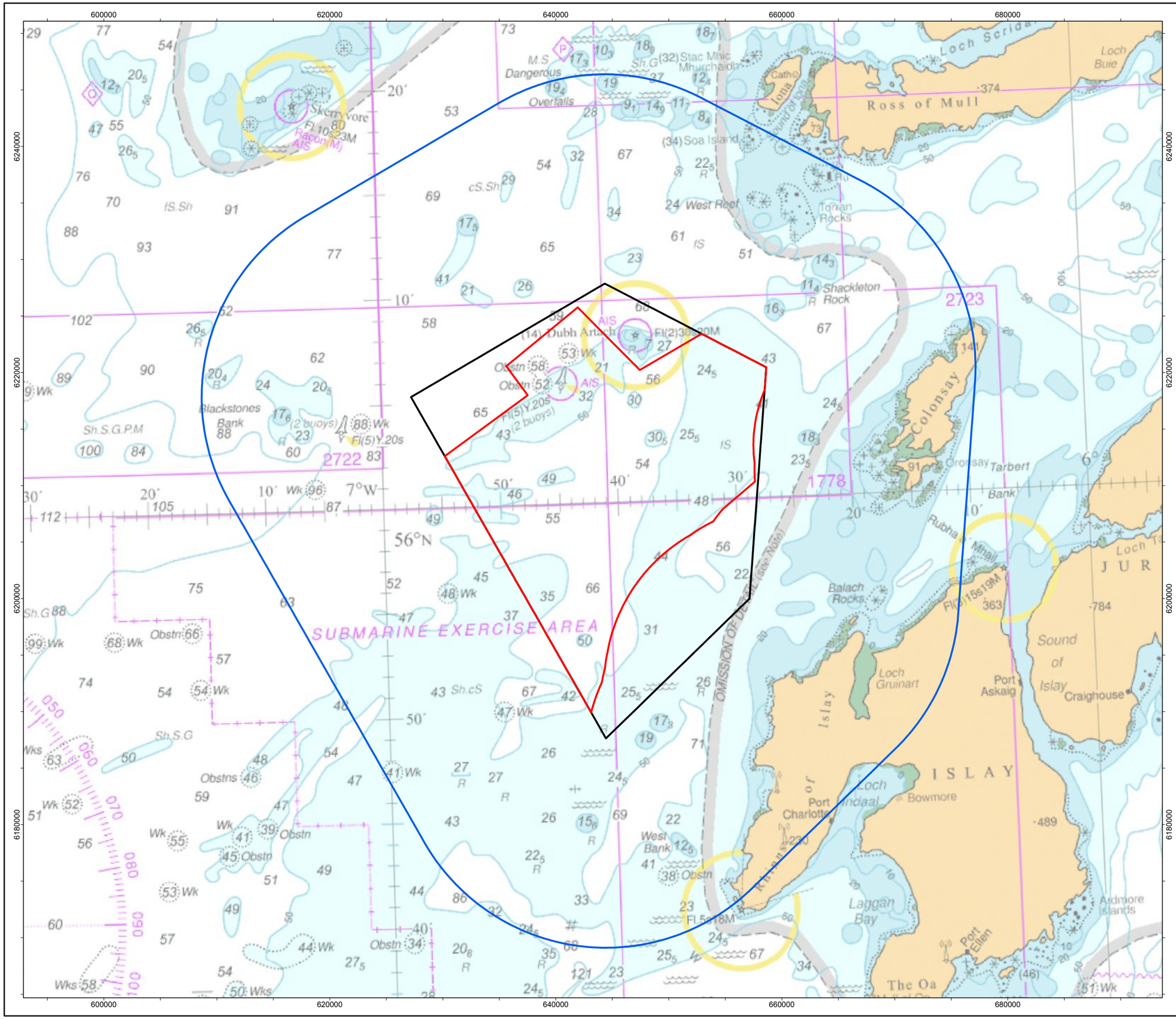

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
3	15/08/2024	DS	AF	--	--

DRAWING NUMBER	MCW-GEN-GIS-MAP-ANA-000080		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:320,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 13.1: Overview of Shipping and Navigation Study Area

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13.7 EXISTING ENVIRONMENT

631. This section describes the shipping and navigation receptors, using publicly available data sources (**Section 13.4**) and site-specific survey data (**Section 13.5**), deemed of relevance to the Study Area (**Section 13.6**). This sets the context for the identification of mitigation measures (**Section 13.8**) and scoping of potential impacts (**Section 13.9**) which then feeds into the consideration of cumulative effects (**Section 13.10**) and potential transboundary impacts (**Section 13.11**).

13.7.1 Navigational Features

632. This section provides preliminary assessment of navigational features located in proximity to the WDA, identified via Admiralty Charts and Sailing Directions. The navigational features are shown in **Figure 13.2.**

633. One buoy is temporarily located within the northern portion of the WDA. This buoy is equipped with Automatic Identification System (AIS) and was deployed by the Applicant to collect wind resource and metocean data. This buoy will remain in situ until it is removed to shore, in Spring 2025.

634. One additional key aid to navigation located within the OAA but outwith the WDA is the Dubh Artach lighthouse, which is also equipped with AIS. Other notable key aids to navigation in the vicinity of the WDA include two buoys approximately 5 nm to its west, one of which is a special mark, and a pillar buoy equipped with AIS approximately 9 nm to its south-east.

635. There is one charted wreck within the northern portion of the WDA, at a depth of 53 metres (m) below Chart Datum. This is also the only charted wreck within the OAA. There are six additional charted wrecks within the Study Area; four offshore and two inshore.

636. There are two charted obstructions within the northern portion of the WDA, at a depth of 52 m and 58 m below Chart Datum. These are also the only charted obstructions within the OAA. A single additional obstruction is located within the Study Area, approximately 9 nm south-east of the WDA and approximately 630 m north of the aforementioned buoy equipped with AIS.

637. A single preferred anchorage location is located within the Study Area; inshore of the WDA, approximately 8.5 nm to its south-east, at the entrance to Loch Gruinart and inshore of Nave Island.

638. Two subsea cables connect to Colonsay (inshore of the WDA), one connecting to the Isle of Mull to its north, and one connecting to Islay to its south.

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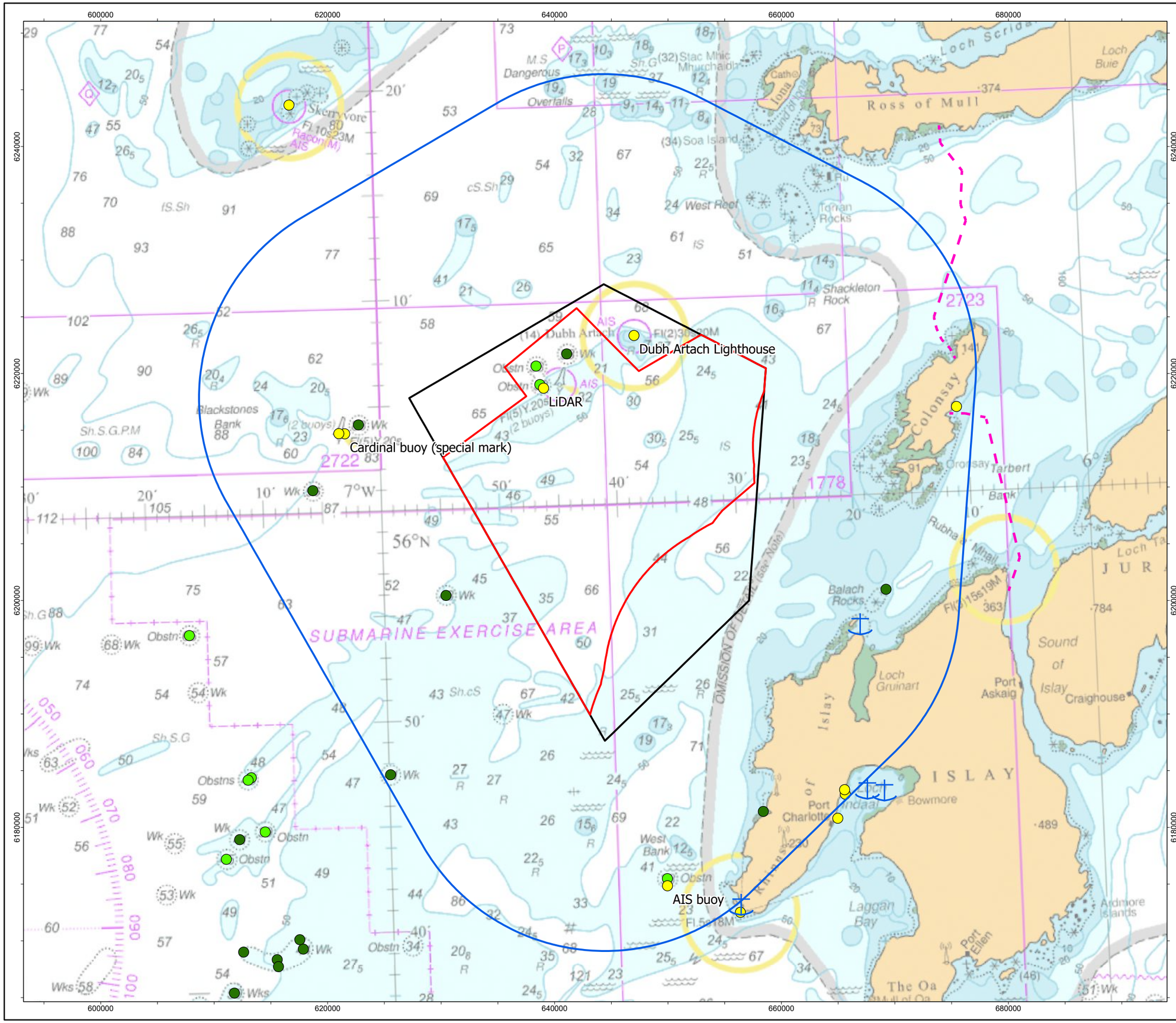

N

- Windfarm Development Area
- Shipping and Navigation Study Area
- Option Agreement Area

Navigational Features

- Key Aid to Navigation
- Charted Wreck
- Charted Obstruction
- Preferred Anchorage
- Subsea Cable

0 4 Nautical Miles
0 5 10 15 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
3	15/08/2024	DS	AF	--	--

DRAWING NUMBER	MCW-GEN-GIS-MAP-ANA-000081		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:320,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 13.2: Navigational Features

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13.7.2 Vessel Traffic

639. This section provides preliminary assessment of vessel traffic data sources available at the scoping stage. As detailed in **Section 13.4** and **Section 13.5**, the vessel traffic data assessed in this section consists of a 14 day summer period and a 14 day winter period, noting that the summer period is AIS only. The vessel traffic data recorded during the summer period therefore has the potential to under-represent non-AIS traffic. The most likely vessel types which may be under-represented are recreational vessels and smaller fishing vessels. The NRA will consider 28 days of vessel traffic data that is fully compliant with MGN 654, as noted in **Section 13.12**.

640. An average of 25 unique vessels per day was recorded within the shipping and navigation Study Area during the summer period which dropped to an average of 12 each day during the winter period. This difference in volume is mainly due to higher levels of recreational activity during the summer period, coinciding with the more favourable weather.

641. Nine to ten recreational vessels were recorded, per day, within the Study Area during the summer survey, while only one recreational vessel was recorded, on two separate days, during the winter survey. It is noted that the majority of recreational activity during the summer took place at the eastern extent of the shipping and navigation Study Area, mainly transiting to and from the Island of Colonsay. As detailed above, non-AIS recreational traffic may be under-represented in the summer data.

642. The most common vessel type recorded within the Study Area during the 28-day period was cargo, with five per day during the summer and seven per day during the winter. There were higher levels of passenger vessels during the summer compared to winter (three to four per day versus one every one to two days). It is noted that passenger vessel traffic included large sailing vessels and a tourist vessel as well as cruise liners and a Roll-on/Roll-off Passenger (RoPax) vessel. There were also slightly higher levels of tankers during the summer (two per day in summer versus one to two per day in winter).

643. Fishing vessel levels were higher during the summer compared to the winter within the Study Area, with three to four per day compared to one to two per day. Potential active fishing activity was observed during the summer period to the south of the WDA. Potential active fishing activity was also recorded during the winter period within the WDA, noting that this vessel was not broadcasting on AIS. As detailed above, non-AIS fishing vessel traffic may be under-represented in the summer data.

644. Intersections through the WDA were most commonly from cargo vessels transiting north/south through its eastern portion, with a variety of destinations including ports in the UK and Norway; an average of one vessel every one to two days was recorded on this route during the 28-day period. There were also sparser north/south intersections from a wider range of vessel types through its western portion, and north-east/south-west intersections from vessels transiting between Mull and Colonsay. However, most commercial traffic in the Study Area avoided the WDA, passing to its south-west, and travelling north-west/south-east.

645. Anchored vessels were identified within the Study Area (based on a high-level behavioural assessment) however, none were recorded within the OAA. The majority of anchored vessels were recreational vessels inshore of the Islands of Colonsay and Oronsay. A passenger vessel and a cargo vessel were also identified as at anchor in this region. The closest anchored vessel to the WDA was a tug, approximately 4.2 nm to its north-west.

646. The 28 days of vessel traffic data assessed in this scoping chapter is shown in **Figure 13.3.**

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6240000 6220000 6200000 6180000

Windfarm Development Area

Shipping and Navigation Study Area

Option Agreement Area

Vessel Type

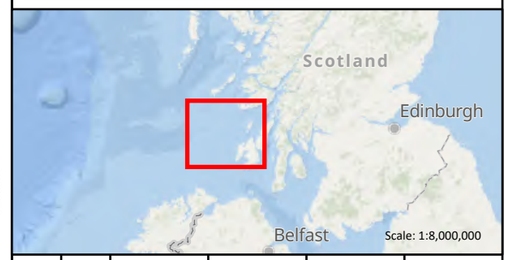
(28 Days, Summer and Winter 2023)

- Unspecified
- Fishing
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational
- Oil and Gas

N

0 4 Nautical Miles

0 5 10 15 Kilometres



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
3	15/08/2024	DS	AF	--	--

DRAWING NUMBER	MCW-GEN-GIS-MAP-ANA-000082		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:320,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 13.3: Vessels by Type

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13.7.3 Maritime Incidents

647. This section provides preliminary assessment of maritime incidents that have occurred in the vicinity of the WDA based on recent Marine Accident Investigation Branch (MAIB) data and Royal National Lifeboat Institution (RNLI) data. The analysis is intended to provide a general indication as to incident rates within the Study Area.

13.7.3.1 Marine Accident Investigation Branch

648. The MAIB incident locations (excluding false alarms and hoaxes) recorded within the Study Area during the 10-year period between 2012 and 2021 have been assessed.

649. Over the 10-year period, a total of 18 incidents were recorded within the Study Area corresponding to an average of two incidents per year. Two incidents occurred within the WDA itself: both incidents involving a fishing vessel experiencing machinery failure.

13.7.3.2 Royal National Lifeboat Institution

650. The RNLI incident locations (excluding false alarms and hoaxes) recorded within the Study Area during the 10-year period between 2013 and 2022 have been assessed.

651. Over the 10 year period, a total of 21 incidents were recorded within the Study Area corresponding to an average of two incidents per year which broadly aligns with the assessment of the MAIB data (see **Section 13.7.3.1**). Three incidents occurred within the WDA itself; two were the same incidents as documented by the MAIB (see **Section 13.7.3.1**), while the third involved a recreational vessel experiencing sail failure. Most lifeboats were mobilised from the Islay station.

13.8 MITIGATION MEASURES

652. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on shipping and navigation. These measures described in **Table 13.5** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 13.5 Indicative embedded mitigation measures for shipping and navigation

ID	Parameter	Description of Mitigation Measure
M-7	Marine Pollution Contingency Plan	Development of, and adherence to, a Marine Pollution Contingency Plan (MPCP). Submission of a MPCP. The MPCP will provide guidance to the Project personnel, contractors and subcontractors on the actions and reporting requirements in the event of spills and collision incidents. The MPCP will also contain emergency plans and mitigation procedures for a range of potential marine pollution incidents.
M-8	Cable Plan	Development of, and adherence to, a Cable Plan (incorporating a Cable Burial Risk Assessment). The Cable Plan will confirm planned cable routeing, burial, and any additional external cable protection, and will set out methods for post-installation cable monitoring. Furthermore, this plan will detail environmental sensitivities and design consideration to mitigate, as far as practicable, the effects of Inter-Array Cables (IACs) laying and associated protection during installation and operation of the Windfarm Development Area (WDA) infrastructure.
M-10	Unexploded Ordnance	Development of an Unexploded Ordnance (UXO) Threat and Risk Assessment.
M-18	Navigational Safety Plan	Development of, and adherence to, a Navigational Safety Plan (NSP). The NSP will describe measures put in place related to navigational safety, including information on safety zones, charting, construction buoyage, temporary lighting and marking, and means of notification of activities associated with the WDA to other sea users.

ID	Parameter	Description of Mitigation Measure
M-19	Notice to Mariners	Advance warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher webpage. All notices will be uploaded to the Project website.
M-20	Lighting and Marking Plan	Development of, and adherence to a Lighting and Marking Plan. This plan will set out the marine and aviation navigational lighting and marking measures to be applied during the construction and operation of the WDA in line with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guidance G1162 (IALA, 2021) including a buoyed construction area.
M-23	Safety Zones	Application for and use of Safety Zones of up to 500 metres (m) during construction, major repairs and decommissioning phases. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation during construction, Operation and Maintenance (O&M), and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards. Safety zones during the operational phase are also being considered. The Environmental Impact Assessment (EIA) will include an assessment of the proposed approach to Safety Zones at the point of application.
M-24	Dropped Objects	Dropped objects on the seabed during works associated with the WDA which may pose a hazard will be reported in line with the Marine Directorate - Licensing Operations Team (MD-LOT) procedures. Objects will be recovered where they pose a hazard to other marine users and where recovery is possible.
M-25	Marking	All WDA infrastructure will be appropriately marked on the United Kingdom Hydrographic Office Admiralty Charts.
M-26	Search and Rescue	Development of a Search and Rescue (SAR) checklist in consultation with the Maritime and Coastguard Agency (MCA) to ensure compliance with Marine Guidance Note 654 and its annexes. This will be completed post consent.
M-27	Emergency Response and Cooperation Plan	Development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP). This plan ensures co-operation with the MCA by detailing the design parameters of the WDA, emergency contact details, and processes to be followed.
M-28	Guard Vessels	Where appropriate, guard vessels will be used to ensure adherence with Safety Zones (M-23) or advisory passing distances.
M-29	Marine Coordination Centre	A marine coordination centre will be implemented to manage project vessels throughout construction, O&M and decommissioning.
M-30	Blade Tip Clearance / Air Gap	Blade tip clearance height / Air Gap of at least 22 m above mean high water springs (in line with Marine Guidance Note 654 (MCA, 2021) and Royal Yachting Association (RYA) policy (RYA, 2019a)).
M-31	Vessel Marine Regulations	Compliance of all Project vessels with international marine regulations as adopted by the Flag State, notably Convention on International Regulations for Preventing Collisions at Sea (International Maritime Organisation (IMO), 1972/77) and International Convention for the Safety of Life at Sea (IMO, 1974).
M-32	Vessel Management Plan	Development of, and adherence to, a Vessel Management Plan. This plan will provide the procedures for management and coordination of vessels to mitigate the impact of Project vessels.

ID	Parameter	Description of Mitigation Measure
M-34	Development Specification and Layout Plan	Development of, and adherence to, a Development Specification and Layout Plan. The layout of the Wind Turbine Generators (WTGs) will be finalised post consent. Consultation with the MCA and Northern Lighthouse Board (NLB) will be undertaken to ensure that the specific WTG layout is compatible with potential SAR activity.
M-35	Failures of Lighting and Marking	Failures of the lighting and marking in the WDA will be appropriately reported and rectified as soon as practicable. Interim hazard warnings (i.e. Notice to Mariners (M-19)) will be put in place as required.
M-36	Site Navigation Marking	Marking and lighting of the site following consultation with NLB and in line with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guidance G1162 (IALA, 2021) including a buoyed construction area.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

653. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to shipping and navigation will be assessed with this mitigation in place.

13.9 SCOPING OF POTENTIAL IMPACTS

654. A range of potential impacts on shipping and navigation receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

655. **Table 13.6** outlines the shipping and navigation impacts which are proposed to be scoped into the EIA, alongside justification. No impacts have been scoped out at this stage given MGN 654 (MCA, 2021) requires full assessment within the NRA.

Table 13.6 Potential impacts scoped in or scoped out for shipping and navigation

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Displacement of vessels leading to increased collision risk between third-party vessels	✓	✓	✓	Baseline vessel traffic data indicates certain vessels are likely to deviate due to activities associated with the Windfarm Development Area (WDA) (in particular north/south bound commercial traffic, as discussed in **Section 13.7.2**) and as such collision risk in the area may increase given that vessel densities in areas outside of the WDA may increase. The Navigation Risk Assessment (NRA) will include quantitative modelling in addition to qualitative assessment of the risk and will assess the likely increase in magnitude of any deviations and the frequency. Therefore, potential impacts and effects on the displacement of vessels leading to increased collision risk between third-party vessels has been **scoped into** the Environmental Impact Assessment (EIA), for all phases.
Increased vessel-to-vessel collision risk between a third-party vessel and project vessel	✓	✓	✓	The presence of Project vessels will increase general traffic levels in the area and therefore may lead to an increased number of encounters and a subsequent increase in the collision risk between third-party and Project vessels. It will be necessary to consider the potential associated increases in overall vessel numbers, and how these vessels could interact with existing traffic. Therefore, potential impacts and effects on the increased vessel-to-vessel collision risk between a third-party vessel and Project vessel has been **scoped into** the EIA, for all phases.
Increased vessel to structure allision risk (powered)	✓	✓	✓	The presence of new surface structures (i.e. the Wind Turbine Generators (WTGs)) will create new allision risk to vessels under power which may be caused by human/navigational error and/or unfamiliarity/unawareness of the WDA. The NRA will include quantitative modelling in addition to qualitative assessment of the risk, which include consideration of predicted vessel routeing. Therefore, potential impacts and effects on the increased vessel to structure allision risk (powered) has been **scoped into** the EIA, for all phases.
Increased vessel to structure allision risk (drifting)	✓	✓	✓	The presence of new surface structures (i.e. the WTGs) will create new allision risk to drifting vessels (which may be caused by mechanical/technical failure, adverse weather and/or a navigational system error). The NRA will include quantitative modelling in addition to qualitative assessment of the risk which include consideration of predicted vessel routeing. Therefore, potential impacts and effects on the increased vessel to structure allision risk (drifting) has been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Reduced access to local ports, harbours and marinas	✓	✓	✓	Access to local ports, harbours and marinas may be impacted due to the presence of the WDA, or vessels/activities associated with the WDA. Further consideration is required of baseline vessel routeing and the potential increases in traffic that could arise to / from relevant ports. Therefore, potential impacts and effects on the reduced access to local ports, harbours and marinas has been **scoped into** the EIA, for all phases.
Reduction of Search and Rescue (SAR) capability	✓	✓	✓	The presence of the WDA will increase the number of vessels and personnel in the area which may result in an increased number of incidents requiring emergency response and may reduce access for SAR responders. The WDA infrastructure may also impact on access for SAR assets. The NRA will consider baseline incident rates, the potential impact on these rates from the WDA, and the additional resources associated with the WDA that will be available. Therefore, potential impacts and effects on the reduction of SAR capability has been **scoped into** the EIA, for all phases.
Reduction of under keel clearance (leading to allision/displacement)	✓	✓	✓	The implementation of cable protection may reduce navigable water depths, thereby reducing the under-keel clearance for third-party traffic. The NRA will include assessment of the vessel draughts identified within the vessel traffic datasets collected. Therefore, potential impacts and effects on the creation of an aviation obstacle environment has been **scoped into** the EIA, for all phases.
Increased anchor interaction with subsea infrastructure	✓	✓	✓	The presence of subsea cables may increase the likelihood of interaction for third-party vessels including an anchor snagging risk. The NRA will include assessment of baseline vessel anchoring, including consideration of the potential that a vessel may anchor in the WDA. Therefore, potential impacts and effects on the creation of an aviation obstacle environment has been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Interference with marine navigation, communications, and position-fixing equipment	✓	✓	✓	Marine navigation, communications and position fixing equipment (e.g., Automatic Identification System (AIS), Radio Detection and Ranging or compasses) may be affected by the presence of the WDA infrastructure (e.g., via electromagnetic inference from the subsea cables or via the presence of the physical surface piercing structures). This will be considered in detail in the NRA. Therefore, potential impacts and effects on the creation of an aviation obstacle environment has been **scoped into** the EIA, for all phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

13.10 POTENTIAL CUMULATIVE EFFECTS

656. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA and OfTDA to affect shipping and navigation receptors. The overarching Cumulative Effects Assessment (CEA) will follow the approach outlined in **Chapter 4 Approach to Scoping and EIA,** noting that for shipping and navigation, the Formal Safety Assessment (FSA) approach will be applied as discussed in **Section 13.12**.

657. Prospective OWFs and any other relevant marine activity within 50 nm of the WDA will be considered in the CEA, with a screening process undertaken as part of the NRA to determine which developments and activities should be considered. Criteria used in the screening process will include:

- Cumulative project status;
- Proximity to the WDA;
- Level of interaction with baseline traffic in particular regular routeing potentially impacted by the WDA;
- Level of stakeholder concern raised during consultation; and
- Data confidence.

658. Where relevant, impacts assessed through the NRA process (see **Section 13.8**) will also be assessed for potential cumulative effects.

13.11 POTENTIAL TRANSBOUNDARY IMPACTS

659. There is the potential for transboundary impacts, particularly in relation to transits to and from other countries including effects on shipping routes to and from transboundary ports. This will be considered within the NRA process, with relevant impacts likely to be in relation to vessel displacement and reduction in port access as discussed in **Section 13.8**.

13.12 APPROACH TO IMPACT ASSESSMENT

660. The shipping and navigation EIAR chapter will follow the methodology set out in the following key guidance documents:

- MGN 654 OREIs – Guidance on UK Navigational Practice, Safety and Emergency Responses and its Annexes (MCA, 2021); and
- Revised Guidelines for FSA for Use in the Rule-Making Process. MSC-MEPCC.2/Circ.12/Rev.2 (IMO, 2018).

661. The following guidance is also relevant and will be considered:

- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guideline G1162 on the Marking of Offshore Man-Made Structures (IALA, 2021);
- MGN 372 Amendment 1 (M+F) – Safety of Navigation: Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022); and
- The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2019a).

662. As per the methodology stated in the MCA methodology (Annex 1 to MGN 654 (MCA, 2021)), an NRA will be undertaken with the output forming the primary input into the shipping and navigation chapter of the EIAR. The MCA Methodology requires the application of the International Maritime Organisation (IMO) FSA approach for impact assessment, noting this is the internationally recognised approach for assessing the impacts to shipping and navigation users. This methodology is centred on risk control and involves assessing each impact in terms of its frequency and consequence to reduce the significance of effects to As Low As Reasonably Practicable. The

significance of effect can be determined as Broadly Acceptable, Tolerable or Unacceptable, as defined below.

Table 13.7 Definitions of Significance Rankings

Significance	Definition
Broadly acceptable	Low risk – no action required.
Tolerable	Moderate risk – acceptable if As Low As Reasonably Practicable.
Unacceptable	High risk – additional mitigation must be implemented (beyond those considered embedded measures) to reduce to tolerable and As Low As Reasonably Practicable.

663. The significance of each assessed impact will be determined based on impact's frequency and consequence rankings, as defined in **Table 13.8** and **Table 13.9** respectively. These rankings will be determined via the NRA process using a number of inputs, including but not limited to:

- An extensive quantitative modelling process;
- Outputs of the baseline assessment considering the available baseline data sources;
- Consideration of assumed embedded mitigation;
- Lessons learnt from other similar or relevant offshore developments;
- Level of stakeholder concern raised during consultation;
- Consultation output; and
- Expert opinion.

Table 13.8 Definitions of Frequency Rankings

Frequency	Definition
Negligible	Fewer than 1 occurrence per 10,000 years.
Extremely Unlikely	1 per 100 to 10,000 years.
Remote	1 per 10 to 100 years.
Reasonably Probably	1 per 1 to 10 years.
Frequent	Yearly.

Table 13.9 Definitions of Consequence Rankings

Consequence	Definition			
	People	Property	Environment	Business
Negligible	No perceptible risk.	No perceptible risk.	No perceptible risk.	No perceptible risk.
Minor	Slight injury(s).	Minor damage to property, i.e., superficial damage.	Tier 1 local assistance required.	Minor reputational risks – limited to users.
Moderate	Multiple minor or single serious injury.	Damage not critical to operations.	Tier 2 limited external assistance required.	Local reputational risks.
Serious	Multiple serious injuries or single fatality.	Damage resulting in critical risk to operations.	Tier 2 regional assistance required.	National reputational risks.
Major	More than one fatality.	Total loss of property.	Tier 3 national assistance required.	International reputational risks.

664. The risk ranking matrix, as presented in **Table 13.10**, will determine each impact's significance ranking based on its frequency and consequence ranking.

Table 13.10 Risk ranking matrix

		Frequency				
		Negligible	**Extremely Unlikely**	**Remote**	**Reasonably Probable**	**Frequent**
Consequence	**Negligible**	Broadly acceptable	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable
	Minor	Broadly acceptable	Broadly acceptable	Broadly acceptable	Tolerable	Tolerable
	Moderate	Broadly acceptable	Broadly acceptable	Tolerable	Tolerable	Unacceptable
	Serious	Broadly acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

665. A requirement of MGN 654 is for the assessment of a minimum of 28 days of vessel traffic data accounting for seasonal variation as well as vessels not broadcasting via AIS. This will be accomplished by using the 14-day winter vessel traffic survey and 14-day summer vessel traffic survey dataset (**Table 13.4**) undertaken from a dedicated on-site survey vessel and recording vessel traffic via AIS, Radio Detection and Ranging and visual observations.

666. Other data sources will also be considered as directed by the NRA process. This will include the RYA Coastal Atlas (RYA, 2019b).

667. Consultation during the pre-application phase is also planned with the following statutory and non-statutory organisations:

- Caledonian MacBrayne;
- Marine Directorate Licensing Operations Team (MD-LOT);
- Marine Directorate (MD);
- MCA;
- NLB;
- UK Chamber of Shipping;
- RYA Scotland;
- Cruising Association;
- Scottish Fishermen's Federation;
- RNLI;
- Relevant local authorities; and
- Relevant local port and harbour authorities.

668. A Hazard Workshop will be held with regular operators, local port operators, and other relevant stakeholders as part of the NRA process (noting this is an MGN 654 requirement).

13.13 SCOPING QUESTIONS TO CONSULTEES

669. The following questions are posed to consultees to help frame and focus their response to the shipping and navigation scoping exercise, which will in turn inform the Scoping Opinion:

- Is the legislation, policy and guidance proposed for consideration as part of the EIA (notably including the NRA for shipping and navigation) suitable and sufficient?

- Is the Study Area defined, data sources considered, and proposed data sources to inform the NRA suitable and sufficient (noting that the requirements of MGN 654 have been applied in the proposed approach)?
- Is the methodology outlined for undertaking the risk assessment suitable, including on a cumulative level?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on shipping and navigation receptors?
- Have all potential hazards (impacts) due to the presence of the WDA been identified for shipping and navigation users?
- Are the mitigation measures described suitable and sufficient for managing and mitigating risk associated with the potential hazards?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

13.14 REFERENCES

IALA (2021). IALA Guidance G1162 The Marking of Offshore Man-Made Structures. Edition 1.1. Saint Germain en Laye, France: IALA.

IMO (1972/77). Convention on International Regulations for Preventing Collisions at Sea (COLREGs) – Annex 3. London: IMO.

IMO (1974). International Convention for the Safety of Life at Sea (SOLAS). London: IMO.

IMO (2018). Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process. MSC-MEPCC.2/Circ.12/Rev.2. London: IMO.

MAIB (2022). Marine Accident Investigation Branch Incident Data. Available at: https://www.gov.uk/maib-reports. [Accessed 20/02/2024]

MCA (2021). Marine Guidance Note 654 (Merchant and Fishing) safety of Navigation: offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response. Southampton: MCA.

MCA (2022). MGN 372 Amendment 1 (M+F) – Safety of Navigation: Guidance to Mariners Operating in the Vicinity of UK Offshore Renewable Energy Installations (OREIs). Southampton: MCA.

RNLI (2023). Royal National Lifeboat Institution Incident Data. Available at: https://data-rnli.opendata.arcgis.com/. [Accessed 10/06/2024]

RYA (2019a). The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy. 5th revision. Southampton: RYA.

RYA (2019b). UK Coastal Atlas of Recreational Boating. Southampton: RYA.

Scottish Government (2015). Scotland's National Marine Plan. A Single Framework for Managing Our Seas. Published 27 March 2015.

Scottish Government (2020). Sectoral Marine Plan for Offshore Wind Energy. Available at: Sectoral marine plan for offshore wind energy - gov.scot (www.gov.scot). [Accessed 10/06/2024]

UKHO (2023). Admiralty Sailing Directions South-West Coast of Scotland Pilot NP66A 3rd Edition. Taunton: UKHO.

14 OFFSHORE ARCHAEOLOGY AND CULTURAL HERITAGE

14.1 INTRODUCTION

670. This chapter considers the scope of potential impacts and likely significant effects (LSE) on offshore archaeology and cultural heritage that may arise from the construction, Operation and Maintenance (O&M), and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

671. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on offshore archaeology and cultural heritage in the Environmental Impact Assessment (EIA).

672. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 6 Marine Physical Environment** – changes to the marine physical environment have the potential to result in indirect impacts to heritage assets if, for example, buried heritage assets become exposed due to increased wave / tidal action and scour, or if increased sedimentation results in an exposed site becoming buried; and
- **Chapter 16 Seascape, Landscape and Visual Impacts –** the results of the Seascape, Landscape and Visual Impact Assessment (SLVIA), and the definition of a zone of theoretical visibility, will inform the assessment of impacts to the setting of onshore heritage assets from the offshore infrastructure.

673. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

14.2 LEGISLATION, POLICY AND GUIDANCE

674. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 14.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for offshore archaeology and cultural heritage.

Table 14.1 Summary of relevant legislation, policy and guidance for offshore archaeology and cultural heritage

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Legislation	
Marine (Scotland) Act 2010	Provides the designation of Historic Marine Protected Areas (MPAs) in respect of historically significant areas within the marine zone, including wrecks formerly protected under the Protection of Wrecks Act (1973). The Act provides a framework to help balance competing demands on Scotland's seas. It introduces a duty to protect and enhance the marine environment and includes measures to help boost economic investment and growth in areas such as marine renewables. **The key references are:** **Section 73: Historic MPAs –** *"An area may be designated by a designation order as a Historic MPA if the Scottish Ministers consider it desirable to do so for the purpose of preserving a marine historic asset of national importance which is, or which they are satisfied may be, located in the area…"* **Section 80: Advice by Scottish Natural Heritage as regards Nature Conservation MPAs and Demonstration and Research MPAs –** *"Scottish Natural Heritage may give advice and guidance as to (a) The matters which are capable of damaging or otherwise affecting any protected feature (or the protected features) of a Nature Conservation MPA or (as the case may be) a stated purpose for a Demonstration and Research MPA…"* **Section 82: Duties of public authorities in relation to marine protected areas –** *"Where a public authority has any function the exercise of which is capable of affecting (other than insignificantly) (a) any protected feature of a Nature Conservation MPA…"* **Section 83: Duties of public authorities in relation to certain decisions – "***This section applies where (a) a public authority has the function of determining an application (whenever made) for authorisation of the doing of any act…"* **Section 84: Failure to comply with duties –** *"In relation to a Nature Conservation MPA or a Demonstration and Research MPA if, in the opinion of Scottish Natural Heritage, a public authority has failed – (a) to act in accordance with advice or guidance given by Scottish Natural Heritage under section 80…"*
Merchant Shipping Act (1995)	This Act sets out the procedures for determining the ownership of underwater finds classified as a 'wreck' (flotsam, jetsam, derelict and lagan) found in or on the shores of the sea or any tidal water. It includes ship, aircraft, hovercraft, parts of these, their cargo or equipment. The Receiver of Wreck is responsible for processing incoming reports of wreck and cargo. The development activities associated with the Windfarm Development Area (WDA) have the potential to impact items associated with wrecks, which fall within the definition of 'wreck'.
The Protection of Military Remains Act (1986)	Provides protection for the wreckage of military aircraft and certain military wrecks. Designations can be either as a controlled site or protected place where access may be permitted but any operations that may disturb the site are illegal unless licenced by the Ministry of Defence (MoD). All military aircraft are automatically protected under this legislation; however, vessels must be designated individually.

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Policy	
National Planning Framework 4 (Scottish Government, 2023)	The National Planning Framework 4 (NPF4) is the national spatial strategy for Scotland which includes a commitment to the protection and enhancement of the historic environment and to safeguard Scotland's shared heritage for future generations. The intent of Policy 7 (historic assets and places) is: To protect and enhance historic environment assets and places, and to enable positive change as a catalyst for the regeneration of places. **The key reference is:** **Policy 7: Historic assets and places** – "*Development proposals with a potentially significant impact on historic assets or places will be accompanied by an assessment which is based on an understanding of the cultural significance of the historic asset and/or place…"*
Historic Environment Policy for Scotland (HES, 2019)	The document is designed to support and enable good decision-making about changes to the historic environment. Historic Environment Policy for Scotland sets out a series of principles and policies for the recognition, care and sustainable management of the historic environment which have informed development of the proposed scope and methodology of the assessment.
Guidance	
Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007)	Guidance note on the survey, appraisal, and monitoring of the historic environment during the development of offshore renewable energy projects in the United Kingdom. The guidance is applicable to the marine environment and the coastal environment adjacent to any development, encompassing the inter-tidal area, coastal margin, and those areas further inland likely to be affected by offshore renewable energy developments.
Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather, 2011)	Guidance to ensure that historic environment considerations form part of the process of planning and implementing geotechnical investigations undertaken for offshore renewable energy projects. The guidance is specifically concerned with offshore areas likely to be affected by renewable energy development, including the area up to the cable landfall.
Historic Environment Scotland (2019-updated May 2021) Scotland's Historic Marine Protected Areas	Explains what historic marine protected areas (MPAs) are and Historic Environment Scotland (HES)'s role in advising the Scottish Government in designating these areas.
Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021)	High-level guidance on a range of archaeological methodologies that may be required in the production of Written Schemes of Investigation (WSIs) and Method Statements.
Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008)	Guidance on cumulative impacts on the historic environment arising from offshore renewable energy projects. The guidance identifies issues relating to the assessment of cumulative and synergistic effects at each stage of the Strategic Environmental Assessment and Environmental Impact Assessment process from screening and scoping to decision making and implementation.
Principles of Cultural Heritage Impact Assessment (IEMA et al, 2021)	This publication sets out guiding principles to supplement existing guidance and give a consistent framework for cultural heritage in a variety of settings.

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Joint Nautical Archaeology Policy Committee Code of Practice for Seabed Development (JNAPC, 2006)	This code builds on the principles set out in the original Code (Joint Nautical Archaeology Policy Committee (JNAPC) (1995)) and offers guidance to developers on issues such as risk management and legislative implications. A list of contacts for further advice is also provided. The code also highlights the responsibility of developers in protecting the UK's marine heritage.

14.3 CONSULTATION

675. This offshore archaeology and cultural heritage chapter has been informed by engagement with stakeholders, including those listed below:

- Argyll and Bute Council;
- Historic Environment Scotland (HES);
- Marine Directorate - Licensing Operations Team (MD-LOT); and
- NatureScot.

676. As part of the consultation process, the Applicant presented the approach to assessment to stakeholders in order to offer transparency around the scoping methodology and rationale, capture stakeholder advice and guidance, and incorporate stakeholder feedback, where appropriate. A summary of the approach to stakeholder communication and consultation is outlined in **Chapter 5 Consultation and Stakeholder Engagement** with each engagement activity being listed within **Appendix L Stakeholder Engagement Log**.

677. The consultation outcomes in relation to offshore archaeology and cultural heritage are outlined in **Table 14.2**, which summarises stakeholder feedback, outlines how the Applicant has responded to the feedback received, and details how it has been considered within this chapter and/or will be used to inform the EIA process and preparation of the EIAR.

678. In addition to the engagement outlined in **Table 14.2,** the point of agreement between the Applicant and all scoping workshop stakeholders is listed below:

- Agreement on the potential impacts proposed to be scoped in for further assessment.

679. Consultation relating to this topic will be ongoing throughout the EIA process. The Applicant welcomes the opportunity to work with stakeholders to deliver a proportionate and robust EIA.

Table 14.2 Summary of consultation relevant to offshore archaeology and cultural heritage

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
Historic Environment Scotland	16 May 2024: Offshore Archaeology and Cultural Heritage Scoping Workshop – Written feedback	Historic Environment Scotland (HES) are content with the characterisation of the existing environment; however it is advised that the Applicant consults with the West of Scotland Archaeology Service (WoSAS) for advice relating to the characterisation of the non-designated aspects of the historic environment.	The Applicant's consultants have confirmed that WoSAS do not hold offshore records for this area, however the Applicant will engage with WoSAS following submission of this Scoping Report.
		HES are content that the appropriate potential cultural heritage impacts have been identified. However, HES note that marine cultural heritage assets also have a setting, and that marine assets may contribute to the setting of terrestrial assets.	The Applicant acknowledges the setting of marine assets is fundamentally part of the assessment approach and will be included in the Environmental Impact Assessment Report (EIAR).
		HES highlighted that, in addition to the listed data sources, archaeological reports and published or unpublished sources for the area should be checked.	The Applicant has included the data sources (as shown in **Section 14.4**), which will be used to inform the EIAR.
		In relation to archaeology data sources and guidance, HES referenced the HES/Scottish Natural Heritage EIA Handbook which provides a widely accepted model methodology for the assessment of impacts on cultural heritage.	The Applicant confirms that the EIAR will take account of the HES/Scottish Natural Heritage EIA Handbook, as well as the "Principles of Cultural Heritage Impact Assessment" issued by CIfA, the Institute of Environmental Management and Assessment (IEMA) and the institute of Historic Building Conservation (IHBC).

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		HES highlighted that the current cultural heritage information does not include a Zone of Theoretical Visibility (ZTV), although one has been prepared for **Chapter 16 Seascape, Landscape and Visual Impacts**. A ZTV specifically prepared for assessment of cultural heritage will be required for the Scoping Report and EIAR. HES can discuss and agree a list of cultural heritage viewpoints for the Project, as there are few appropriate viewpoints included in the Project's seascape, landscape and visual impacts list. HES requested that visualisations should be provided in the EIAR where an impact on the setting of an asset is identified. HES advised that wireframes can be used to assess the degree of impact with photomontages being provided if the impact is assessed as significant.	Although a ZTV specific to cultural heritage settings assessment is not available at the time of submitting this Scoping Report, it will be prepared to inform a staged settings assessment, as detailed in the HES guidance (Managing Change in the Historic Environment: Setting). The ZTV will be required to inform Stage 1 (identify the historic assets that might be affected by the proposed development) and, as such, no assets have been formally scoped out of further assessment in the Scoping Report. The ZTV will also inform the selection of appropriate visualisations, in consultation with HES, to define and analyse the setting of assets included for further assessment (Stage 2) and the evaluation of the potential impacts (Stage 3) and mitigation (Stage 4). The results of all stages of assessment will be detailed in the EIAR.
		HES highlighted that the relevant advice documents in Scotland are The Crown Estate's: • Model Clauses for Archaeological Written Schemes of Investigation (WSIs); and • Protocol for Archaeological Discoveries (PAD) Offshore Renewables Projects.	The Applicant will follow the appropriate guidance for WSIs and PAD, as advised.
		HES advised that relative sea level change should be considered at scoping.	The Applicant has considered sea level change alongside geology and geomorphology.
		HES has advised that as the proposed development is very close to the Dubh Artach Lighthouse, impacts on the setting of this A-listed building is an important concern.	The Applicant has identified the setting of the Dubh Artach lighthouse as a key sensitivity for assessment.

14.4 EXISTING DATA SOURCES

680. **Table 14.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA.

Table 14.3 Summary of key datasets and information sources

Dataset	Description	Author
United Kingdom Hydrographic Office Marine Data Portal	United Kingdom Hydrographic Office (UKHO) records of wrecks and obstructions data including 'dead' and salvaged wrecks that are no longer charted as navigational hazards.	UKHO, 2024
Maritime records maintained by CANMORE	Historic Environment Scotland (HES) maritime records, including documented losses of vessels, and records of terrestrial monuments and findspots, including the archaeological excavation index.	HES, 2024a
Historic Environment Scotland	Records of designated heritage assets within Scotland, maintained by HES. Geographic Information System data for all Protected Wrecks, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.	HES, 2024b
Argyll and Bute Historic Environment Record maintained and hosted by West of Scotland Archaeology Service	Contains data on all recorded non-designated heritage assets within Argyll and Bute. The data includes archaeological, historic landscape and historic building information. Information on previous events (archaeological surveys and investigations) will also be obtained. Maintained and hosted by West of Scotland Archaeology Service.	West of Scotland Archaeology Service, 2024
British Geological Survey	Historic borehole logs and the wider geological background for the region.	British Geological Survey, 2024
ScARF Marine and Maritime Panel Report	Scottish archaeological research framework background information and research framework for the whole of Scotland including Western Scotland, the Firth of Clyde and the Inner Hebrides.	Scottish Archaeological Research Framework, 2012

14.5 SITE-SPECIFIC SURVEY DATA

681. In addition to the existing data sources identified in **Section 14.4**, the project has undertaken site specific surveys to inform the EIA (**Table 14.4**).

Table 14.4 Site-specific survey data

Dataset	Year	Description

Project's site investigation	2023	Site Investigation within the Option Agreement Area undertaken by the Project. The following works were undertaken by Fugro:
		• Geophysical survey (2 km x 500 metres (m) line spacing):
		  ○ Side Scan Sonar;
		  ○ Multibeam Echosounder;
		  ○ Sub Bottom Profiler;
		  ○ Magnetometer.
		• 57 benthic sediment grabs for contaminants, faunal, biomass and particle size distribution analysis;
		• 59 transects of Drop-Down Video with seabed photographs; and
		• 29 water samples for environmental DNA analysis.
		See **Appendix C Contaminants Survey Report**, **Appendix D MachairWind 2023 Benthic Characterisation Report** and **Appendix E Environmental DNA Survey Interpretative Report**.

14.6 OFFSHORE ARCHAEOLOGY AND CULTURAL HERITAGE STUDY AREA

682. This section describes the offshore archaeology and cultural heritage Study Area and how it has been defined. The purpose of the Study Area is to set the geographical boundary within which the existing environment is described (**Section 14.7**), and the EIA will be conducted.

683. The offshore archaeology and cultural heritage Study Area (**Figure 14.1**) is defined by the extent of the WDA boundary. This Study Area corresponds to the footprint within which development activities could occur and, consequently, the area of potential impacts to the offshore archaeology and cultural heritage existing environment.

684. For the purposes of this scoping chapter, reference is also made to an additional 'settings' Study Area (**Figure 14.1**), comprising a 50 km buffer around the WDA. This buffer has been added in order to identify onshore heritage assets with 'settings' which may be impacted by the physical presence of the Wind Turbine Generators (WTGs). The 50 km buffer has been selected on the basis that it would only be in exceptional circumstances that the WTGs would be visible beyond 50 km. It is therefore, envisaged that the WDA would not have any significant impact on the setting of any onshore designated heritage assets beyond this point.

685. An additional 50 km 'settings' Study Area will be revised in conjunction with **Chapter 16 Seascape, Landscape and Visual Impacts** and the definition of a zone of theoretical visibility, which will inform the assessment of impacts to the setting of onshore heritage assets from the offshore infrastructure to be undertaken for the EIA.

600000
650000
700000
6250000
6200000
6150000

Windfarm Development Area / Study Area for Marine Archaeology assets

Option Agreement Area

50km Study Area for setting to onshore heritage assets

N

0 5 10 20
Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	09/08/2024	JH	AB	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000027		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:550,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 14.1: Offshore Archaeology and Cultural Heritage Study Area

NOT TO BE USED FOR NAVIGATION

Royal HaskoningDHV
Enhancing Society Together

ScottishPower Renewables

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14.7 EXISTING ENVIRONMENT

686. This section describes the offshore archaeology and cultural heritage receptors, using publicly available data sources (**Section 14.4**) and site-specific survey data (**Section 14.5**), deemed of relevance to the Study Areas (**Section 14.6**). This sets the context for the identification of mitigation measures (**Section 14.8**) and scoping of potential impacts (**Section 14.9**) which then feeds into the consideration of cumulative effects (**Section 14.10**) and potential transboundary impacts (**Section 14.11**).

14.7.1 Seabed Prehistory

687. There are no prehistoric records within the WDA. Equally, there are no records in the maritime section of the National Monument Record of Scotland that relate to submerged prehistoric landscapes (Wessex Archaeology Coastal and Marine, 2012). Despite this, it is clear from modelling of sea level change that there is the potential for such assets to exist around many parts of the Scottish coast.

688. Currently there are no Lower, Middle or Early Upper Palaeolithic archaeological remains recorded within Scotland or Northern Ireland (Wessex Archaeology, 2006). This lack of archaeological evidence is undoubtedly due to several periods of glaciations and cover by ice sheets in this area.

689. It is assumed that there was no human occupation on the ice sheets, however, human occupation may have occurred at the ice sheet margins, even if only seasonally, and during intervening milder periods (Wymer, 1999).

690. The earliest archaeological evidence for human inhabitation in Scotland and in Ireland dates to the Mesolithic, and there is a range of inhabitation sites fringing the WDA that demonstrate the importance of the area to these early populations (Wickham-Jones and Dawson, 2006). Mesolithic sites found in coastal or near coastal locations across the Inner Hebrides include sites recorded on Colonsay, Jura, Islay (Mithen *et al*., 2001), Mull (Mithen and Wicks, 2018) and Coll.

691. In terms of submerged sites, there is no specific data on relative sea level rise for this area of the Inner Hebrides. However, it is assumed that sea level reached roughly its present level between 5000 to 3000 years ago suggesting that any submerged archaeological sites are likely to relate to Mesolithic or early Neolithic settlement (Scottish Archaeological Research Framework, 2012).

14.7.2 Maritime and Aviation Archaeology

692. There are no Historic Marine Protected Areas (MPAs) within the WDA. These are designated areas, protected under Part 5 of the Marine (Scotland) Act 2010, which protect 'marine historic assets' of national importance which survive in Scottish territorial waters (HES, 2019).

693. Similarly, there are no vessels or aircraft in the WDA that are protected under the Protection of Military Remains Act (1986).

694. Within the WDA there are five United Kingdom Hydrographic Office (UKHO) records, as shown in **Figure 14.2.** Three of these are recorded as 'dead' meaning they have not been identified through multiple surveys. UKHO 2627 (in the north of the WDA) is the wreck *Eli* (Possibly), a cargo ship built in 1931 and sunk by a German aircraft in 1940. UKHO 79885 (also in the north of the WDA) is a group of contacts identified in 2011 and described as possible wreckage within areas of rock.

695. In addition to the five UKHO records, there are three CANMORE records in the WDA, as shown in **Figure 14.3**. One of these (the most southerly) relates to one of the 'dead' UKHO wrecks. The most northerly record in the WDA is a reported loss (location unverified) of an unknown wreck which is reported to have 'snagged' 3.5 miles west of the Dubh Artach lighthouse in March 1836. The other record relates to the reported loss (location unverified) of *Stanley*, a 20th century barque lost while carrying coal.

696. The geophysical survey data acquired in 2023 are yet to be assessed. However, the geophysical contractor reports the presence of one wreck identified in the sidescan sonar data.

14.7.3 Onshore Designated Heritage Assets

697. Within the additional 50 km 'settings' Study Area, there are 178 scheduled monuments and 319 listed buildings, as shown in **Figure 14.4** including a Category A listed Dubh Artach Lighthouse, which is located approximately 2 km from the WDA. These will be further considered through the heritage settings assessment to be undertaken in the EIA. The heritage settings assessment will be provided as an appendix to the EIAR with the findings summarised in the Offshore Archaeology and Cultural Heritage EIAR chapter.

620000
640000
660000
6220000
6200000
SUBMARINE EXERCISE
SUBMARINE EXERCISE AREA
SUBMARINE EXERCISE AREA
SUBMARINE EXERCISE AREA
BANK
7°00'W
55°30'N

Windfarm Development Area / Study Area for Marine Archaeology assets

Option Agreement Area

UKHO records

N

0 5 10 Kilometres

Edinburgh
Belfast
Scale: 1:10,000,000

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	09/08/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000028		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:200,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 14.2: UKHO records

Royal HaskoningDHV
Enhancing Society Together

ScottishPower Renewables

Project: C:\Users\284634\OneDrive - Royal HaskoningDHV\WIP\PC3479 Team\PC3479 - WIP\E02 GIS & Drawings\F02_Figures\02_Scoping\WindFarmSite\Chapter_14_OffshoreArchaeology\MCW_ScopingWFS_OffshoreArchaeology.aprx
Name: MCW-GEN-GIS-MAP-RHS-000028_UKHO records

620000
640000
660000
6220000
6200000
SUBMARINE EXERCISE
SUBMARINE EXERCISE AREA
SUBMARINE EXERCISE AREA
SUBMARINE EXERCISE AREA
BANK
7°00'W
55°50'N

Windfarm Development Area / Study Area for Marine Archaeology assets

Option Agreement Area

CANMORE records

Reported loss

Wreck

N

0 5 10 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	09/08/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000029		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:200,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 14.3: CANMORE records

NOT TO BE USED FOR NAVIGATION

Royal HaskoningDHV
Enhancing Society Together

ScottishPower Renewables

600000
650000
700000
6250000
6200000
6150000

Windfarm Development Area / Study Area for Marine Archaeology assets

Option Agreement Area

50km Study Area for setting to onshore heritage assets

Scheduled Monuments

Listed Buildings Category

- A
- B
- C

N

0 5 10 20 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	09/08/2024	JH	AB	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000030		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:550,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 14.4: Scheduled Monuments and Listed Buildings

NOT TO BE USED FOR NAVIGATION

Royal HaskoningDHV Enhancing Society Together

ScottishPower Renewables

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14.8 MITIGATION MEASURES

698. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on offshore archaeology and cultural heritage. These measures described in **Table 14.5** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 14.5 Indicative embedded mitigation measures for offshore archaeology and cultural heritage

ID	Parameter	Description of Mitigation Measure
M-8	Cable Plan	Development of, and adherence to, a Cable Plan (incorporating a Cable Burial Risk Assessment (CBRA)). The Cable Plan will confirm planned cable routeing, burial, and any additional external cable protection, and will set out methods for post-installation cable monitoring. Furthermore, this plan will detail environmental sensitives and design considerations to mitigate, as far as practicable, the effects of inter-array cable laying and associated protection during installation and operation of the Windfarm Development Area (WDA) infrastructure.
M-10	Unexploded Ordnance	Development of an Unexploded Ordnance (UXO) Threat and Risk Assessment.
M-14	Micro-siting	Micro-siting of infrastructure, where practicable, around any identified sensitive habitats and identified anomalies of archaeological interest.
M-37	Archaeological Exclusion Zones	Implementation of Archaeological Exclusion Zones around known sites of archaeological importance.
M-38	Archaeological Survey Input	Archaeological experts will provide input into the specifications for and analysis of future preconstruction geotechnical and geophysical surveys.
M-39	Written Scheme of Investigation	Development of, and adherence to an Offshore Written Scheme of Investigation (WSI). This will clearly detail the process and approach to undertaking heritage works associated with the WDA.
M-40	Protocol for Archaeological Discoveries	Development of, and adherence to a Protocol for Archaeological Discoveries (PAD). This will provide procedures for avoidance where practicable, as well as reporting and investigation of unexpected archaeological discoveries found during the site investigations and construction activities.
M-41	Further Investigation	Further investigation of any identified anomalies of possible archaeological interest that cannot be avoided by micro-siting of design.
M-42	Archaeological Watching Briefs	Archaeological Watching Briefs are a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. These will be carried out prior to any activities that interact with the seabed.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

699. The Outline Written Scheme of Investigation (WSI) to be submitted with the EIAR will provide a high level ‘outline’ approach to the investigation and mitigation commitments made by the Applicant, as described in **Table 14.5**.

700. Post-consent, a refined WSI will be produced to take account of more detailed and specific project requirements and this 'Final' WSI will be submitted to discharge the relevant condition of consent.

701. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to archaeology and cultural heritage will be assessed with this mitigation in place.

14.9 SCOPING OF POTENTIAL IMPACTS

702. A range of potential impacts on offshore archaeology and cultural heritage assets may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

703. **Table 14.6** outlines the offshore archaeology and cultural heritage impacts which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data becomes available.

Table 14.6 Potential impacts scoped in or scoped out for offshore archaeology and cultural heritage

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Direct impacts to heritage assets	✓	✓	✓	Direct impacts may occur if archaeological material is present within the footprint of the Windfarm Development Area (WDA) infrastructure (e.g. cable trenches and foundations) or during any activities which disturb the seafloor (e.g. seabed preparation, including grapnel runs, or seabed contact by legs of jack up barge and vessel anchors). During operation and maintenance (O&M) and decommissioning, direct impacts could occur during maintenance activities or during the removal of installed infrastructure, for example. However, given the areas where such activities would be undertaken would already have been disturbed during construction, there would be limited potential for any further impact. Therefore, potential impacts and effects on direct impacts to heritage assets has been **scoped into** the Environmental Impact Assessment (EIA), for all phases.
Indirect impacts to heritage assets associated with changes to marine physical processes	✓	✓	✓	Indirect impacts to heritage assets may occur if installation or maintenance activities and the physical presence of the WDA infrastructure affects the hydrodynamic regime and sedimentary processes, including increased potential for scour around installed infrastructure. Indirect impacts to heritage assets may also occur through cable protection measures such as the installation of a rock berm which may lead to heritage assets being covered and crushed. During the decommissioning phase, although there is potential for the removal of infrastructure to affect the hydrodynamic regime, this would likely be comparable to the construction phase resulting in limited potential for further indirect impacts to heritage assets. Therefore, potential impacts and effects on indirect impacts to heritage assets associated with changes to marine physical processes has been **scoped into** the EIA, for all phases.
Change to the setting of heritage assets	✓	✓	✓	There may be potential for impacts to the setting of heritage assets from the presence of vessels associated with construction and maintenance activities and from the WDA infrastructure once installed. Decommissioning would result in a further change to the setting of heritage assets with the removal of the infrastructure, and the presence of vessels, which may impact their significance. Therefore, potential impacts and effects on change to the setting of heritage assets has been **scoped into** the EIA, for all phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

14.10 POTENTIAL CUMULATIVE EFFECTS

704. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA and OfTDA to affect offshore archaeology and cultural heritage receptors. The approach to assessment of potential cumulative impacts is set out in **Chapter 4 Approach to Scoping and EIA**.

705. The potential impacts to be taken forward for consideration in the Cumulative Effects Assessment (CEA) will be in line with those described for the WDA-alone assessment and OfTDA appraisal. Individual heritage assets would not be subject to cumulative direct impacts from other known plans or projects as they are discrete and there would be no physical overlap of different infrastructure. However, although individual assets are discrete, taken together they could have collective heritage significance and therefore multiple impacts upon similar assets could occur cumulatively.

706. In addition, there is potential for multiple developments to affect the larger-scale archaeological features such as palaeolandscapes and to affect the setting of heritage assets.

707. There is also the potential for cumulative indirect impacts associated with changes to marine physical processes.

14.11 POTENTIAL TRANSBOUNDARY IMPACTS

708. Direct transboundary impacts may occur during construction if wrecks or aircraft of non-British nationality are subject to impact from the development of the Project. Such wrecks may fall within the jurisdiction of another country, and may include, for example, foreign warships lost in UK waters.

709. Similarly, where palaeolandscapes within the North Atlantic cross international boundaries, direct transboundary impacts may occur.

710. Indirect transboundary impacts, associated with changes to marine physical processes, where those changes cross an international boundary, may occur as the WDA is located near the Irish Exclusive Economic Zone.

14.12 APPROACH TO IMPACT ASSESSMENT

711. The marine archaeology and cultural heritage assessment will be informed by the interpretation of the geophysical survey data (namely the bathymetry and side scan sonar data to identify seabed features, such as wrecks, magnetometry data to identify magnetic anomalies and sub-bottom profiler data to identify palaeolandscape features) by a suitably qualified archaeology subcontractor.

712. The assessment will also be informed by the geoarchaeological assessment of geotechnical data to be acquired pre-consent which could include Cone Penetrometer Tests, boreholes, vibrocores or a combination of the above. The methodology for geoarchaeological assessment has been set out in a geoarchaeological method statement which will be issued to HES for review in advance of any planned survey activity.

713. A marine archaeological desk-based assessment will be undertaken to establish the baseline for both known and potential heritage assets within the WDA based upon the desk-based sources listed in **Table 14.3.**

714. The methodology of the assessment will also take account of relevant guidance including:

- Joint Nautical Archaeology Policy Committee Code of Practice for Seabed Development (JNAPC, 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007);

- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008);
- Offshore Geotechnical Investigations and Historic Environment Analysis (Gribble and Leather, 2011);
- Principles of Cultural Heritage Impact Assessment in the UK (IEMA et al,2021);
- Managing Change in the Historic Environment: Setting (HES, 2020); and
- Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments (2014a) and Code of Conduct (2014b).

715. The archaeological desk-based assessment and assessment of geophysical and geotechnical data will be used to identify a strategy for mitigation including the avoidance of identified heritage assets through the application of Archaeological Exclusion Zones where appropriate. This mitigation strategy will be set out in the Outline WSI, which will be submitted alongside the EIAR.

716. Initial consideration of the setting of heritage assets and any potential for impact upon their associated heritage significance will be undertaken as part of the setting assessment. This will be provided as an appendix to the EIAR with the findings summarised in the Offshore Archaeology and Cultural Heritage EIAR chapter. This will be informed by site visits to onshore heritage assets, Seascape Landscape Visual Impact Assessment wireframes, zones of theoretical visibility, visualisation and photomontages where appropriate. A full consideration of, and conclusions regarding, setting impacts will be made in the EIAR, following finalisation of the windfarm site design.

717. Technical consultation with HES will be undertaken. This will help to identify and agree the primary methodologies, present initial findings, and ensure potential historic environment issues and risks are identified and considered in the EIA.

718. The impact assessment methodology will define heritage assets, and their settings, likely to be impacted by the Project and assess the level of any resulting benefit, harm or loss to their significance. The assessment is not limited to direct (physical) impacts, but also assesses possible indirect (physical) impacts upon heritage assets which may arise from changes to hydrodynamic and sedimentary processes and changes to the setting of heritage assets, whether visually, or in the form of noise, dust and vibration, spatial associations and a consideration of historic relationships between places which may impact their significance.

719. **Section 4.4** provides a summary of the general impact assessment methodology applied. The specific approach used to assess the LSE on Offshore Archaeology and Cultural Heritage is outlined below.

720. As set out in Principles of Cultural Heritage Impact Assessment in the UK (IEMA et al., 2021), Cultural Heritage Impact Assessment is concerned with "understanding the consequences of change to cultural significance". The principles of assessment are:

- Understanding cultural heritage assets; and
- Evaluating the consequences of change.

721. Understanding cultural heritage assets distinguishes between:

- Describing the asset (what it is and what is known about it);
- Ascribing cultural significance (a description of what is valued about it); and
- Attributing importance (a scaled measure of the degree to which the cultural significance of that asset should be protected).

722. Evaluating the consequences of change additionally distinguishes between three separate analytical stages:

- Understanding change (a factual statement of how a proposal would change a cultural heritage asset or its setting, including how it is experienced);
- Assessing impact (a scaled measure of the degree to which any change would impact on cultural significance); and
- Weighting the effect (the measure that brings together the magnitude of the impact and the cultural heritage asset's importance).

723. The three stages of 'understanding cultural heritage assets' (a description of the assets and their cultural significance, including the contribution of setting to that significance, and attributing importance) will be described as part of the Existing Environment. An evaluation of the consequences of change will be presented in the impact assessment.

724. The sensitivity of a receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. However, while impacts to a heritage asset's setting or character can be temporary, impacts which result in damage or destruction of the assets themselves, or their relationship with their wider environment and context, are permanent. Once destroyed an asset cannot recover. On this basis, it is the importance of a heritage asset (as a scaled measure of the degree to which we seek to protect and preserve the cultural significance of that asset through, for example, legislation and planning policy) rather than the sensitivity which forms the basis for assessment.

725. For the purposes of the EIA, the criteria for determining the heritage importance of any relevant heritage assets are described in **Table 14.7**.

Table 14.7 Definition of importance for cultural heritage assets

Importance	Definition
High	Assets perceived to be of international / national importance including: • World Heritage Sites; • Scheduled Monuments; • Listed Buildings or structures; • Protected wrecks; • Designated historic landscapes of outstanding interest; • Conservation Areas containing buildings or structures with high heritage importance, or high concentrations of listed buildings; • Non-designated assets of acknowledged international / national importance; and • Assets that can contribute significantly to acknowledged international / national research objectives. Assets where the importance / existence / level of survival of the asset has not been ascertained (or fully ascertained / understood) from available evidence and is therefore considered of high importance as a precautionary measure.
Medium	Assets perceived to be of regional importance including: • Designated special historic landscapes; • Other types and character of Conservation Areas (i.e. not containing buildings or structures with high heritage importance, or high concentrations of listed buildings); • Assets that contribute to regional research objectives; and • Assets with regional value, educational interest or cultural appreciation.

Importance	Definition
Low	Assets perceived to be of local importance including: • 'Locally Listed' buildings or structures; • Assets that contribute to local research objectives; and • Assets with local value, educational interest or cultural appreciation. Assets compromised by poor preservation and / or poor contextual associations.
Negligible	Assets with no significant value or archaeological / historical interest.

726. The magnitude of adverse impact with respect to Offshore Archaeology and Cultural Heritage directly relates to the extent of harm to, or loss of, key elements of the asset's cultural significance, which may include its setting. The magnitude of beneficial impact directly relates to the level of public benefit associated with an individual impact. Benefits may correspond directly to the project itself where a project will enhance the historic environment (e.g. through measures which will improve the setting of a heritage asset or public access to it). Alternatively, benefits may occur on the basis of data gathering exercises undertaken for the purpose of a project which will enhance public understanding by adding to the archaeological record (e.g. through the accumulation of publicly available information and data).

727. The criteria used for assessing the magnitude of impact with regard to offshore archaeology and cultural heritage are presented in **Table 14.8**.

Table 14.8 Definition of magnitude of impacts

Magnitude	Definition
High Adverse	Key elements of the asset's fabric and / or setting are lost or fundamentally altered, such that the asset's cultural significance is lost or severely compromised.
Medium Adverse	Elements of the asset's fabric and / or setting which contribute to its significance are affected, but to a more limited extent, resulting in an appreciable, but partial, loss of the asset's cultural significance.
Low Adverse	Elements of the asset's fabric and / or setting which contribute to its cultural significance are affected, resulting in a slight loss of cultural significance.
Negligible	The asset's fabric and / or setting is changed in ways which do not materially affect its cultural significance.
Low Beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to a slight loss of cultural significance, are preserved in situ; or Elements of the asset's setting are improved, slightly enhancing its cultural significance; or Research and recording leads to a slight enhancement to the archaeological or historical interest of the asset. This only applies in situations where the asset would not be otherwise harmed i.e. it is not recording in advance of loss.
Medium Beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to an appreciable but partial loss of cultural significance, are preserved in situ; or Elements of the asset's setting are considerably improved, appreciably enhancing its cultural significance; or Research and recording leads to a considerable enhancement to the archaeological or historical interest of the asset. This only applies in situations where the asset would not be otherwise harmed i.e. it is not recording in advance of loss.

Magnitude	Definition
High Beneficial	Elements of the asset's physical fabric which would otherwise be lost, severely compromising its cultural significance, are preserved in situ; or Elements of the asset's setting, which were previously lost or unintelligible, are restored, greatly enhancing its cultural significance.
No impact	No change to the assets fabric or setting which affects its cultural significance.

728. The likely significant effect is the measure that brings together the magnitude of the impact and the cultural heritage asset's importance to assess the degree to which any change would impact on cultural significance. This measure is indicative of the weight that should be given to the matter in influencing the design of the proposal or, ultimately, in influencing whether the proposal will be acceptable and permitted.

729. The determination of significance is guided by the use of an impact significance matrix provided in **Table 14.9**.

Table 14.9 Significance of effect matrix

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

730. Definitions for this weighted measure of significance of effect for Offshore Archaeology and Cultural Heritage are provided in **Table 14.10**. For the purposes of this assessment, any effect that is of major or moderate significance is considered to be significant in EIA terms, whether this be adverse or beneficial. Any effect of minor or negligible significance is deemed not significant.

Table 14.10 Definition of effect significance

Importance	Definition
Major	Changes in cultural significance, both adverse or beneficial, which are likely to be important considerations at a national or regional level because they contribute to achieving national or regional objectives. Effective / acceptable mitigation options may still be possible, to offset and / or reduce residual impacts to satisfactory levels.
Moderate	Changes in cultural significance, both adverse and beneficial, which are likely to be important considerations at a local level. Effective / acceptable mitigation options may still be possible, to offset and / or reduce residual impacts to satisfactory levels.
Minor	Changes in cultural significance, both adverse and beneficial, which may be raised as local issues but are unlikely to be material considerations in the decision-making process. Industry standard mitigation measures may still apply.

Importance	Definition
Negligible	No material change to cultural significance.
No change	No impact, therefore, no change to cultural significance.

14.13 SCOPING QUESTIONS TO CONSULTEES

731. The following questions are posed to consultees to help frame and focus their response to the offshore archaeology and cultural heritage scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on offshore archaeology and cultural heritage receptors?
- Have all the marine archaeology and cultural heritage impacts resulting from the WDA been identified in this Scoping Report?
- Do you agree with the offshore archaeology and cultural heritage impacts that have been scoped in / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed approach to assessment in the EIA?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

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15 MILITARY AND CIVIL AVIATION

15.1 INTRODUCTION

732. This chapter considers the scope of potential impacts and likely significant effects (LSE) on military and civil aviation that may arise from the construction, Operation and Maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

733. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on military and civil aviation in the Environmental Impact Assessment (EIA).

734. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 13 Shipping and Navigation –** identifies the potential impacts that the WDA infrastructure may have on helicopters involved in Search and Rescue (SAR) and naval military Practise and Exercise Areas (PEXAs)**;** and
- **Chapter 17 Infrastructure and Other Marine Users –** identifies any potential impacts to offshore oil and gas platforms which typically feature helidecks. Helidecks are considered within this chapter, from an aviation perspective.

735. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

15.2 LEGISLATION, POLICY AND GUIDANCE

736. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 15.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for military and civil aviation.

Table 15.1 Summary of relevant legislation, policy and guidance for military and civil aviation

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Legislation	
International Civil Aviation Organisation (2022). The convention of International Civil Aviation: Aerodrome Design and Operations, Annex 14	Includes recommendations for the marking and lighting of Wind Turbine Generators (WTGs).
HM Government, Civil Aviation Act 1982	Provides the legal framework for aviation safety, security, and the operation of civil aircraft. Regulations for aviation safety include addressing obstacles such as wind turbines.
Policy	

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Civil Aviation Authority Policy and Guidelines on Wind Turbines. Civil Aviation Publication 764 (CAA, 2016)	Details Civil Aviation Authority (CAA) policy and guidelines associated with WTG effects on aviation that aviation stakeholders and wind energy developers need to consider when assessing a development's viability.
Guidance	
Safety of Navigation: Offshore Renewable Energy Installations – Guidance on UK Navigational Practice, Safety, and Emergency Response. Marine Guidance Note 654 (MCA, 2021)	Highlights issues to consider when assessing navigational safety and emergency response, caused by Offshore Renewable Energy Installations (OREI).
Aeronautical Information Publication. CAP 032 (CAA, 2024a)	Contains information on facilities, services, rules, regulations and restrictions in United Kingdom airspace.
Air Navigation Order 2016	Aerodromes and Lighting, articles 222 and 223 contain information on the lighting of en-route obstacles and offshore WTGs in UK territorial waters.
Safeguarding of Aerodromes. CAP 738 (CAA, 2020)	Document offers guidance to those responsible for the safe operation of an aerodrome or a technical site, to help them assess what effects a proposed development or construction might have on that operation.
Air Traffic Services Safety Requirements. CAP 670 (CAA, 2019)	Highlights the requirements to be met by providers of civil Air Traffic Service (ATS) and other services in the UK to ensure that those services are safe for use by aircraft.
Licensing of Aerodromes. CAP 168 (CAA, 2022)	Sets out the standards required at UK licensed aerodromes relating to management systems, operational procedures, physical characteristics assessment and treatment of obstacles.
Standards for Offshore Helicopter Landing Areas. CAP 437 (CAA, 2023)	Provides the criteria applied by the CAA in assessing offshore helicopter landing areas for worldwide use by helicopters registered in the UK and includes winching area 'best practice' design criteria for WTGs.
UK Flight Information Services. CAP 774 (CAA, 2021)	Details the suite of ATS which (excluding aerodrome services) are the only services provided in class G airspace within the UK Flight Information Region (FIR) and where notified, elements of which are also provided to Visual Flight Rules flights operating in class E airspace.
Airspace Change. CAP 1616 (CAA, 2021).	Explains the CAAs regulatory process for changes to airspace.
Airspace Change. CAP 1616 v5 (CAA, 2024b)	Explains the airspace change process for making a permanent change to the notified airspace design.
Guidance on Airspace Change Process for Permanent Airspace Change Proposals. CAP 1616f (CAA, 2024b)	Provides guidance to the aviation industry on the airspace change process requirements for permanent airspace change proposals.
CAP1616i Environmental Assessment Requirements and Guidance for Airspace Change Proposals (CAA, 2024c)	Provides guidance to the aviation industry on providing environmental and habitats regulations assessments for airspace change proposals.

15.3 CONSULTATION

737. Consultation with military and civil aviation stakeholders will be ongoing throughout the EIA process and will include engagement with:

- Civil Aviation Authority (CAA);
- Highlands and Islands Airport Ltd;
- HM Coastguard;
- Ministry of Defence (MoD);
- National Air Traffic Services (NATS); and
- Northern Lighthouse Board (NLB).

738. Initial consultation with some of the stakeholders listed above has commenced in relation to early data collection activities within the WDA and to establish communication processes for future activities associated with the WDA.

15.4 EXISTING DATA SOURCES

739. **Table 15.2** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA. The primary sources of aviation data are UK civil and military Aeronautical Information Publications (AIPs). The AIPs contain details on airspace and en-route procedures as well as charts and other air navigation information.

Table 15.2 Summary of key datasets and information sources

Dataset	Description	Author
Civil Aviation Publication 032	Civil Aviation Publication (CAP) containing information on facilities, services, rules, regulations, and restrictions in UK airspace.	CAA, 2024a
United Kingdom Military Aeronautical Information Publication	The main resource for information on flight procedures at all military aerodromes.	MoD, 2024
Irish Aeronautical Information Publication	Contains information on facilities, services, rules, regulations, and restrictions in Irish airspace.	Irish Aviation Authority (IAA), 2024
National Air Traffic Services Wind Farm self-assessment maps	Maps provided by National Air Traffic Services (NATS) to ascertain potential impacts of Wind Turbine Generators (WTGs) on their enroute electronic infrastructure.	NATS, 2024
United Kingdom Continental Shelf Offshore Infrastructure Data	Regularly updated North Sea Transition Authority (NSTA) offshore oil and gas platform shapefiles.	NSTA, 2024
Helideck Certificates	Regularly updated offshore helideck certifications.	Helideck Certification Authority (HCA), 2024
Operational Programme for the Exchange of Weather Radar Information Database	Contains information for weather station radars throughout the UK.	European Meteorological Network (EUMETNET), 2024
Northern Lighthouse Board, Our Lighthouses	Contains the locations of all lighthouses operated by the Northern Lighthouse Board (NLB).	NLB, 2024

15.5 SITE-SPECIFIC SURVEY DATA

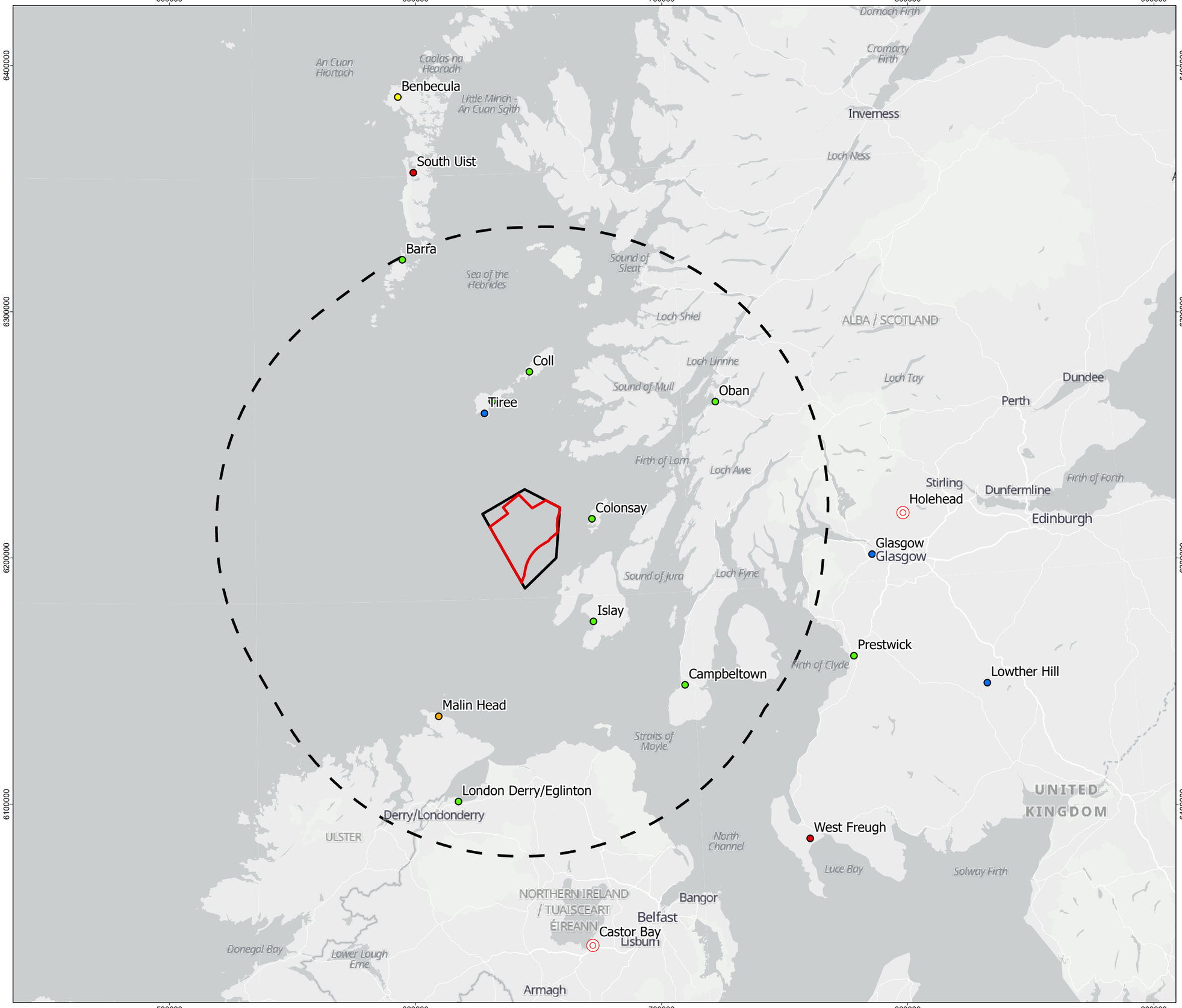
740. It is considered that no additional baseline information needs to be gathered specifically from the site to inform this chapter, as there are sufficient existing data sources available to provide an environmental baseline to inform scoping and EIA.

15.6 MILITARY AND CIVIL AVIATION STUDY AREA

741. This section describes the military and civil aviation Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 15.7**) and the EIA will be conducted.

742. The main factor to be considered when determining the spatial extent of the Study Area, is the potential for Wind Turbine Generators (WTGs) within the WDA to have an impact on civil and military radars through the review of radar operational ranges. Primary Surveillance Radars (PSRs) installed on civil and military airfields have an operational range from 40 to 60 nautical miles (nm). All radar-equipped airfields within 60 nm of the WDA are therefore included in the military and civil aviation Study Area. En route radars operated by NATS (En Route) plc (NERL) and military Air Defence radars are required to provide coverage at ranges in excess of 60 nm. All such radars with potential Radar Line of Sight (RLoS) of WTGs in the WDA are included in the military and civil aviation Study Area.

743. The military and civil aviation Study Area is defined by the WDA boundary, plus an appropriate buffer of 60 nm, shown in **Figure 15.1**. This ensures that all airspace within the vicinity of the WDA is considered within this chapter. This includes the airspace between the WDA, the UK and the Republic of Ireland, extending from the MoD facility Benbecula, 168.8 km) to the north and to West Freugh which is located 156.6 km to the southeast of the WDA. Airports and radars within the Study Area that are under consideration within this chapter are shown in **Figure 15.1**.



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- Windfarm Development Area
- Option Agreement Area
- 60nm Scoping Study Area
- Civil Aerodromes
- Military AD Radars
- Military Radars
- NATS En Route Radar
- ROI Radars
- Weather Radars

0 5 10 20 30 40 50 60 70 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	09/08/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000048		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,500,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 15.1: Military and Civil Aviation Study Area

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15.7 EXISTING ENVIRONMENT

744. This section describes the military and civil aviation receptors, using publicly available data sources (**Section 15.4**), deemed of relevance to the Study Area (**Section 15.6**). This sets the context for the identification of mitigation measures (**Section 15.8**) and scoping of potential impacts (**Section 15.9**) which then feeds into the consideration of cumulative effects (**Section 15.10**) and potential transboundary impacts (**Section 15.11**).

15.7.1 Civil Aviation

745. The airspace above the WDA is used by both civil and military aircraft and lies within the Scottish Flight Information Region (FIR) for Air Traffic Control (ATC). This airspace is regulated by the UK CAA. The Scottish FIR is adjacent to the Shannon FIR and Shanwick Oceanic FIR and regulated by the Irish Aviation Authority and UK CAA respectively. The boundary of the Shannon FIR is approximately 60 km southwest and the Shanwick Oceanic FIR is approximately 194 km west of the WDA at its closest point.

746. Airspace is classified as either controlled or uncontrolled and is divided into several classes depending on what kind of Air Traffic Service (ATS) is provided and under what conditions. In the UK there are five classes of airspace: specifically; A, C, D, E and G. The first four (A, C, D and E) are controlled airspace while class G is uncontrolled. Within controlled airspace, aircraft are monitored and instructed by ATC. Aircraft within uncontrolled airspace, are not subject to ATC instruction but rather operate according to a simple set of regulations. ATC may still provide information, if requested, to ensure flight safety.

747. Aircraft operate under one of two flight rules:

- Visual Flight Rules (VFR), conducted with visual reference to the natural horizon; or
- Instrument Flight Rules, requires reference solely to aircraft instrumentation.

748. From sea level to Flight Level (FL) 195 (approximately 19,500 ft Above Mean Sea Level (amsl)), the airspace above the WDA is Class G uncontrolled airspace. The airspace within this area is predominantly used by low level flight operations and generally by aircraft flying under VFR. Under VFR the pilot is responsible for maintaining a safe distance from terrain, obstacles and other aircraft.

749. Above FL 195 is Class C airspace in the form of a Temporary Reserved Area. This airspace, Temporary Reserved Area 800C, has an upper limit of FL 245 (approximately 24,500 ft amsl). A Temporary Reserved Area is a defined volume of airspace normally under the jurisdiction of one aviation authority and temporarily reserved, by common agreement, for the specific use by another aviation authority and through which other traffic may be allowed to transit under an ATS authority.

750. Laterally, the closest controlled lower airspace to the WDA is Argyll Control Area 2, located 19 km to the north. Argyll Control Area 2 is class E controlled airspace and has a lower limit of FL 115 (approximately 11,500 ft) and an upper limit of FL 195.

751. All airspace mentioned above is shown within **Figure 15.2**.

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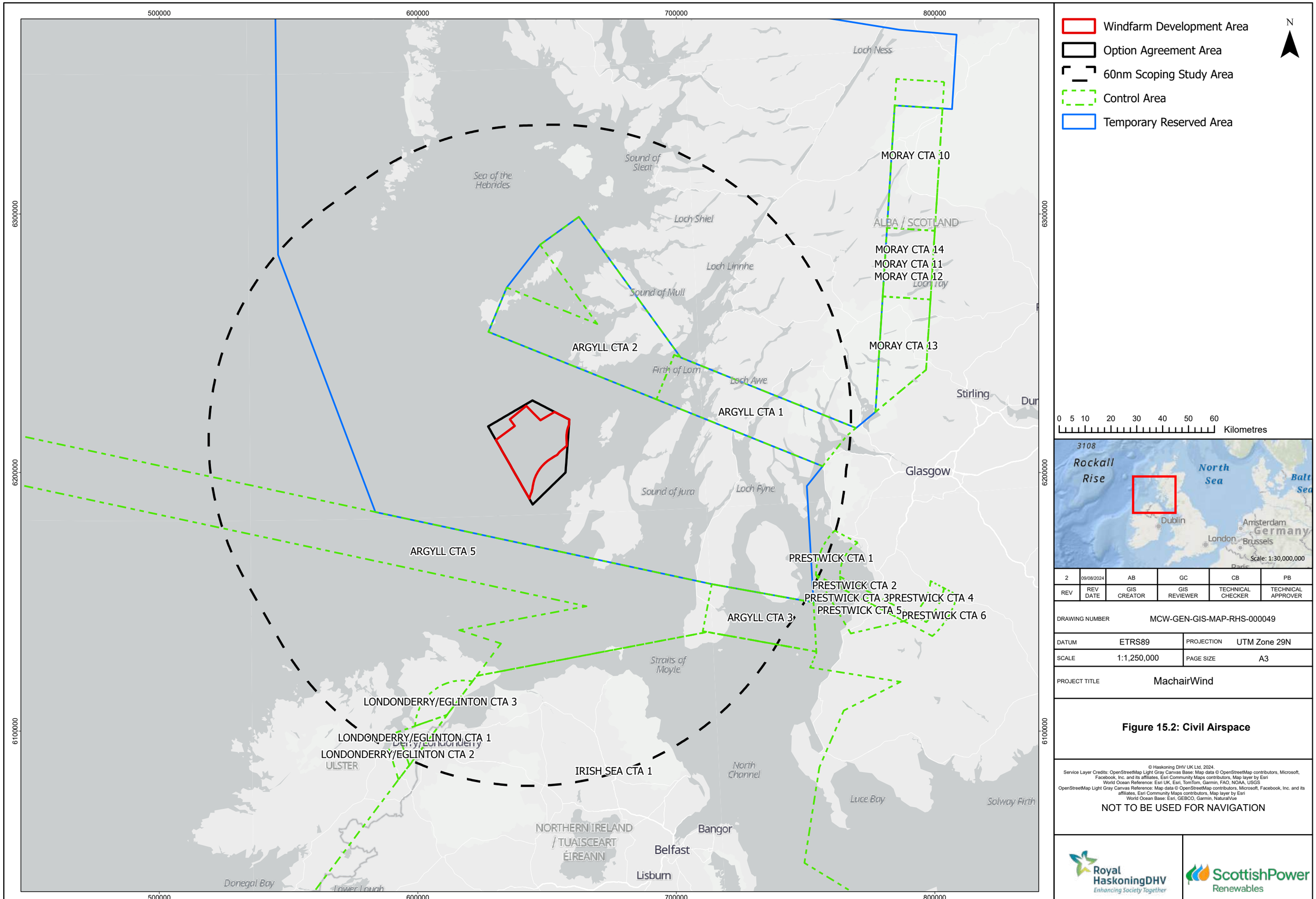

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DATUM	ETRS89	PROJECTION	UTM Zone 29N
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PROJECT TITLE	MachairWind		

Figure 15.2: Civil Airspace

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752. The nearest UK civil airport to the WDA is Colonsay Airfield, located 13.2 km to the east of the WDA. Colonsay Airfield is a licensed aerodrome with no associated Instrument Flight Procedure (IFP) and a runway length of 501 metres (m). With a runway length less than 1,100 m, Colonsay features a consultation zone of 5 km as specified by guidance in CAP 764. The WDA is located outside of this consultation zone.

753. The nearest licensed aerodromes with associated IFPs to the WDA within the Study Area are Tiree Airport, Islay Airport and Campbeltown Airport (**Figure 15.1**), all owned by Highlands and Islands Airports Limited. All of these airports have IFPs which lie coincidental with the WDA. The potential impact the WDA may have on IFPs will be determined by specialist analysis and consultation with Highlands and Islands Airports Limited.

754. NERL provides en-route civil ATSs within the Scottish FIR and operates on a network of radar facilities providing information for ATC on both civil and military aircraft. The nearest NERL facilities to the WDA are Tiree, Glasgow, and Lowther Hill, situated 39 km to the north, 130 km to the east and 185 km to the east southeast from the WDA respectively.

755. Preliminary RLoS analysis indicates that WTGs with a maximum blade tip height of 338 m amsl (see **Chapter 3 Project Description, Site Selection and Alternatives**) within the WDA will be visible to Tiree RLoS, analysis also indicates that WTGs with a maximum tip height of 338 m amsl will not be within RLoS of Glasgow and Lowther Hill.

756. NERL facilities are combined with Secondary Surveillance Radar (SSR) systems. CAP 764 states that WTGs have less impact on SSRs than PSRs provided they are more than 10 km away from the SSR. Furthermore, NATS do not consider the impact of WTGs on SSR to be material or relevant for WTGs that are beyond approximately 28 km from their SSR facilities (NATS, 2024). Tiree is located 36 km to the north of the WDA, therefore WTGs within the WDA may not impact the SSR system at Tiree.

757. RLoS coverage for Tiree, Glasgow and Lowther Hill is shown in **Figure 15.3**.

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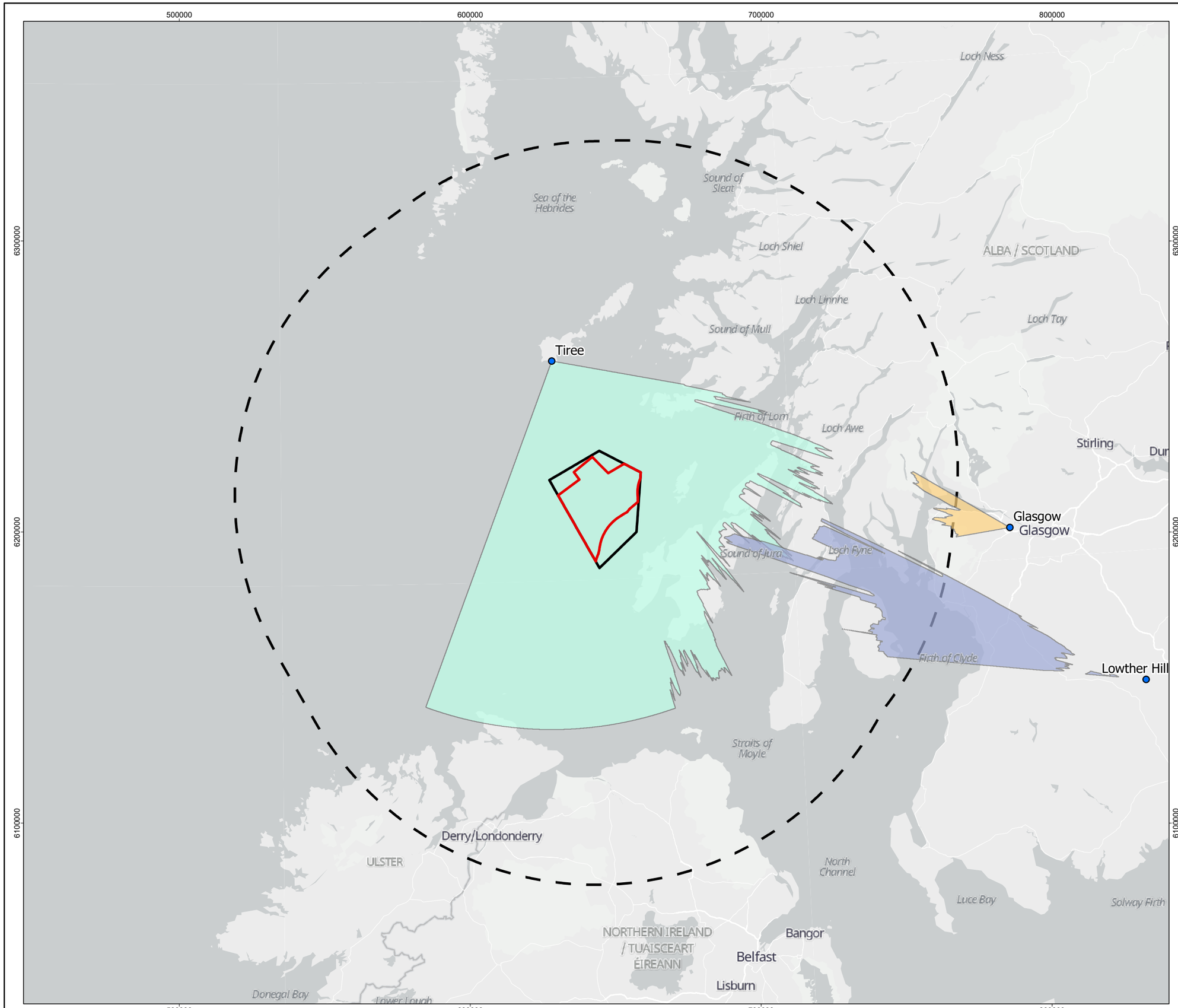

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DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,250,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 15.3: NATS RLoS Coverage at 338 m amsl

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15.7.2 Military Aviation

758. The WDA is situated below the Fast Jet Area South (EG D713), with the northeast section within this area when activated. This area provides segregated airspace for military flying training. The WDA is positioned across the southern border of EG D713 which has a lower and upper airspace limit of FL 245 and FL 550 respectively (approximately 24,500 to 55,500 ft amsl). High energy manoeuvres, ordnance, munitions and explosives activities take place within these danger areas.

759. PEXAs in the vicinity of the WDA are: Hebrides (EG D701M, EG D701K, EG D701J, EG D701I, EG D701D, EG D701B). These are situated to the north and west and have unlimited upper airspace limits from the surface; Campbelltown (EG D509) is located to the southeast and has an upper limit of 55,000 ft from the surface. Magilligan (EG D505) is located to the south with an upper limit of 6,500 ft from the surface; and Garelochhead (EG D601) is located to the east with an upper limit 4,000 ft from the surface.

760. Located 13.6 km to the west of the WDA is the Air-to-Air Refuelling Area, Area 4. The Air-to-Air Refuelling Area, Area 4, has a lower limit of FL 180 and an upper limit of FL 240 (approximately 18,000 to 24,000 ft amsl respectively) and is permanently available to military traffic.

761. There are no known further PEXAs within the vicinity of the WDA. All PEXAs mentioned above are shown in **Figure 15.4.**

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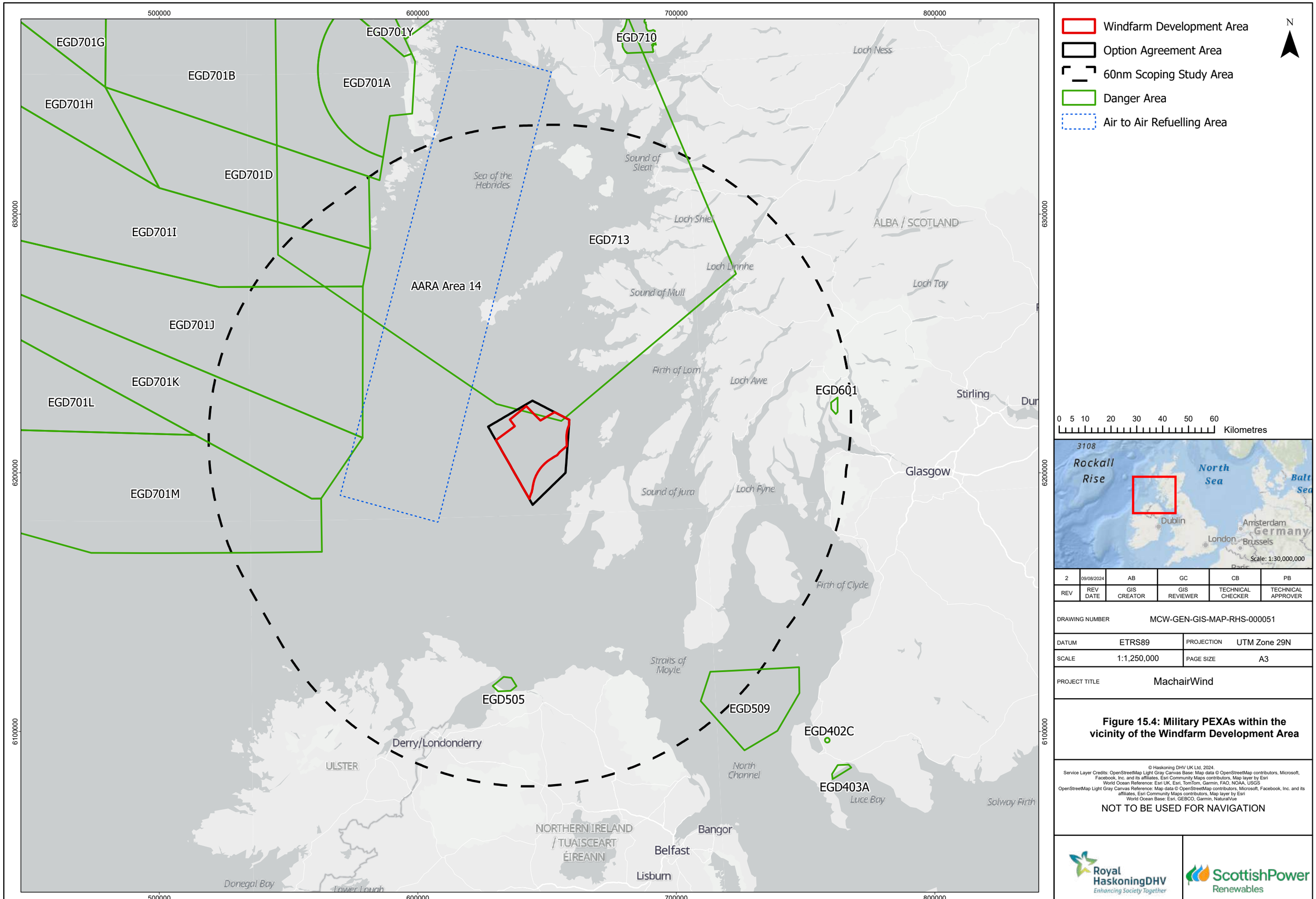

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SCALE	1:1,250,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 15.4: Military PEXAs within the vicinity of the Windfarm Development Area

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762. The nearest military radars are located at South Uist and West Freugh, located 137.6 km to the north and 156.5 km to the west southwest of the WDA respectively. Preliminary RLoS analysis indicates WTGs with a maximum tip height of 338 m amsl within the WDA will not be within RLoS of South Uist and West Freugh.

763. The closest MoD air defence (AD) radar is based at Benbecula, located 168.8 km north of the WDA. Preliminary RLoS analysis indicates that WTGs with a maximum tip height of 338 m amsl will not be within RLoS of Benbecula.

764. RLoS analysis for military and AD radars is shown in **Figure 15.5.**

15.7.3 Meteorological Radar Facilities

765. The closest Met Office weather radars to the WDA are Holehead and Castor Bay, located approximately 140 km to the east and 150 km to the south of the WDA respectively. Preliminary RLoS analysis indicates that WTGs with a maximum tip height of 338 m amsl will not be within RLoS of Holehead and Castor Bay.

766. RLoS analysis for weather radars is shown in **Figure 15.6**.

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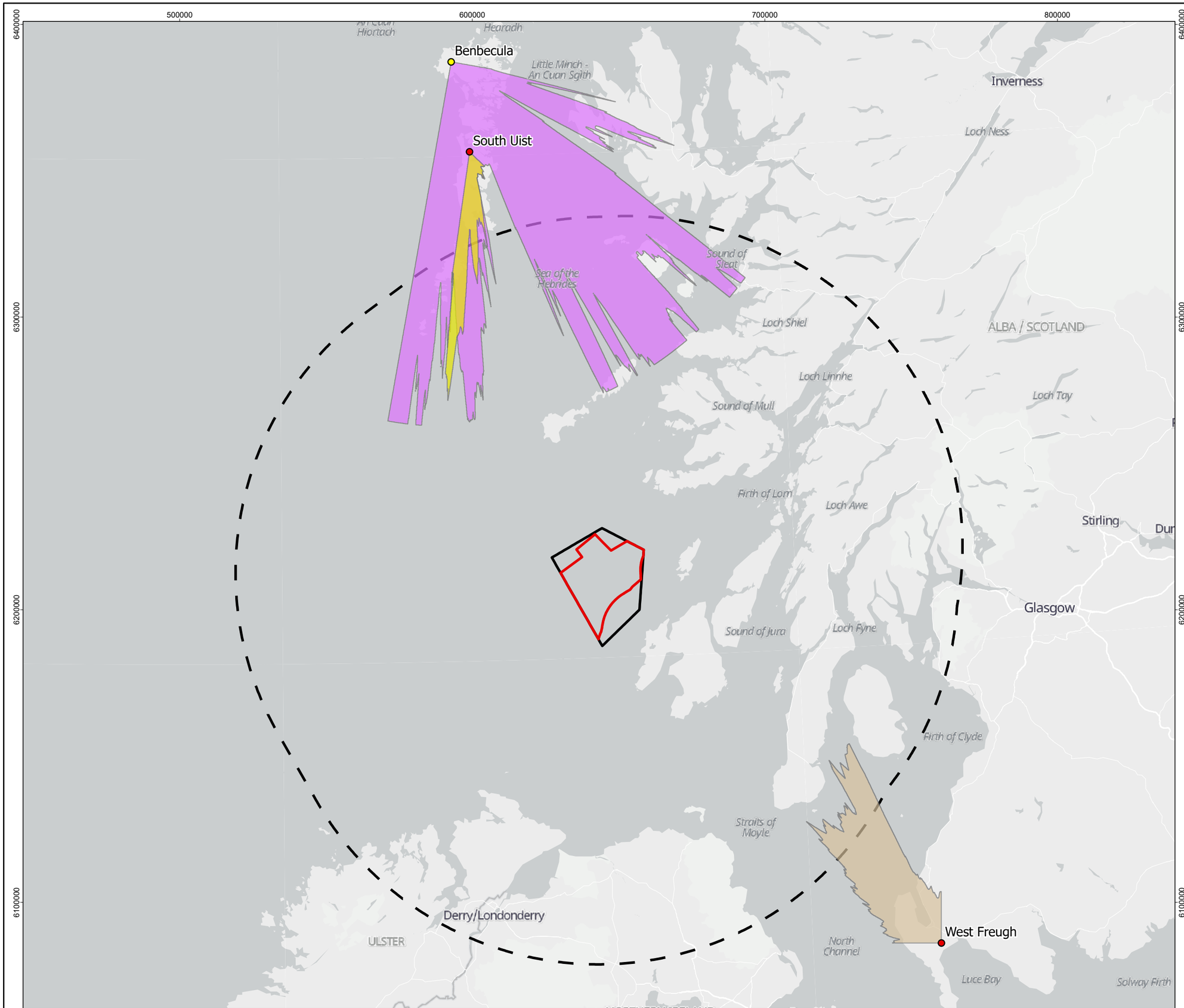

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DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000052		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,250,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 15.5: Military and AD RLoS Coverage at 338 m amsl

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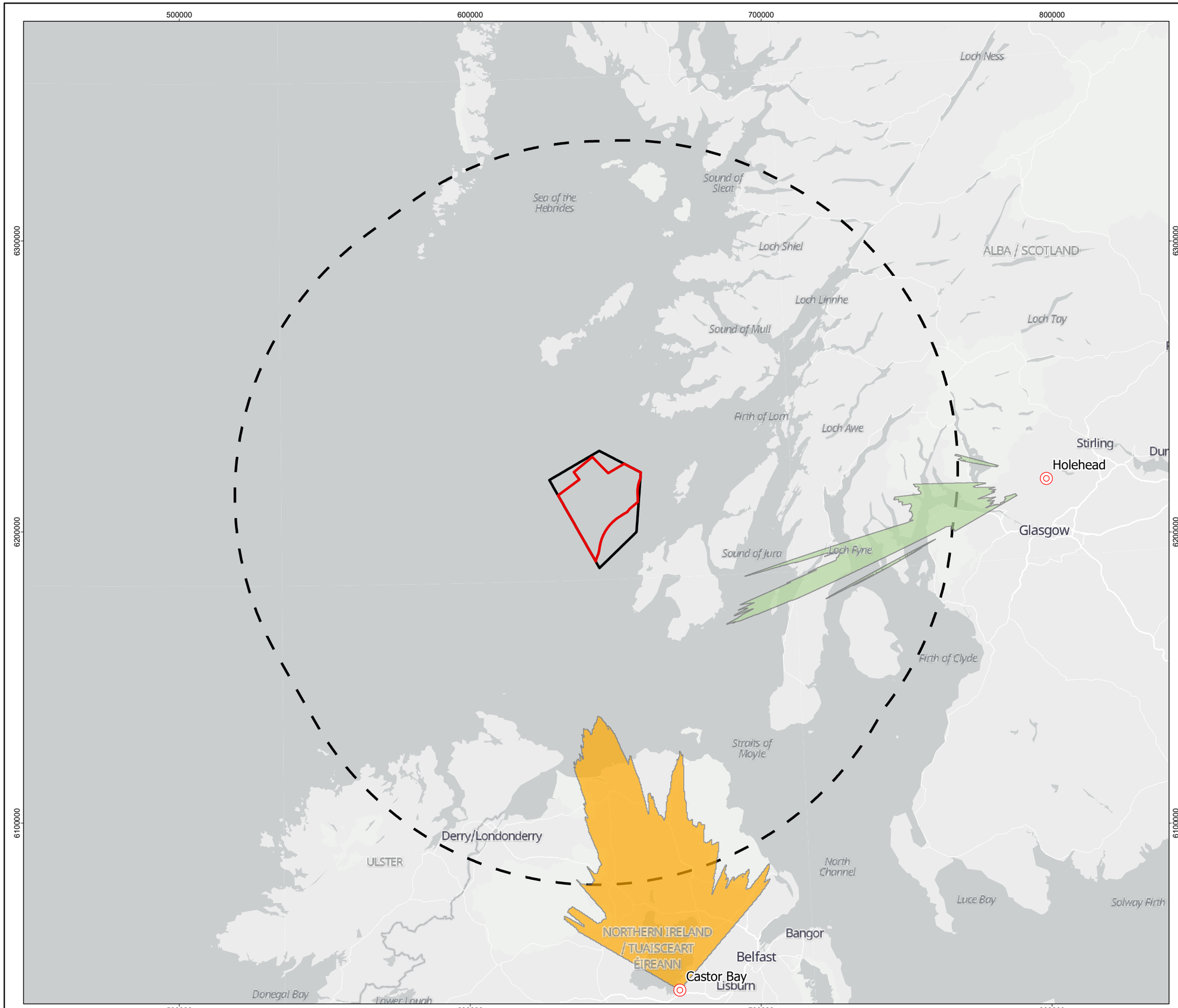

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DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:1,250,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 15.6: Meterological Weather Radars RLoS Coverage at 338 m amsl

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15.7.4 Helicopter Main Routeing Indicators

767. Helicopter Main Routeing Indicators are a network of offshore routes used by civilian helicopters for navigational purposes. There are no Helicopter Main Routeing Indicators in the vicinity of the WDA as these are located over the North Sea in support of oil and gas facilities.

15.7.5 Helidecks

768. To achieve a safe operating environment under low visibility, a consultation zone with a 9 nm radius is present around each helideck. This means obstacles such as WTGs within this radius must be consulted on with the helideck operators to maintain safe offshore helicopter operations alongside the WDA. The Dubh Artach lighthouse helideck is within 9 nm of the WDA, located 1.5 km to the north of the WDA. As noted above, there are no offshore oil and gas helidecks within the vicinity of the WDA.

15.7.6 Search and Rescue

769. Bristow Group currently operate SAR operations from Prestwick airport, this is located 130 km (70 nm) east southeast of the WDA. For SAR operations to be carried out safely and efficiently, they require developers to fulfil WTG spacing, marking and lighting requirements set out by the Maritime and Coastguard Agency and NLB.

15.8 MITIGATION MEASURES

770. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on military and civil aviation. These measures described in **Table 15.3** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

Table 15.3 Indicative embedded mitigation measures for military and civil aviation

ID	Parameter	Description of Mitigation Measure
M-20	Light and Marking Plan	Development of, and adherence to, a Lighting and Marking Plan (LMP). This plan will set out the marine and navigational lighting and marking measures to be applied during the construction and operation of the Windfarm Development Area (WDA). Aviation lighting and marking, as described in the LMP, will be installed in accordance with Article 223 of the United Kingdom (UK) Air Navigation Order 2016 which sets out the mandatory requirements to be followed for lighting of offshore Wind Turbine Generators (WTGs).
M-26	Search and Rescue	Development of a Search and Rescue (SAR) Checklist in consultation with the Maritime and Coastguard Agency (MCA) to ensure compliance with Marine Guidance Note 654 and its annexes. This will be completed post consent.
M-27	Emergency Response and Cooperation Plan	Development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP). This plan ensures co-operation with the MCA by detailing the design parameters of the WDA, emergency contact details, and processes to be followed.
M-33	Aeronautical Navigational Marking	Appropriate marking of the WDA on aeronautical charts. This will include provision of the positions and heights of structures to Civil Aviation Authority (CAA), Ministry of Defence (MoD), and Defence Geographics Centre.

ID	Parameter	Description of Mitigation Measure
M-34	Development Specification and Layout Plan	Development of, and adherence to, a Development Specification and Layout Plan. The layout of the WTGs will be finalised post consent. Consultation with the MCA and Northern Lighthouse Board (NLB) will be undertaken to ensure that the specific WTG layout is compatible with potential SAR activity (M-26).
M-35	Failures of Lighting and Marking	Failures of the lighting and marking in the WDA will be appropriately reported and rectified as soon as practicable. Interim hazard warnings (i.e. Notice to Mariners (M-19) will be put in place as required.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

771. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to military and civil aviation will be assessed with this mitigation in place.

15.9 SCOPING OF POTENTIAL IMPACTS

772. A range of potential impacts on military and civil aviation receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

773. **Table 15.4** outlines the military and civil aviation impacts which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data becomes available.

Table 15.4 Potential impacts scoped in or out for military and civil aviation

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impact on military Air Traffic Control and Air Defence radars	✘	✘	✘	The impact to military Air Traffic Control (ATC) radars has been scoped out for all stages of the Windfarm Development Area (WDA). Radar Line of Site (RLoS) analysis indicates that Wind Turbine Generators (WTGs) with a maximum tip height of 338 metres (m) above mean sea level (amsl) (see **Chapter 3 Project Description, Site Selection and Alternatives**) will not be within RLoS of the nearest military radars at South Uist and West Freugh. Therefore, potential impacts and effects on military ATC and Air Defence (AD) radars has been **scoped out** of the Environmental Impacts Assessment (EIA), for all phases.
Impact on civil and military Secondary Surveillance Radar systems	✘	✘	✘	The impact on Secondary Surveillance Radar (SSR) systems is scoped out through all stages of the WDA due to the significant distance from the WDA and the nearest active SSR facility. National Air Traffic Services (NATS) have released guidance for windfarm developers which indicates that NATS do not consider the impacts on SSR facilities to be material or relevant for WTGs that are beyond approximately 28 km from their SSR facilities (NATS, 2012). Furthermore, Civil Aviation Publication (CAP) 764 states that the effects on SSR *"…are typically only a consideration when the turbines are located very close to the SSR i.e. less than 10 km".* The nearest SSR facility is located at Tiree Airport 38 km to the northwest of the WDA. Therefore, potential impacts and effects on civil and military SSR systems has been **scoped out** of the EIA, for all phases.
Impact on weather radars	✘	✘	✘	The impact on weather radars has been scoped out for all stages. The nearest weather radar, Holehead is located 139.4 km from the WDA, which is beyond the established 20 km safeguard zone. RLoS analysis indicates the WTGs will not be within RLoS of Holehead. Therefore, potential impacts and effects on weather radars has been **scoped out** of the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Creation of an aviation obstacle environment	✓	✓	✓	The creation of an obstacle environment is an impact that is scoped in for the construction, operation and maintenance (O&M), and decommissioning phases of the WDA. The construction and decommissioning of the WDA infrastructure may involve tall crane vessels creating a physical obstruction. The presence of WTGs and associated structures may also pose a physical obstruction to low flying aircraft (including Search and Rescue (SAR) operations and helicopters involved in lighthouse maintenance), increasing the risk of collision or requiring aircraft to fly extended routes to avoid obstructions. Specifically, the introduction of obstructions within all stages of the WDA has the potential to impact Instrument Flight Procedures (IFPs) at Islay, Tiree, and Campbeltown Airport. Therefore, potential impacts and effects on the creation of an aviation obstacle environment has been **scoped into** the EIA, for all phases.
Increased air traffic in the area related to Project activities	✓	✓	✓	Increased air traffic in the area related to activities within the WDA is an impact scoped in for the construction, O&M and decommissioning phases of the WDA. Helicopters involved in all stages of the WDA lifecycle may impact on existing traffic in that area, increasing the risk of aircraft-to-aircraft collision. Air traffic potentially impacted includes helicopters involved in SAR operations and the maintenance of the Dubh Artach Lighthouse. Therefore, potential impacts and effects on increased air traffic in the area related to WDA activities has been **scoped into** the EIA, for all phases.
Impact on civil Primary Surveillance Radars systems	✘	✓	✘	The effect on NATS (En Route) plc (NERL) Primary Surveillance Radars (PSR) systems is scoped in for the O&M phase of the WDA. To discriminate wanted aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. PSRs with visibility of rotating WTG blades can mistake them for aircraft and so present them on ATC radar displays as clutter. Controllers may not be able to distinguish aircraft from clutter. The only phase in which the WTGs should be fully operational, therefore generating clutter, is the O&M phase. Specifically, WTGs may impact the NERL radar at Tiree. Therefore, potential impacts and effects on civil PSR systems has been **scoped into** the EIA, for the O&M phase only.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

15.10 POTENTIAL CUMULATIVE EFFECTS

774. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA to affect military and civil aviation receptors. The approach to assessment of potential cumulative impacts is set out in **Chapter 4 Approach to Scoping and EIA**.

775. The Cumulative Effects Assessment (CEA) will consider the impacts in combination with other existing and future onshore and Offshore Windfarms (OWFs) and associated aviation activities, including increased collision risk and cumulative impacts on radar. The OWFs and other activities relevant to the CEA will be identified through a screening exercise. Consultation with other OWF developers in the area will be undertaken to understand what mitigations exist or are planned and how these may impact or harmonise with potential mitigations for the WDA.

776. The aviation and radar CEA will consider the maximum design envelope for each adjacent project and any associated activities.

15.11 POTENTIAL TRANSBOUNDARY IMPACTS

777. The potential impacts of WTGs on aviation are localised and the WDA is wholly within UK airspace. The 60 nm buffer zone is partially within Shannon FIR, to the southwest, which is the Republic of Ireland airspace. There are no known PSR systems with potential RLoS of the WDA. Therefore, transboundary impacts are proposed to be **scoped out** of further assessment within the EIA.

15.12 APPROACH TO IMPACT ASSESSMENT

778. **Chapter 4 Approach to Scoping and EIA** explains the general impact assessment methodology applied to the Project. The following sections describe the specific methods that will be used to assess the LSE on aviation and radar.

779. A thorough, desk-based collation and review of the relevant data will be undertaken to inform the EIA. The EIA will be informed by further desk-based studies, including RLoS modelling, which will identify and examine in greater detail sensitive aviation and radar receptors. RLoS is determined using radar propagation modelling software and 3D terrain data.

780. Studies will be undertaken in parallel with consultation with relevant stakeholders to provide a detailed understanding of potential impacts and effects. It is expected that the consultation stage will be an iterative process, allowing for any concerns to be addressed during the pre-application phase and in finalising the WDA EIAR.

781. The military and civil aviation assessment will comply with the guidance laid out in the documents listed in **Section 15.2**.

782. In assessing the significance of the effects from the WDA it will be necessary to identify whether there could be an impact on aviation operations. The aviation industry is highly regulated and subject to numerous mandatory standards, checks and safety requirements (for example CAP 670), many international in nature, and requiring the issue of operating licences. In all cases, the sensitivity or magnitude of the impact on operations can only be identified by the appropriate aviation organisation conforming to the Risk Classification Scheme used to quantify and qualify the severity and likelihood of a hazard occurring.

783. The Risk Classification Scheme is a fundamental element of an aviation organisation's safety management system, which must be acceptable to, and approved by, the UK CAA or the Military Aviation Authority, as appropriate. As such, for the purposes of this assessment, no detailed grading will be made of the magnitude of the impact or sensitivity of the receptor on the basis that any potential reduction in aviation safety cannot be tolerated. Instead, the following definitions of basic

significance have been used as defined in **Table 15.5**. This represents a deviation from the standard methodology presented within **Chapter 4 Approach to Scoping and EIA**. The same definitions of effect significance will also be used for the CEA.

Table 15.5 Definition of Effect Significance

Effect Significance	Definition
Major Significant	Receptor would be unable to continue safe operations or safe provision of air navigation services (radar) or effective air defence surveillance in the presence of the Wind Turbine Generators. Technical or operational mitigation of the impact would be required.
Moderate Significant	Receptor would be able to continue safe operations but with some restrictions or non-standard mitigation measures in place.
Not Significant	The Windfarm Development Area (WDA) would have little impact on the aviation receptor, or the level of effect would be acceptable to the aviation receptor.
No Change	The WDA would have no impact on the aviation receptor and would be acceptable to the aviation receptor.

15.13 SCOPING QUESTIONS TO CONSULTEES

784. The following questions are posed to consultees to help frame and focus their response to the military and civil aviation scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the Study Area for military and civil aviation?
- Do you agree with the list of data sources?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on military and civil aviation receptors?
- Do you agree that all receptors related to military and civil aviation have been identified?
- Do you agree with the scoping in and out of impact pathways in relation to military and civil aviation?
- Do you agree with the assessment of cumulative effects in relation to aviation and radar?
- Do you agree with the scoping out of transboundary impacts in relation to military and civil aviation?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

15.14 REFERENCES

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16 SEASCAPE, LANDSCAPE AND VISUAL IMPACTS

16.1 INTRODUCTION

785. This chapter considers the scope of potential impacts and likely significant effects (LSE) on Seascape, Landscape and Visual Impact Assessment (SLVIA) that may arise from the construction, operation and maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

786. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on SLVIA in the Environmental Impact Assessment (EIA).

787. The SLVIA considers effects on:

- Seascape / landscape as a resource in its own right (caused by changes to its constituent elements, its specific aesthetic or perceptual qualities and / or its character); and
- Views and visual amenity as experienced by people (caused by changes in the appearance of the seascape / landscape).

788. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 13 Shipping and Navigation –** identifies offshore marine users which operate in the vicinity of the WDA;
- **Chapter 14 Offshore Archaeology and Cultural Heritage -** identifies onshore heritage assets which influence landscape character; and
- **Chapter 18 Socio-economics -** identifies socio-economic receptors where visual effects may result in secondary effects on amenity and use.

789. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

16.2 LEGISLATION, POLICY AND GUIDANCE

790. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 16.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for seascape, landscape and visual impacts.

Table 16.1 Summary of relevant legislation, policy and guidance for seascape, landscape and visual impacts

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Policy	
National Planning Framework 4 (Scottish Government, 2023)	Sets out policies in relation to proposed "*renewable energy development onshore and offshore*", including effects on landscape and visual receptors. **The key references are:** **Policy 4: Natural places** – *"Development proposals which by virtue of type, location or scale will have an unacceptable impact on the natural environment, will not be supported…"* **Policy 11: Energy** – *"Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported. These include: i) wind farms including repowering, extending, expanding and extending the life of existing wind farms…"*
Scotland's National Marine Plan (Scottish Government, 2015)	Sets out policies that apply to the marine environment, including policies relating to effects on seascape, landscape and visual receptors. **The key reference is:** **GEN 7: Landscape/seascape –** *"Marine planners and decision makers should ensure that development and use of the marine environment take seascape, landscape and visual impacts into account…"*
Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020)	The Sectoral Marine Plan (SMP) for Offshore Wind Energy identifies sustainable areas for the future development of commercial scale offshore wind energy in Scotland, including a spatial strategy to inform the seabed leasing process for the purposes of offshore wind energy. The WDA is located in Plan Option W1, as identified in the SMP for Offshore Wind. Plan Options including W1 were subject to testing, refinement and area reduction through Strategic Environmental Assessment (SEA), Habitats Regulations Appraisal (HRA) and plan development processes. The SEA identified relevant characteristics of Plan Option W1 and identified key risks to be addressed in consenting applications. Key risk factors noted for W1 include potential visual impacts and landscape/seascape character impacts.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Argyll and Bute Local Development Plan 2 (Argyll and Bute Council, 2024)	The current development plan for the onshore part of the Seascape, Landscape and Visual Impact Assessment (SLVIA) Study Area (see **Section 16.6**), including policies relating to landscape character and landscape designations, relevant to consideration of onshore receptors. **The key references are:** **Policy 28: Supporting Sustainable Aquatic and Coastal Development – "***Proposals for marine and freshwater aquaculture, marine and coastal developments will be supported where it can be demonstrated that there will be no significant adverse effects, directly, indirectly or cumulatively on***:** *The landscape/coastal character***,** *seascape or visual amenity (including Isolated Coast, Wild Land and National Scenic Areas)...***'** **Policy 30: The Sustainable Growth of Renewables –** "*The Council will support renewable energy developments where these are consistent with the principles of sustainable development and it can be adequately demonstrated that there would be no unacceptable environmental effects, whether individual or cumulative, on local communities, natural and historic environments, landscape character and visual amenity, and that the proposals would be compatible with adjacent land uses…"* **Policy 70: Development Impact on National Scenic Areas –** *"Argyll and Bute Council will resist any development in, or affecting, National Scenic Areas that would compromise the objectives of their designation and the overall integrity of the area either individually or cumulatively, or that would fail to safeguard Special Qualities* of the area unless it is adequately demonstrated that…"* **Policy 71: Development Impact on Local Landscape Areas –** *"Argyll and Bute Council will resist development in, or affecting, a Local Landscape Area where its scale, location or design will have a significant adverse impact on the character of the landscape…"*
Guidance	
Guidelines for Landscape and Visual Impact Assessment (Landscape Institute and IEMA, 2013)	Industry standard guidance on approach to undertaking assessment of effects of development on landscape and visual receptors.
Visual Representation of Development Proposals Technical Guidance Note 06/1 (Landscape Institute, 2019)	Provides guidance on preparing and presenting visualisations, such as photomontages, which will be used to support SLVIA.
Assessing landscape value outside national designations. Technical Guidance Note 02/21 (Landscape Institute, 2021)	Provides guidance on how to assess the value of landscape receptors, which *Guidelines for Landscape and Visual Impact Assessment*. Third Edition (GLVIA3) approach states is a component of their sensitivity.
Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021)	Provides guidance on assessing cumulative landscape and visual effects, which is applicable to offshore as well as onshore projects.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Visual Representation of Windfarms (Scottish Natural Heritage (SNH), 2017a)	Provides wind-farm-specific guidance on preparing and presenting visualisations, such as photomontages, which will be used to support SLVIA.
Guidance on Coastal Character Assessment (SNH, 2017b)	Provides guidance on undertaking coastal character assessment as a means of classifying and describing coastal landscapes.
Assessment of Potential Seascape, Landscape and Visual Impacts and Provision of Design Guidance (SNH, 2020)	Provides guidance on the potential landscape and visual effects relating to the WDA and the opportunities for mitigating these, through wind farm siting and design.

16.3 CONSULTATION

791. This seascape, landscape and visual impacts chapter has been informed by engagement with stakeholders, including those listed below:

- Argyll and Bute Council;
- Marine Directorate - Licensing Operations Team (MD-LOT); and
- NatureScot.

792. As part of the consultation process, the Applicant presented the approach to assessment to stakeholders in order to offer transparency around the scoping methodology and rationale, capture stakeholder advice and guidance, and incorporate stakeholder feedback, where appropriate. A summary of the approach to stakeholder communication and consultation is outlined in **Chapter 5 Consultation and Stakeholder Engagement** with each engagement activity being listed within **Appendix L Stakeholder Engagement Log**.

793. The consultation outcomes in relation to seascape, landscape and visual impacts are outlined in **Table 16.2**, which summarises stakeholder feedback, outlines how the Applicant has responded to the feedback received, and details how it has been considered within this chapter and/or will be used to inform the EIA process and preparation of the EIAR.

794. In addition to the engagement outlined in **Table 16.2**, the points of agreement between the Applicant and NatureScot are listed below:

- Confirmed acceptance of the Study Areas; and
- Confirmed the National Scenic Areas / Wild Land Areas that the Applicant is proposing to scope in and out.

795. Consultation relating to this topic will be ongoing throughout the EIA process. The Applicant welcomes the opportunity to work with stakeholders to deliver a proportionate and robust EIA.

Table 16.2 Summary of consultation relevant to seascape, landscape and visual impacts

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
Colonsay Community Council & Colonsay Community Development Company	Council guided tour of Colonsay on 19 April 2023	The following viewpoint locations were requested: • Settlement close to Dun Uragaig. • Car park or similar at the Isle of Colonsay Golf Club Port Mòr, Kilchattan.	The Applicant has incorporated the following Seascape, Landscape and Visual Impact Assessment (SLVIA) viewpoints to address these suggestions: • Viewpoint 14 – Colonsay West Coast (represents Golf Club and Port Mòr). • Viewpoint 15 – Uragaig, Colonsay.
Argyll and Bute Council	Meeting to discuss viewpoints, held on 02 August 2023	The following viewpoint locations were requested at the meeting: • Colonsay – Port Askaig Ferry. • Hynish, Tiree (instead of proposed viewpoint at Scarinish).	The Applicant has incorporated the following SLVIA viewpoints to address these suggestions: • Viewpoint 9 - Colonsay – Port Askaig Ferry. • Viewpoint 29 – Hynish.
NatureScot	Meeting to discuss viewpoints, held on 15 August 2023, and subsequent letter dated 23 August 2023	The following viewpoint locations were requested to capture the Special Qualities (SQs) of designated landscapes: • Colonsay – Port Askaig Ferry. • West coast of Jura (Jura National Scenic Area (NSA)). • Scarba (Scarba, Lunga and the Garvellachs NSA). • Dun I, Iona. • Staffa / Fingal's Cave (Loch na Keal - Isle of Mull NSA). • Ulva (Loch na Keal - Isle of Mull NSA). • Mull Mainland B8085 Loch na Keal (Loch na Keal - Isle of Mull NSA). • Sea-based assessment points (Loch na Keal - Isle of Mull NSA).	The Applicant has incorporated the following SLVIA viewpoints to address these suggestions: • Viewpoint 9 - Colonsay – Port Askaig Ferry. • Viewpoint 10 - Jura west coast (wireline only). • Viewpoint 18 - Scarba (wireline only). • Viewpoint 22 - Dun I, Iona. • Viewpoint 24 - Staffa (wireline only). • Viewpoint 25 – Ulva. • Viewpoint 26 - B8085 Mull. Sea-based views around Mull are represented by the range of shore-based viewpoints.
Argyll and Bute Council	Scoping Workshop on 01 May 2024	The following additional / alternative viewpoints were requested: • Bowmore Church, looking down the Main Street towards Loch Indaal. • American Monument, The Oa. • Cullipool, Luing, to look across the Scarba, Lunga and the Garvellachs NSA.	The Applicant has incorporated the following SLVIA viewpoints to address these suggestions: • Viewpoint 6 – Bowmore Church, Islay. • Viewpoint 8 – American Monument, The Oa, Islay. • Viewpoint 19 – Cnoc Dhomnuill, Luing, at an accessible high point close to Cullipool.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
NatureScot	23 May 2024: Seascape, Landscape and Visual Impact Assessment Scoping Workshop – Written feedback	NatureScot advise a 40 km radius landscape and coastal character study area should be adopted.	The Applicant proposes to undertake a coastal character assessment within 40 km of the Windfarm Development Area (WDA), but with a focus on the area within 30 km, and a higher-level review between 30 to 40 km, refer to **Section 16.7.2.1**.
		NatureScot agreed with the current viewpoint selection with the exception of VP15 from the Oban-Colonsay ferry route, which should be considered for relocation further north-east to ensure that the Scarba, Lunga and Garvellachs NSA is fully captured. NatureScot also consider that north Jura is currently under-represented.	The Applicant has identified an additional viewpoint (Viewpoint 19) near Culliport on Luing which would capture the view across the Scarba, Lunga and the Garvellachs NSA. VP15 has been retained in its former location, but the Applicant will seek to take a number of ranges from the ferry route and select the most appropriate to use for the panorama. The Applicant has identified a representative viewpoint on north Jura (Viewpoint 12). As with Viewpoint 9 on west Jura, and other inaccessible locations agreed with NatureScot, this will be presented as a wireline only.

Consultee	Date / Engagement Activity	Stakeholder Comment	Applicant Response
		NatureScot referenced issues raised previously in relation to design considerations: • The visual impact of the turbines on the three NSA's needs to be considered due to limited screening of sea views, particularly views of Colonsay. • Open views of the Atlantic, protected landscapes and strong maritime influence on the area. • Proximity to Islay and Colonsay's sensitive and diverse coastal character and receptors. The special qualities of the NSA's highlight the frontier character, open Atlantic views, vast natural world and outstanding views and distances over which these views can be obtained and strong maritime influence on these protected landscapes. NatureScot directed the Applicant to the Sectoral Plan Seascape, Landscape and Visual Impact Assessment and Design Guidance, which sets out general design principles for reducing effects on sensitive coastal landscapes.	As part of the design process, the Applicant will consider embedded mitigation measures to reduce the impact of the WDA on seascape, landscape and visual receptors. The potential for impact on coastal landscape and views is acknowledged, as set out in the NatureScot Sectoral Plan Seascape, Landscape and Visual Impact Assessment and Design Guidance. The Applicant will explore key sensitivities through targeted site survey work on Islay, Colonsay and other islands. Using computer-generated wireline views, the potential for impact will be considered, and different configurations of the WDA will be investigated. Factors such as the distance from shore and the horizontal extent of the WDA will be key considerations and will be subject to change based on the outcome of these analyses. The Applicant proposes to work with NatureScot on this process through expert topic group meetings to arrive at a design that addresses the sensitive landscape and visual receptors and the Special Qualities of the NSAs. Further refinement of the WDA boundary is likely once additional data is collected following the completion of further WDA surveys and studies, and as part of the outcomes of the EIA process, including feedback from stakeholders.

16.4 EXISTING DATA SOURCES

796. **Table 16.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA.

Table 16.3 Summary of key datasets and information sources

Dataset	Description	Author
National Marine Plan Interactive	National Marine Plan Interactive (NMPi) is a compilation of various datasets including vessel traffic and offshore infrastructure, relevant to the understanding of baseline seascape character and potential visual receptors.	Scottish Government, 2023
Coastal Character Types	Scottish Natural Heritage (SNH) list of high-level classification of coastal character at a national scale.	SNH, 2010
Scottish Landscape Character Types Map and Descriptions	Digital map-based classification of Scotland's landscape character.	NatureScot, 2019
National Scenic Areas	Extent of nationally designated landscapes in the onshore part of the Study Area.	SNH, 2010
Argyll and Bute locally designated landscapes	Extent of locally designated landscapes in the onshore part of the Study Area.	Argyll and Bute Council, 2024

16.5 SITE-SPECIFIC SURVEY DATA

797. Site visits, including viewpoint photography, will be undertaken to the landward part of the Study Area defined in **Section 16.6** and selected ferry routes to verify the baseline and to carry out the EIA.

16.6 SEASCAPE, LANDSCAPE AND VISUAL IMPACT ASSESSMENT STUDY AREA

798. This section describes the SLVIA Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 16.7**) and within which the EIA will be conducted.

799. The Study Area is defined as a radius around the WDA. The WDA is shown in **Figure 16.1** and has been reduced from the larger W1 Option Agreement Area (OAA). A number of factors have influenced the extent of the WDA, including a buffer of at least 12 km from the nearest coasts.

800. This chapter considers a Study Area of 60 km radius. **Figure 16.1** shows the WDA and 60 km Study Area.

801. Published guidance suggests a Study Area of 45 km radius for Wind Turbine Generators (WTG) over 150 m in overall height (SNH, 2017a). A typical radius of 50 km has been adopted for offshore developments with WTGs around 200 m to blade tip. A 'ready reckoner' of potential visual effects related to WTG size (White et al., 2019) suggests a very approximate ratio of 1:133 between WTG height and distance at which low magnitude of impact might be detected. For a proposed maximum blade tip height of 340 m above Lowest Astronomical Tide (LAT), this would indicate a Study Area radius of 45.2 km.

802. However, for recent offshore wind proposals, a Study Area of 60 km has been advised by stakeholders in recognition of the increasing heights of WTGs. For example, 60 km was recommended for Berwick Bank Offshore Wind Farm (OWF), where 355 m turbines are proposed (Marine Scotland, 2021), and for Caledonia OWF, which is proposing a maximum 350 m blade tip height (Marine Scotland, 2023a).

803. A Zone of Theoretical Visibility (ZTV) map has been generated. This indicates the potential visibility of WTGs of 340 m tip height within the WDA. The ZTV is based on bare earth terrain modelling and takes no account of distance or atmospheric visibility. It therefore overestimates visibility and cannot be used as an indicator of LSE. The ZTV shown in **Figure 16.1** is used as a tool to inform the identification of receptors.

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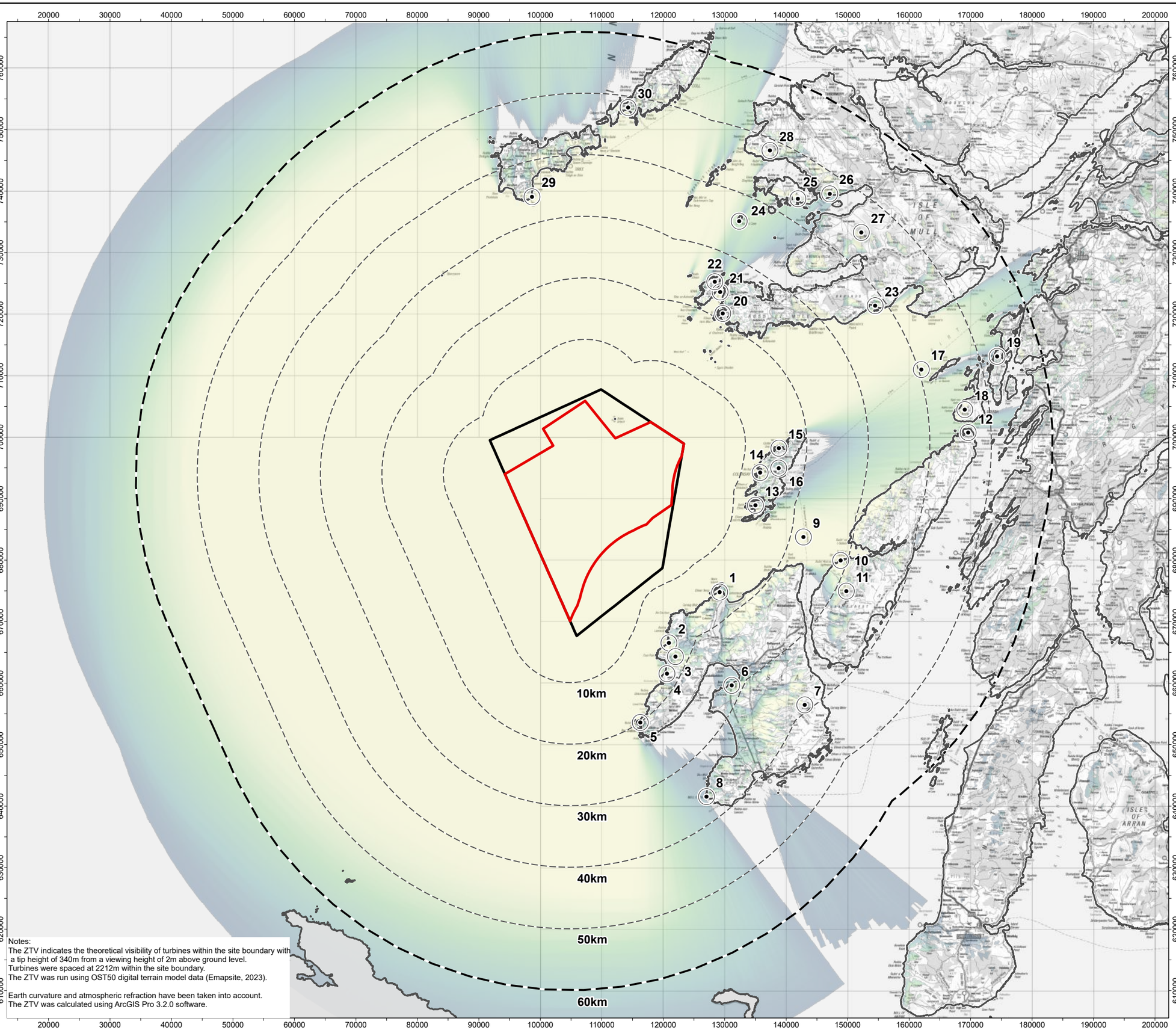

Notes:
The ZTV indicates the theoretical visibility of turbines within the site boundary with a tip height of 340m from a viewing height of 2m above ground level.
Turbines were spaced at 2212m within the site boundary.
The ZTV was run using OST50 digital terrain model data (Emapsite, 2023).

Earth curvature and atmospheric refraction have been taken into account.
The ZTV was calculated using ArcGIS Pro 3.2.0 software.

N

Windfarm development area

Option Agreement Area

10km interval from site boundary

60km study area

Zone of Theoretical Visibility

More turbines visible

Less turbines visible

Viewpoint

1: Ardnave Point, Islay
2: Saligo Bay, Islay
3: Kilchoman, Islay
4: Creag Bealach na Caillich, Islay
5: Minor Rd near Portnahaven, Islay
6: Bowmore Church, Islay
7: Beinn Bheigier, Islay
8: American Monument, The Oa, Islay
9: Colonsay – Port Askaig Ferry
10: Jura west coast
11: Beinn an Oir, Jura
12: An Cruachan, north Jura
13: Oronsay Priory, Colonsay
14: Colonsay West Coast
15: Uragaig, Colonsay
16: Beinn nan Gudairean, Colonsay
17: Oban-Colonsay Ferry
18: Scarba
19: Cnoc Dhomnuill, Luing
20: Erraid, Mull
21: Mull-Iona Ferry
22: Dun I, Iona
23: Carsaig Bay, Mull
24: Staffa
25: Ulva
26: B8085 Mull
27: Ben More, Mull
28: Cruachan Treshnish Cairn, Mull
29: Hynish, Tiree
30: Crossapol Bay, Coll

0 5 10 15 20 25
Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	08/03/2024	HD	SR	--	--

DRAWING NUMBER	MCW-GEN-GIS-MAP-LUC-000083		
DATUM	OSGB36 (EPSG:27700)	PROJECTION	Transverse Mercator
SCALE	1:600,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 16.1: SLVIA Study Area and Zone of Theoretical Visibility with Viewpoints

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Project: S:\12000\12059 Machair Wind SLVIA\GIS\PRO\Report\12059_r0_Machair_Scoping_A3L.aprx
Name: 12059_r1_Fig16_1_TipH_ZTV_A3L

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16.7 EXISTING ENVIRONMENT

804. This section describes the SLVIA receptors, using publicly available data sources (**Section 16.4**), deemed of relevance to the Study Area (**Section 16.6**). This sets the context for the identification of mitigation measures (**Section 16.8**) and scoping of potential impacts (**Section 16.9**) which then feeds into the consideration of cumulative effects (**Section 16.10**) and potential transboundary impacts (**Section 16.11**). This section also considers the value attached to the identified receptors.

16.7.1 Offshore Seascape Baseline

805. Most of the central, southern and western parts of the Study Area are within the Sea of the Hebrides, a partly sheltered section of the North Atlantic Ocean along the west coast of Scotland.

806. There are several ferry routes connecting the islands of the Inner Hebrides to each other and to the mainland and no operational OWFs within the Study Area.

807. There is no published characterisation of offshore seascape character in Scotland. As such, there are no key characteristics for a large part of the Study Area. There are no designations within the offshore environment that are relevant to SLVIA, although onshore designations do have a marine influence. The seascape is extensively used for marine recreation.

808. The value of the offshore seascape is therefore considered to be medium, in accordance with the methodology adopted by the Project, based on previous seascape assessments by the lead author which is derived from GLVIA3.

16.7.2 Coastal and Onshore Landscape Character Baseline

809. The Study Area includes the southern islands of the Inner Hebrides, the largest of which are Coll and Tiree in the north, Mull in the north-east, and Colonsay, Islay and Jura in the east. Part of the Argyll coast is located in the far east of the Study Area, between Loch Melfort in the north and Rhunahaorine Point in the south.

16.7.2.1 Coastal Character

810. Coastal character assessment is the preferred approach to identifying the key characteristics of coastal and marine landscapes in Scotland (SNH, 2017b). Coastal character types have been mapped at a national level (SNH, 2010). The following coastal character types are found within the Study Area:

- Type 9. Sounds, Narrows and Islands - encompassing the eastern seaboard of Islay, Jura and Mull, and described as a "*deeply indented and fragmented coastline*" which is "*generally low and rocky*" (SNH, 2010);
- Type 12. Deposition Coasts of Islands – encompassing the west facing coasts of Coll, Tiree, Islay and Iona, described as having "*long sandy beaches backed by dunes and low lying machair, or by pastures"* with an *"often wild, remote 'edge of ocean' feel*" (SNH, 2010); and
- Type 13. Low Rocky Island Coasts – encompassing part of Coll, Colonsay, the west coast of Jura, parts of Islay and the west coast of Mull. Described as a "*generally low rocky coastline, rising to cliffs in places*" with views of the open North Atlantic Ocean.

811. There is no national dataset of coastal character areas. A baseline coastal character assessment will be undertaken, following NatureScot guidance as set out in SNH (2017b). Beyond 30 km, the WDA infrastructure would have a decreasing influence, and significant effects on coastal character, as opposed to views, are considered less likely beyond this distance.

812. To ensure that all LSE are captured and in line with a request from NatureScot (See **Table 16.2**), the coastal character assessment will identify regional coastal character areas within 40 km of the WDA,

encompassing Islay, Jura, Colonsay, Mull and Iona, and part of Tiree. The key characteristics of regional coastal character areas will be recorded, with a focus on views along the coast and out to sea and sensitivity to offshore development.

813. Given the extent of designated landscapes within the Study Area (see **Section 17.1.1.1**), indicating national or regional importance, and the popularity of the area for tourism and recreation, the value of the coastal character areas is considered to be high.

16.7.2.2 Landscape Character

814. Onshore landscape character is described in a national dataset of Landscape Character Types (LCT), published by NatureScot (2019). LCTs within the onshore part of the Study Area are listed in **Table 16.4**. It is proposed that LCTs beyond 30 km are scoped out of the SLVIA. Beyond 30 km there would be a reduction in the influence of the WDA infrastructure, and significant effects on coastal character, as opposed to views, are not considered to be likely. **Table 16.4** sets out which LCTs will be examined further in the EIA, and which can be scoped out as there will be no LSE.

815. The value of LCTs within the Study Area is considered to range between medium and high, depending on factors which include scenic quality, conservation interest, recreational value, cultural associations or rarity, as well as the presence of nationally or locally designated landscapes.

Table 16.4 Landscape Character Types within 30 km of the Windfarm Development Area

Landscape Character Type	Scope in / out of the SLVIA
49 – Island Mixed Farmland	Theoretical visibility is indicated from the Landscape Character Types (LCT) (across parts of Colonsay, Oronsay, Islay and Iona) within approximately 12 km. **Scoped into the Seascape, Landscape and Visual Impact Assessment (SLVIA)**.
58 – Sand Dunes and Machair	Theoretical visibility is indicated from the LCT (across parts of Colonsay and Islay) within approximately 12 km. **Scoped into the SLVIA**.
42 – Rocky Moorland – Argyll	Theoretical visibility is indicated from the LCT (across parts of Islay) within approximately 15 km. **Scoped into the SLVIA**.
48 – Lowland Bog and Moor	Theoretical visibility is indicated from the LCT (across parts of Islay) within approximately 15 km. **Scoped into the SLVIA**.
41 – Plateau Moorland – Argyll	Theoretical visibility is indicated from the LCT (across parts of Islay) within approximately 20 km. **Scoped into the SLVIA**.
44 – Boulder Moors – Argyll	Theoretical visibility is indicated from the LCT (across parts of Mull) within approximately 20 km. **Scoped into the SLVIA**.
50 – Stepped Rocky Coastlands	Theoretical visibility is indicated from the LCT (across parts of Mull) within approximately 28 km. However, theoretical visibility is indicated from areas of commercial forestry, where visibility of the WDA infrastructure would be reduced. **Proposed to be scoped out of the SLVIA due to distance and potential screening / filtering of views by forestry.**
45 – Stepped Cliffs and Terraces – Argyll	Theoretical visibility is indicated from the LCT (across parts of Mull) within approximately 29 km, although the majority of the LCT is over 30 km from the WDA. **Proposed to be scoped out of the SLVIA due to distance.**
Reference: NatureScot (2019)	

17.1.1.1 Landscape Designations and Wild Land Areas

816. Nationally and locally designated landscapes and Wild Land Areas (WLA) within the Study Area are described in **Table 16.5**. This includes four NSAs, two WLAs and several Local Landscape Areas (LLAs) designated by Argyll and Bute Council, as shown on **Figure 16.2**.

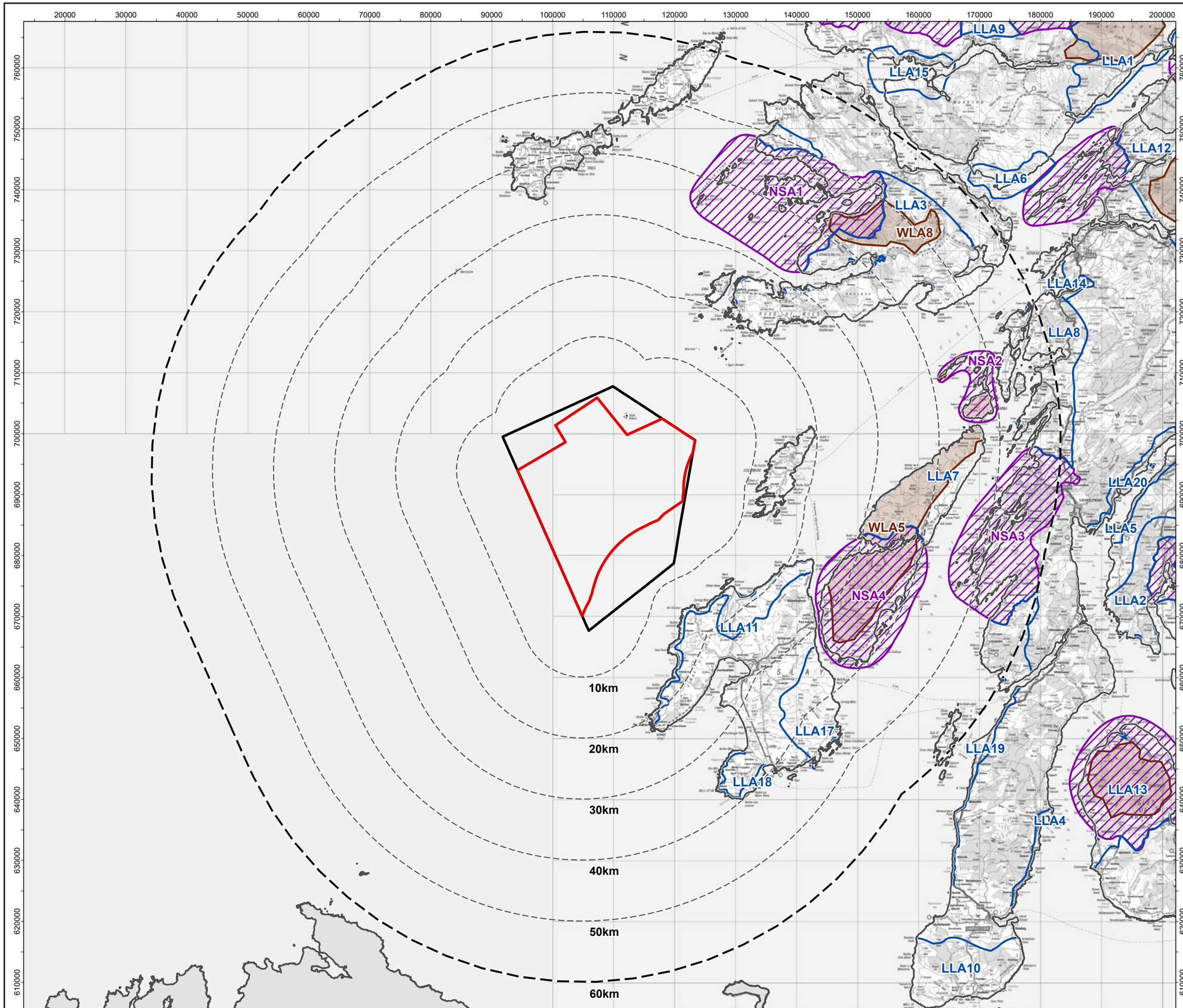
817. Given the proximity of some of the designated landscapes, and the potential for theoretical visibility of the WDA infrastructure from within them, an assessment of the potential effects on their relevant Special Qualities (SQs) would be included in the SLVIA. It is proposed that some designated landscapes are scoped out due to the limited potential for significant effects on their SQs, as set out in **Table 16.5**. It is also proposed that WLAs are scoped out due to the limited potential for significant effects on their wild land attributes.

818. For those NSAs that are scoped in, an assessment of effects on SQs will be undertaken in accordance with draft guidance published by NatureScot (2017). A similar approach will be taken to assessing effects on LLAs, with reference to any SQs that may be available in planning documents.

Table 16.5 Designated landscapes and Wild Land Areas within the Study Area

Designated Landscape	Scope In / Out of the SLVIA
National Scenic Areas	
Jura	The Jura National Scenic Area (NSA) encompasses the southern half of the island. Theoretical visibility is indicated from the NSA which is approximately 25 km from the Windfarm Development Area (WDA) at its closest point. The Special Qualities (SQs) include "*the distinctive Paps of Jura*" with their "*unparalleled views to the Inner Hebrides, the Mull of Kintyre and beyond*". The NSA is also noted for its "*great sense of wildness*". **Scoped into the Seascape, Landscape and Visual Impact Assessment (SLVIA).**
Loch na Keal, Isle of Mull	Theoretical visibility is indicated from the NSA which is approximately 31 km from the WDA at its closest point. The NSA is focused around Loch na Keal, a major sea loch on Mull's Atlantic seaboard, and the SQs include the "*Highly distinctive seaways and shores*". The "*voyage from enclosed sea loch to the open Atlantic*" which "*offers impressive and unique seascapes*" is also noted as a SQ. Inward and outward views are also noted to be of importance to the NSA, with "*views of an island-studded sea*" noted as a SQ. Despite the distance between the WDA and the NSA, it is proposed that it is **scoped into the SLVIA** due to the importance of the seascapes and views.
Scarba, Lunga and the Garvellachs	The NSA encompasses a group of uninhabited and remote islands off the Argyll coast, approximately 42 km from the WDA at its closest point. Theoretical visibility is indicated from the rugged west-facing coasts and hill summits. The SQs include the "*pyramidal island of Scarba*" with its "*extensive panoramic views to the Argyll and Irish coasts*." Despite the distance between the WDA and the NSA, it is proposed that it is **scoped into the SLVIA** due to the importance of the seascapes and views.
Knapdale	The Knapdale NSA is located on the Argyll coast, approximately 45 km to the east of the WDA. Some limited theoretical visibility is indicated from elevated linear ridges and west facing slopes, including from some areas which are forested. Although "*dramatic sea views*" are noted to be a SQ, at distances of over 45 km perceptibility of the WDA infrastructure would be reduced, and it is proposed that this NSA is **scoped out of the SLVIA**.
Wild Land Areas (WLA)	
Jura, Scarba, Lunga and the Garvellachs	The WLA includes the majority of Jura and the smaller uninhabited islands to the north. The key attributes and qualities (NatureScot, 2017) are as follows: • "All-pervading influence of the sea and sense of being perched on the edge of the land; • Inaccessible and remote, with a strong sense of solitude, despite the proximity to the mainland; • Dramatic mountains, cliffs, islands, and tidal currents emphasise a sense of nature being in control; and • Most signs of human activity are focussed within the southern part of the WLA, with few human artefacts or contemporary land use further north."

Designated Landscape	Scope In / Out of the SLVIA
	Theoretical visibility is indicated from across the WLA, which is largely over 30 km from the WDA. At this distance, no significant effects on wild land attributes and qualities are anticipated, and a wild land assessment of this WLA is **scoped out of the SLVIA**.
Ben More, Mull	The WLA includes the summit of Ben More and surrounding hills in the centre of Mull. The key attributes and qualities (NatureScot, 2017) are as follows: • "A landscape which is well defined where the dominant Munro of Ben More accentuates the rugged and remote interior; • Rugged summits sweeping down to steep, dramatic cliffed and scree covered hill slopes result in a surprising high sense of remoteness within relatively small extent of area; • A range of distinctive geological features contribute to a high sense of naturalness, distinctiveness and sense of awe; • A secluded yet open interior with a strong sense of naturalness and sanctuary; and • The influence of the sea is striking contributing to remoteness and perceived naturalness and awe." The WLA is over 40 km from the WDA, and theoretical visibility is limited to the highest ground. At this distance, no significant effects on wild land attributes are anticipated, and a wild land assessment of this WLA is **scoped out of the SLVIA**.
Locally Designated Landscapes	
North and West Islay – Coast Local Landscape Areas	The Local Landscape Areas (LLA) encompasses the northern and western coast of Islay. Theoretical visibility is indicated from the LLA within approximately 15 km at its closest point. **Scoped into the SLVIA**.
Central, South and West Mull Local Landscape Areas	The LLA encompasses the southern part of Mull and adjoins the Loch na Keal NSA. Theoretical visibility is indicated from the LLA within approximately 20 km at its closest point. **Scoped into the SLVIA**.
South West Islay Local Landscape Areas	The LLA encompasses the south-west coast of Islay. The Zone of Theoretical Visibility (ZTV) indicates some theoretical visibility along the north-west facing coast of the LLA at over 30 km. Significant effects on SQs are considered unlikely, and it is proposed that this LLA is **scoped out of the SLVIA**.
South and East Islay Local Landscape Areas	The LLA encompasses the higher ground of Islay as well as the south and east coasts. The ZTV indicates theoretical visibility on higher ground between 35 and 40 km, but not from the coast. Significant effects on SQs are considered unlikely, and it is proposed that this LLA is **scoped out of the SLVIA**.
Jura Local Landscape Areas	The LLA encompasses the northern part of Jura which is not in the NSA. The ZTV indicates visibility across the western coast. Wildness is likely to be a special quality of the LLA, therefore the effects of the WDA infrastructure will be examined. **Scoped into the SLVIA**.
Knapdale / Melfort Local Landscape Areas	The LLA encompasses areas of the mainland to the north and south of the Knapdale NSA, including the Slate Islands of Seil and Luing. The ZTV indicates some visibility from the northern part of the LLA, but at over 50 km from the WDA. Significant effects on SQs are considered unlikely, and it is proposed that this LLA is **scoped out of the SLVIA**.



N

- Windfarm development area
- Option Agreement Area
- 10km interval from site boundary
- 60km study area
- National Scenic Area
  - NSA1: Loch na Keal, Isle of Mull
  - NSA2: Scarba, Lunga and the Garvellachs
  - NSA3: Knapdale
  - NSA4: Jura
- Wild Land Area
  - WLA5: Jura, Scarba Lunga and Garvellachs
  - WLA8: Ben More, Mull
- Local Landscape Area
  - LLA1: Ardgour
  - LLA2: Bute & South Cowal
  - LLA3: Central, South & West Mull
  - LLA4: East Kintyre (Coast)
  - LLA5: East Loch Fyne (Coast)
  - LLA6: Inninmore Bay and Garbh Shlios
  - LLA7: Jura
  - LLA8: Knapdale / Melfort
  - LLA9: Moidart, Morar and Glen Shiel
  - LLA10: Mull of Kintyre
  - LLA11: North & West Islay (Coast)
  - LLA12: North Argyll
  - LLA13: North Arran
  - LLA14: North West Argyll (Coast)
  - LLA15: Outer Loch Sunart and Islands
  - LLA16: Pladda
  - LLA17: South & East Islay
  - LLA18: South West Islay
  - LLA19: West Kintyre (Coast)
  - LLA20: West Loch Fyne (Coast)

0 5 10 15 20 25 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
1	08/03/2024	HD	SR	--	--

DRAWING NUMBER	MCW-GEN-GIS-MAP-LUC-000084		
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PROJECT TITLE	MachairWind		

Figure 16.2: National Designations relevant to SLVIA

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16.7.3 Visual Amenity Baseline

16.7.3.1 Visibility

819. A ZTV is shown in **Figure 16.1**. Clear views of the WDA infrastructure can be assumed for closer marine and coastal views within the ZTV. For more distant receptors on land and at sea, several factors affect the visibility of distant features. These are: the acuity of the human eye; atmospheric visibility; meteorological conditions; and the curvature of the Earth. These are considered in the following section, to determine whether significant effects on sensitive onshore receptors would be likely.

820. The Review and Update of Seascape and Visual Buffer study for Offshore Wind Farms (White Consultants, 2020) states that "*The largest currently consented turbine towers have a diameter of up to 5 m and so, theoretically, can be seen from 50 km. Larger turbines 350-400 m high are likely to have larger diameter towers and so may be able to be seen from longer distances. Therefore visual acuity is unlikely to be a limiting factor in terms of visual buffers*".

821. White Consultants (2020) presents a formula *"for calculating the maximum distance at which an observer can discern the outline of an object"*. This formula includes a locally determined 'extinction coefficient', which is a measure of how much haze is in the air. Using this formula, White Consultants (2020) gives a 'maximum likely viewable distance' for 'northern Scotland', where the extinction coefficient is lowest, at 39 km.

822. The Met Office records data on atmospheric visibility and classifies atmospheric visibility of over 40 km as 'excellent'. An analysis carried out for the Seagreen OWF (Seagreen, 2012), using Met Office data from Leuchars, Fife, indicates that visibility of greater than 40 km only occurs 8% of the time, the equivalent of 29 days per year. Visibility is also affected by meteorological conditions, such as rain. It is noted that atmospheric visibility is likely to be different off Scotland's west coast, and locally relevant visibility data will be sought to inform the SLVIA. Regardless, all assessments will consider the worst-case which will assume the best possible visibility.

823. The curvature of the Earth means that distant structures may appear beyond the horizon. Tall structures such as wind turbines are likely to be visible at long distances, as their blades may be visible even when the tower base or hub is out of sight. Diagram 5.1 in White Consultants (2020) shows the effect of curvature of the Earth on wind turbine visibility. This indicates that a wind turbine of 350 m height would need to be 82 km offshore to be out of the view of an observer located 6 m above sea level. An observer on higher ground would theoretically see part of the same WTG at even greater distances.

16.7.3.2 Visual Receptors

824. Visual receptors within the northern and eastern parts of the Study Area include people on land where they have views of the sea. This includes people on the islands of the Inner Hebrides and the Argyll coast. Recreational receptors would include people visiting the islands' numerous coastal walks, beaches and viewpoints offering views out to sea. Sea views are also available to residents in their homes and within their communities, and people travelling along the coast on roads. Visual receptors also include users of the numerous ferry routes within the Study Area, as well as people engaged in marine recreation such as kayaking, angling, wildlife watching and sailing.

825. Visual receptors within the central and western parts of the SLVIA Study Area, that is, within the offshore environment, are limited to those passing through the area on vessels, most of whom will be working in the fishing or transport industries.

826. Automatic Identification System (AIS) Ship Traffic data has been used to identify potential receptors crossing the SLVIA Study Area (Marine Scotland, 2023b). Shipping activity includes cargo vessels,

which generally travel through the west of the SLVIA Study Area, passing between the Minch and the North Channel. Fishing vessels tend to be located in the eastern part of the area, closer to the coast. Movements of recreational craft are focused along the island coasts, with key routes between Islay, Colonsay, Iona and Mull, though with limited traffic to the west of Islay. Regular passenger ferries link each island with the mainland. These routes include: Kennacraig (mainland Argyll) to Port Ellen and Port Askaig (Islay); Port Askaig (Islay) to Colonsay; Oban (mainland Argyll) to Colonsay, Craignure (Mull), Coll and Tiree; and Fionnphort (Mull) to Iona.

16.7.3.3 Representative Viewpoints

827. To examine and illustrate the potential views of the WDA infrastructure, several representative viewpoints have been selected. In accordance with good practice guidance (Landscape Institute and Institute of Environmental Management and Assessment's (IEMA), 2013) these viewpoints are all publicly accessible and include:

- Locations selected to represent the experience of different types of receptors, including island residents, visitors, and people travelling through the area;
- Locations at different distances to provide a representative range of viewing angles and distances;
- Locations which represent a range of viewing experiences, i.e. static views and points along sequential routes;
- Specific viewpoints selected because they represent promoted views or viewpoints within the landscape; and
- Illustrative viewpoints chosen specifically to demonstrate a particular visual effect or specific issue (which could include restricted visibility in particular locations or effects from coastal settlements).

828. An initial list of proposed viewpoints was discussed at meetings with Argyll and Bute Council on 02 August 2023 and with NatureScot on 15 August 2023. NatureScot provided written feedback and recommendations following these discussions. All recommendations have been reviewed and an updated viewpoint list is presented in **Table 16.6**. Distances stated are to the WDA boundary. Viewpoints are also shown on **Figure 16.1.** Viewpoint locations will be confirmed at EIA Design Freeze once the design of the windfarm layout has progressed. Consultation on the selection of the viewpoint locations will be informed through SLVIA Expert Topic Group (ETG) meetings.

829. Photomontages will be produced to show the likely appearance of the WDA from each viewpoint. In certain cases, primarily due to difficulty of access for photography, wireline views are proposed. Dusk photomontages will be produced from a selection of viewpoints to give an impression of the appearance of aviation lighting during the hours of darkness. Locations of wireline-only and dusk viewpoints are noted in **Table 16.6**.

Table 16.6 Proposed SLVIA viewpoints

No.	Viewpoint location	Easting	Northing	Distance (km)	Reason for Selection
1	Ardnave Point, Islay	129200	674822	16	Represents views experienced by recreational receptors on a coastal walking route along Ardnave Point on Islay (within North and West Islay Local Landscape Area (LLA)).
2	Saligo Bay, Islay	120929	666557	16	Represents views experienced by recreational receptors at this popular bay and beach on west coast of Islay (within North and West Islay LLA).
3*	Kilchoman, Islay	121995	664281	18	Represents views experienced by visitors at the Kilchoman Distillery, in the west of Islay.
4	Creag Bealach na Caillich, Islay	120621	661531	18	Represents views from an accessible high point on west coast of Islay (within North and West Islay LLA).
5*	Minor Rd near Portnahaven, Islay	116287	653575	20	Represents views experienced by residents near Portnahaven and road users travelling along the minor road leading to Portnahaven, the main settlement on the Rinns of Islay (within North and West Islay LLA).
6*	Bowmore Church, Islay	131153	659639	28	Represents views experienced by local residents at Bowmore, looking down the main street.
7	Beinn Bheigier, Islay	143023	656443	40	Represents views experienced from an elevated viewpoint on the south-east of Islay (within South and East Islay LLA).
8	American Monument, The Oa, Islay	127051	641557	36	Represents views from this popular coastal monument in south-west Islay (within South West Islay LLA).
9	Colonsay – Port Askaig Ferry	142829	683719	22	Location on the ferry route between Islay and Colonsay, representative of views from the west coast of Jura.
10**	Jura west coast	148882	679940	29	Representative of views from west coast of Jura, within the Jura National Scenic Area (NSA), looking west to Islay and Colonsay.
11	Beinn an Oir, Jura	149793	674951	32	Represents views experienced by hill walkers at the highest summit of the Paps of Jura, within the Jura NSA, with views across Islay.
12	An Cruachan, north Jura	169616	700707	46	Representative of views from north Jura, on a high point close to the northern-most accessible location (within the Jura LLA).
13	Oronsay Priory, Colonsay	135013	688904	14	Represents views experienced by recreational receptors visiting this medieval Priory overlooking the west coast of Oronsay.
14	Colonsay West Coast	135771	694203	13	Represents open views from the road on the west coast of Colonsay, close to Port Mòr, Kilchattan and the golf course.

No.	Viewpoint location	Easting	Northing	Distance (km)	Reason for Selection
15	Uragaig, Colonsay	138830	698190	15	Represents views from a settled area on the north-west coast of Colonsay.
16	Beinn nan Gudairean, Colonsay	138803	694975	16	Represents views experienced from an elevated viewpoint on Colonsay.
17	Oban-Colonsay Ferry	162000	711000	40	Represents views experienced by receptors travelling on the Oban-Colonsay Ferry as it passes the Garvellachs.
18**	Scarba	169068	704462	46	High point on uninhabited island within Scarba, Lunga and the Garvellachs NSA.
19	Cnoc Dhomnuill, Luing	174322	713139	52	High point close to the village of Cullipool, looking west across the Scarba, Lunga and the Garvellachs NSA (within the Knapdale / Melfort LLA).
20	Erraid, Mull	129699	720095	21	Represents views experienced from an accessible high point on Erraid, near Fionnphort, Mull (within Central, South and West Mull LLA).
21	Mull-Iona Ferry	129260	723614	25	Represents views experienced by residents and visitors using the ferry crossing to Iona, looking down the Sound of Iona (within Central, South and West Mull LLA).
22	Dun I, Iona	128385	725232	25	Popular viewpoint on the island of Iona, accessible from the ferry (within Central, South and West Mull LLA).
23	Carsaig Bay, Mull	154483	721332	38	Represents views experience by recreational receptors and visitors staying in holiday accommodation around Carsaig Bay on the south coast of Mull (within Central, South and West Mull LLA).
24**	Staffa	132372	735116	36	Trig point at summit of island within Loch na Keal NSA. Uninhabited but popular boat trips to the island and Fingal's Cave. Landings only possible in good weather.
25	Ulva	141911	738761	44	Footpath across Ulva, within Loch na Keal NSA, with panoramic views over Loch na Keal, representative of special qualities.
26	B8085 Mull	147099	739578	47	Location along the road within the Loch na Keal NSA, with panoramic views. No formal stopping place on this road.
27	Ben More, Mull	152249	733251	45	Represents views experienced by hill walkers on the highest summit on Mull, within Loch na Keal NSA.
28	Cruachan Treshnish Cairn, Mull	137369	746613	48	Represents views experienced from elevated ground in the north of Mull, and views experienced by hill walkers at the Cruachan Treshnish Cairn, within Loch na Keal NSA.

No.	Viewpoint location	Easting	Northing	Distance (km)	Reason for Selection
29	Hynish, Tiree	098664	739093	34	Represents views experienced by residential and recreational receptors and visitors at Hynish, in the south of Tiree.
30	Crossapol Bay, Coll	114292	753567	48	Represents views from the Local Nature Reserve and beach on the south coast of Coll.
*Dusk viewpoint **Wireline only					

16.8 MITIGATION MEASURES

830. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on seascape, landscape and visual receptors. These measures described in **Table 16.7** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

831. Mitigation of landscape, seascape and visual impacts can be achieved mainly by maximising the distance between WTGs and the locations of sensitive receptors, which tend to be along the coast. As well as distance, impacts may be reduced by limiting the horizontal spread of WTGs across the skyline, so that they occupy a narrower angle of view when seen from the coast. The arrangement of WTGs may be apparent from certain angles, where lines or rows of WTGs are seen. This effect would vary as the viewer moves around the WDA, and the arrangement of WTGs is unlikely to influence the significance of an effect.

832. The final design will be confirmed through detailed engineering design studies that will be undertaken post-consent based on the findings of pre-construction surveys. The SLVIA will therefore be based on worst-case parameters.

Table 16.7 Indicative embedded mitigation measures for seascape, landscape and visual impacts

ID	Parameter	Description of Mitigation Measure
M-20	Lighting and Marking Plan	Development of, and adherence to, a Lighting and Marking Plan (LMP). This plan will set out the marine and aviation navigational lighting and marking measures to be applied during the construction and operation of the Windfarm Development Ares (WDA). The LMP will consider whether lighting and marking specifications can be developed which are cognisant of seascape, landscape and visual receptor sensitivities in the Study Area with safety of navigation and aviation safety taking precedence.
M-43	Distance from Coast	The northern and eastern boundary of the WDA has been defined by implementation of a buffer of at least 12 km from the nearest points of Islay and Colonsay. This will reduce the magnitude of impact on seascape, landscape and visual impact receptors. Further refinement of the WDA boundary is likely once additional data is collected following the completion of further WDA surveys and studies, and as part of the outcomes of the EIA process, including feedback from stakeholders.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

833. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to seascape and landscape will be assessed with this mitigation in place.

16.9 SCOPING OF POTENTIAL IMPACTS

834. A range of potential impacts on seascape, landscape and visual receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

835. **Table 16.8** outlines the SLVIA impacts and receptors which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data become available.

Table 16.8 Potential impacts scoped in or scoped out for seascape, landscape and visual impacts

Potential Impact	Receptor(s)	Phase* Scoped in (✓) / out (x)			Justification
		C	O&M	D	
Presence of temporary offshore construction activity, including vessel movements, cranes and lighting in the offshore seascape and in views	Offshore seascape character	✗	N/A	N/A	Offshore seascape character (remote from the coast) is unlikely to be sensitive to changes arising from the presence of construction activity. While the scale of change in seascape character may be high in the vicinity of the Windfarm Development Area (WDA), due to the low sensitivity of this receptor, significant effects are unlikely to arise. Therefore, potential impacts and effects on offshore seascape character has been **scoped out** of the Environmental Impact Assessment (EIA), for the construction phase.
	Coastal and onshore landscape character (including Special Qualities (SQs) of designated landscapes)	✓	✗	✗	The presence of construction activity may alter the character of the coastal landscape (including SQs of designated landscapes), within approximately 30 km of the WDA. Therefore, potential impacts and effects on coastal and onshore landscape character has been **scoped into** the EIA, for the construction phase.
	Offshore visual receptors	✓	✗	✗	Presence of construction activity may alter the nature of views experienced by sensitive offshore visual receptors. Therefore, potential impacts and effects on offshore visual receptors has been **scoped into** the EIA, for the construction phase.
	Onshore and nearshore visual receptors	✓	✗	✗	Presence of construction activity may alter the nature of views experienced by sensitive receptors. Therefore, potential impacts and effects on onshore and nearshore visual receptors has been **scoped into** the EIA, for the construction phase.
Longer-term presence of Wind Turbine Generators (WTGs) in the seascape and in views	Offshore seascape character	✗	✗	✗	Offshore seascape character (remote from the coast) is unlikely to be sensitive to changes arising from the WDA infrastructure. While the scale of change in seascape character may be high in the vicinity of the WDA, due to the low sensitivity of this receptor, significant effects are unlikely to arise. Therefore, potential impacts and effects on offshore seascape character receptors has been **scoped out** from the EIA, for all phases.

Potential Impact	Receptor(s)	Phase* Scoped in (✓) / out (x)			Justification
		C	O&M	D	
	Coastal and onshore landscape character (including SQs of designated landscapes)	✘	✓	✘	The operational windfarm, lighting and maintenance activity may alter the character of the coastal landscape (including SQs of designated landscapes), within approximately 30 km of the WDA. Therefore, potential impacts and effects on coastal and onshore landscape character (including SQs of designated landscapes) has been **scoped into** the EIA, for the operation and maintenance (O&M) phase.
	Offshore visual receptors	✘	✓	✘	The operational windfarm, lighting and maintenance activity may alter the nature of views experienced by sensitive receptors. Therefore, potential impacts on offshore visual receptors have been **scoped into** the EIA, for the O&M phase.
	Onshore and inshore visual receptors	✘	✓	✘	The operational windfarm, lighting and maintenance activity may alter the nature of views experienced by sensitive receptors. Therefore, potential impacts and effects on onshore and inshore visual receptors has been **scoped into** the EIA, for the O&M phase.
Presence of decommissioning activity within the seascape and in views	Offshore seascape character	✘	✘	✘	Offshore seascape character (remote from coast) is unlikely to be sensitive to changes arising from decommissioning of the WDA infrastructure. While the scale of change in seascape character may be high in the vicinity of the WDA, due to the low sensitivity of this receptor, significant effects are unlikely to arise. Therefore, potential impacts and effects on offshore seascape character from decommissioning activities has been **scoped out** of the EIA, for the decommissioning phase.
	Coastal and onshore landscape character (including SQs of designated landscapes)	✘	✘	✓	The presence of decommissioning activity may alter the character of the seascape, within approximately 30 km of the WDA. Therefore, potential impacts and effects on coastal and onshore landscape character (including SQs of designated landscapes) from decommissioning activities has been **scoped into** the EIA, for the decommissioning phase.

Potential Impact	Receptor(s)	Phase* Scoped in (✓) / out (x)			Justification
		C	O&M	D	
	Offshore visual receptors	✘	✘	✓	The presence of decommissioning activity may alter the nature of views experienced by sensitive receptors. Therefore, potential impacts and effects on offshore visual receptors from decommissioning activities has been **scoped into** the EIA, for the decommissioning phase.
	Onshore and inshore visual receptors	✘	✘	✓	The presence of decommissioning activity may alter the nature of views experienced by sensitive receptors. Therefore, potential impacts and effects on onshore and inshore visual receptors from decommissioning activities has been **scoped into** the EIA, for the decommissioning phase.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.					

16.10 POTENTIAL CUMULATIVE EFFECTS

836. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA to affect SLVIA receptors. The approach to assessment of potential cumulative impacts is set out in **Chapter 4 Approach to Scoping and EIA**.

837. Operational developments are considered part of the baseline, and any cumulative components of the impact of the Project will be reported within the SLVIA. The potential for cumulative effects to arise as a result of future developments will also be considered.

838. There are no OWFs in operation or at planning application stage within the SLVIA Study Area at the time of writing this Scoping Report. There are a small number of OWF proposals in the Study Area that are at the early stages of planning. At present, there is very limited information about any of these schemes, or any certainty that they will progress to an application. As such it is not proposed to include these proposals in the cumulative assessment. Should these or other windfarms be progressed to a stage where sufficient detail is available, they would be considered in the cumulative assessment.

839. There are several WTGs within the onshore part of the Study Area, but no large windfarms, and no known proposals for new large wind energy developments. Developments, including windfarms and other large-scale proposals, will be reviewed during the preparation of the SLVIA, and any projects which have the potential to give rise to significant cumulative effects will be considered.

16.11 POTENTIAL TRANSBOUNDARY IMPACTS

840. There is the potential for transboundary effects in relation to seascape, landscape and visual receptors in the Republic of Ireland during the construction, O&M and decommissioning phases of the WDA. The WDA is located over 60 km from the north coast of the County of Donegal, and at this distance effects are not considered likely to be significant. Therefore, impacts on transboundary receptors, and transboundary effects are **scoped out** from further consideration in the EIA.

16.12 APPROACH TO IMPACT ASSESSMENT

16.12.1 Methodological Overview

841. The approach to SLVIA in the EIA would follow the principles set out in the Guidelines for Landscape and Visual Impact Assessment (GLVIA) (Landscape Institute and IEMA, 2013). The principal steps involved in the assessment of impacts are set out below:

- The Study Area will be defined based on the extent of the WDA, using a 60 km radius to define the area within which receptors will be considered;
- The area in which the WDA infrastructure may be visible will be established through generation of a ZTV based on maximum height parameters of the WTGs (340 m above LAT).
- The landscape baseline of the Study Area will be analysed, including seascape, coastal character and terrestrial landscape, and receptors will be identified;
- The visual baseline will be recorded in terms of the different groups of people (visual receptors) who may experience views of the WDA infrastructure, the places where they will be affected, and the nature of views and visual amenity that is experienced at present;
- Assessment viewpoints will be selected to represent the range of views likely to be experienced by people, and these viewpoints will be agreed with relevant stakeholders;
- Based on the type and scale of the proposal, the potentially significant effects on landscape and visual receptors will be identified; and

- The significance of seascape, landscape and visual effects will be judged for each receptor. In line with GLVIA3, this will be judged with reference to the sensitivity of the receptor (combining receptor susceptibility and the value attached to the resource) and the magnitude of impact (a combination of the scale, geographical extent, duration and reversibility of the impact).

842. Cumulative effects will be considered in the same way, focusing on the potential interactions between the WDA infrastructure and other projects and plans.

16.12.2 Judging Levels of Effect and Significance

843. The level of LSE of the WDA will be determined by professional consideration of the sensitivity of the receptor and the magnitude of the potential impact.

16.12.3 Sensitivity of Receptors

844. The sensitivity of the baseline conditions, including the importance of environmental features across the Study Area or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and professional judgement.

845. Judgements regarding the sensitivity of seascape, landscape or visual receptors require consideration of both the susceptibility of the receptor to the type of development proposed and the value attached to the seascape, landscape or visual resource. This will be implemented in accordance with the NatureScot draft guidance to assess effects on special qualities of designated landscapes (**Section 16.2**).

846. Judgements will be recorded as high, medium or low, as defined in **Table 16.9** for landscape / seascape receptors, and **Table 16.10** for visual receptors.

Table 16.9 Sensitivity of landscape receptors

Sensitivity	Definition
High	Landscapes which, by nature of their character, would be less able to accommodate development without change in character, due to their relatively higher susceptibility to the type of change proposed, and/or the higher value placed upon them by society.
Medium	Landscapes, which by nature of their character, would be able to accommodate development subject to careful siting and design, due to their more moderate susceptibility to the type of change proposed, and/or relatively moderate value placed upon them by society.
Low	Landscapes which, by nature of their character, would be more able to accommodate development without substantive change in character, due to their relatively lower susceptibility to the type of change proposed, and/or lower value placed upon them by society.

Table 16.10 Sensitivity of visual receptors

Sensitivity	Definition
High	Larger numbers of viewers and/or those with proprietary interest and prolonged viewing opportunities such as residents and users of attractive and well-used recreational facilities. The quality of the existing view, as likely to be perceived by the viewer, is considered to be high.
Medium	Small numbers of residents or moderate numbers of recreational viewers, with an interest in their environment. Larger numbers of recreational road users. The quality of the existing view, as likely to be perceived by the viewer, is considered to be medium.
Low	Small numbers of recreational viewers with interest in their surroundings. Viewers with a passing interest not specifically focussed on the landscape e.g. workers, commuters. The quality of the existing view, as likely to be perceived by the viewer, is considered to be low.

16.12.4 Magnitude of Impact

847. The magnitude of impacts will be identified through consideration of the degree of change to baseline conditions predicted as a result of the WDA, as well as the duration and reversibility of an impact.

848. Judgements regarding the magnitude of seascape, landscape or visual impact will combine an assessment of the scale and geographical extent of the seascape, landscape or visual impact, its duration and reversibility. Judgements will be recorded as high, medium, low or negligible as defined in **Table 16.11** for landscape / seascape receptors, and **Table 16.12** for visual receptors. This professional judgement will be made in line with guidance including GLVIA3.

Table 16.11 Magnitude of landscape impact

Magnitude	Definition
High	A clearly evident and frequent/continuous change in landscape features and characteristic affecting an extensive area, or the characteristics, and/or notable widespread alteration to the special or key qualities of designated areas.
Medium	A moderate change in landscape features and character, frequent or continuous, and over a wide area, or a clearly evident change either over a restricted area, and/or with some alteration to the special or key qualities of designated areas.
Low	A small change in landscape features and character over a wide area or a moderate change over a more restricted area, and/or barely altering the special of key qualities of designated areas.
Negligible	An imperceptible, barely or rarely perceptible change in landscape features and character, and/or not altering the special or key qualities of designated areas.

Table 16.12 Magnitude of visual impact

Magnitude	Definition
High	Large change in view, perhaps where the development is in close proximity in a direct line of vision, or affecting a substantial part of the view, or providing contrast with the existing view.
Medium	Clearly perceptible change in view, perhaps where the development is relatively close but at an oblique angle or further away in the direct line of vision, creating a distinct new element in the view.
Low	Small change in view, perhaps where the development is at a distance or oblique angle, or where the scale of the landscape absorbs the development well.
Negligible	Change in view which is barely perceptible.

16.12.5 Significance of effect

849. The sensitivity of the seascape, landscape or visual receptor and the magnitude of the impact will be used as a guide, informed by professional judgement, to assess the significance of the likely effects. The SLVIA will provide full details of the criteria to be considered in judging the identified aspects of sensitivity (susceptibility and value) and magnitude of impact (scale, geographical extent, duration and reversibility), and the grades used to describe each.

850. Although a numerical or formal weighting system will not be applied, consideration of the relative importance of each aspect will feed into the overall decision. Levels of effect will be identified as negligible, minor, moderate or major (including intermediate judgements where appropriate). Moderate, major-moderate and major effects are considered significant in the context of the EIA Regulations.

851. In terms of the direction of effects (positive or adverse) there is a wide spectrum of opinion with regard to wind energy development. Taking a precautionary stance, effects will be assumed to be adverse, unless stated otherwise.

16.13 SCOPING QUESTIONS TO CONSULTEES

852. The following questions are posed to consultees to help frame and focus their response to the SLVIA scoping exercise, which will in turn inform the Scoping Opinion:

- Is the proposed SLVIA Study Area appropriate?
- Have all the relevant data sources been identified in the Scoping Report?
- Are there any comments on the overall methodology proposed to assess effects on seascape, landscape and visual receptors, or to assess cumulative effects?
- Are there any comments on the proposed list of assessment viewpoint locations and/or suggested visualisations?
- Are there any further seascape, landscape or visual receptors that should be considered within the assessment (i.e. where it is expected that significant effects may occur)?
- Do you agree with the proposed approach to coastal character assessment, within 30 km of the WDA?
- Do you agree with the seascape, landscape and visual impacts and receptors that have been scoped in and out from further consideration within the EIA?
- Do you agree that transboundary effects can be scoped out?
- Are there any other relevant consultees who should be consulted with respect to the SLVIA?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

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17 INFRASTRUCTURE AND OTHER MARINE USERS

17.1 INTRODUCTION

853. This chapter considers the scope of potential impacts and likely significant effects (LSE) on infrastructure and other marine users that may arise from the construction, Operation and Maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA). Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

854. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on infrastructure and other marine users in the Environmental Impact Assessment (EIA).

855. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 12 Commercial Fisheries** – the infrastructure and other marine users assessment includes consideration of impacts on activities associated with existing aquaculture sites.
- **Chapter 13 Shipping and Navigation** – shipping and navigation routes are considered for the infrastructure and other marine users receptors identified within the infrastructure and other marine users Study Area.
- **Chapter 15 Military and Civil Aviation** – existing military and civil aviation activities are considered in the infrastructure and other marine users assessment.

856. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

17.2 LEGISLATION, POLICY AND GUIDANCE

857. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 17.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for infrastructure and other marine users.

Table 17.1 Summary of relevant legislation, policy and guidance for infrastructure and other marine users

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Policy	
Marine (Scotland) Act 2010	Applies to Marine Licences and Section 36 applications within the Scottish marine area (0-12 nautical miles (nm)). The Act provides a framework to help balance competing demands on Scotland's seas. It introduces a duty to protect and enhance the marine environment and includes measures to prevent interference with legitimate uses of the sea.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
UK Marine Policy Statement (UK Government, 2011)	The Marine Policy Statement is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It informs the standard approach to planning and decision making regarding Marine Plans. **The key reference is:** **Chapter 3:** *"This chapter sets out the policy objectives for the key activities that take place in the marine environment. These objectives are the specific policy outcomes which the UK Government, Scottish Government…"*
Scotland's National Marine Plan (Scottish Government, 2015)	The Scottish National Marine Plan (NMP) sets out general, strategic and topic-based policies for the sustainable development of Scotland's marine resources out to 200 nm. The Plan highlights Marine planning policies applicable to infrastructure and other marine users. **The key references are:** **GEN 4 Co-existence**: *"Proposals which enable coexistence with other development sectors and activities within the Scottish marine area are encouraged in planning and decision making processes, when consistent with policies and objectives of this plan".* **GEN 6: Sea Fisheries** – "*The Scottish Government recognises the social, cultural and economic importance of fishing activity to many of Scotland's communities and wishes to see the long history of fishing in Scottish waters continue…"* **GEN 7: Aquaculture** – "*Aquaculture in Scotland is an increasingly important industry and the Scottish Government supports industry plans to grow the sector sustainably…"* **GEN 9: Oil and Gas – "***Scotland will need a mixed energy portfolio, including hydrocarbons, to provide secure and affordable heat and electricity for decades to come…"* **GEN 10: Carbon Capture and Storage** – *"Carbon Capture and Storage (CCS) is a set of technologies that has the potential to reduce carbon dioxide emissions from new and existing coal and gas-fired power plants and large industrial sources. CCS is a three-step process that includes…"* **GEN 11: Offshore Wind and Marine Renewable Energy – "***Scotland's marine area has an estimated 25% of Europe's offshore wind and tidal resource and 10% of the wave resource…"* **GEN 12: Recreation and Tourism –** "*Scotland's marine and coastal areas support a range of recreational, sporting and visitor activities, ranging from coastal walking to international sporting events…"* **GEN 13: Shipping, Ports, Harbours and Ferries** – *"Trade is essential to Scotland's economic prosperity, especially in today's global economy…"* **GEN 14: Submarine Cables – "***Submarine cables are vital to the world's power, information and international telecommunications infrastructure, creating offshore power grid, interconnectors, and communication and broadband provisions…"* **GEN 15: Defence –** *"Scotland's seas and coasts are important for military training exercises, test and evaluation facilities and are critical for operational reasons…"* **GEN 16: Aggregates** – *"Marine aggregate extraction removes sand and gravel from the seabed for use as construction aggregate or for land reclamation or beach replenishment…"*

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Sectoral Marine Plan – Offshore Wind Energy (Scottish Government, 2020)	The Sectoral Marine Plan (SMP) for Offshore Wind Energy identifies sustainable areas for the future development of commercial scale offshore wind energy in Scotland, including a spatial strategy to inform the seabed leasing process for the purposes of offshore wind energy. The Windfarm Development Area (WDA) is located in Plan Option W1, as identified in the SMP for Offshore Wind. Plan Options including W1 were subject to testing, refinement and area reduction through Strategic Environmental Assessment (SEA), Habitats Regulations Appraisal (HRA) and plan development processes. The SEA identified relevant characteristics of Plan Option W1 and identified key risks to be addressed in consenting applications. A key risk factor identified for the W1 area is potential impacts on recreational angling.
National Planning Framework 4 (Scottish Government, 2023)	National Planning Framework 4 (NPF4) sets out Scotland's spatial principles, regional priorities, national developments and national planning policy. NPF4 presents Sustainable Places, Liveable Places and Productive Places to achieve national outcomes including benefits to the environment, communities, and health. NPF4 contains a notable focus on tackling both the climate and nature crises. **The key references are:** **Policy 11: Energy -** "*Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported…"* **Part 3: Annex B, Policy 3 - Strategic Renewable Electricity Generation and Transmission Infrastructure – "***This national development supports renewable electricity generation, repowering, and expansion of the electricity grid…"* **Part 3: Annex B, Policy 15 - Industrial Green Transition Zones – Comments on other technologies such as Carbon Storage and hydrogen developments** – "*Industrial Green Transition Zones (IGTZ) will support the generation of significant economic opportunities while minimising carbon emissions…"* **Part 3: Annex C – Spatial Planning Priorities** – "*Industrial Green Transition Zones (IGTZ) will support the generation of significant economic opportunities while minimising carbon emissions. Technologies that will help Scotland transition to net zero will be supported at these locations…"*
Argyll and Bute Council Local Development Plan 2 (Argyll and Bute Council, 2024)	This plan has specific policies which are relevant to the receptors discussed in this chapter. **The key reference is:** **Policy 30: The Sustainable Growth of Renewables –** *"The Council will support renewable energy developments where these are consistent with the principles of sustainable development and it can be adequately demonstrated that there would be no unacceptable environmental effects, whether individual or cumulative, on local communities, natural and historic environments, landscape character and visual amenity, and that the proposals would be compatible with adjacent land uses..."*
Guidance	
European Subsea Cable Association guidelines (European Subsea Cables Association, 2012)	The European Subsea Cable Association guideline no.6 'The Proximity of Offshore Renewable Energy Installations (OREI) & Submarine Cable Infrastructure in United Kingdom (UK) Waters' provides a framework for collaborative working between Offshore Windfarms and subsea cable developments.

17.3 CONSULTATION

858. Consultation with infrastructure and other marine user stakeholders will be ongoing throughout the EIA process and will include engagement with:

- Chamber of Shipping;
- Cruising Association;

- Ministry of Defence (MoD); and
- The Royal Yachting Association (RYA).

859. Initial consultation with some of the stakeholders listed above has commenced in relation to early data collection activities within the WDA and to establish communication processes for future activities associated with the WDA.

17.4 EXISTING DATA SOURCES

860. **Table 17.2** sets out the information and data sources that have been used to inform this chapter and which will also be used to inform the EIA.

Table 17.2 Summary of key datasets and information sources

Dataset	Description	Author
National Marine Plan Interactive	Marine Directorate National Marine Plan Interactive contains information on: • Aquaculture site locations; • Disposal site locations; • Historic aggregate site data and sand gravel resources; • Subsea cables' locations; and • Spatial information on wave and tidal lease sites around the Study Area.	Marine Scotland, 2023
Offshore oil and gas activity data	Spatial information on gas and oil infrastructure (gas and oil wells, fields, pipelines and licence blocks).	North Sea Transition Authority (NSTA), 2023
Offshore wind lease area	Represents all current offshore windfarms sites in pre-planning, planning, construction and operational phases in Scottish waters.	Crown Estate Scotland, 2023
Carbon Capture Storage	Recent information on Carbon Capture Storage Development and licensing areas.	Scottish Carbon Capture and Storage, 2023

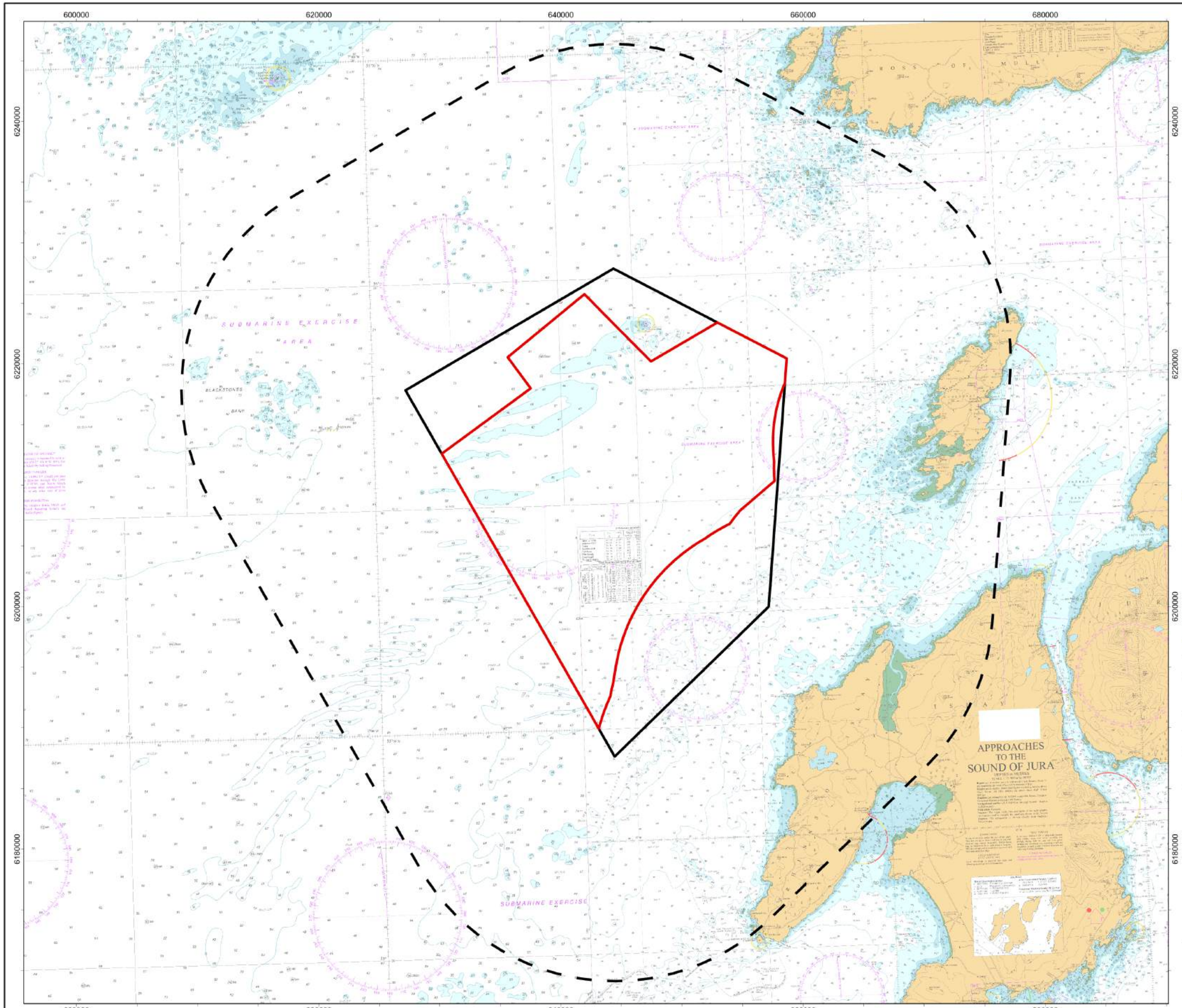
17.5 SITE-SPECIFIC SURVEY DATA

861. It is considered that no additional baseline information needs to be gathered specifically from the site to inform this chapter, as there are sufficient existing data sources available to provide an environmental baseline to inform scoping and EIA.

17.6 INFRASTRUCTURE AND OTHER MARINE USERS STUDY AREA

862. This section describes the infrastructure and other marine users Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is assessed (**Section 17.7**) and the EIA will be conducted.

863. The infrastructure and other marine users Study Area (**Figure 17.1**) is defined by the Option Agreement Area (OAA) plus a 10 nautical miles (nm) buffer to align with the shipping and navigation Study Area presented in **Chapter 13 Shipping and Navigation**.



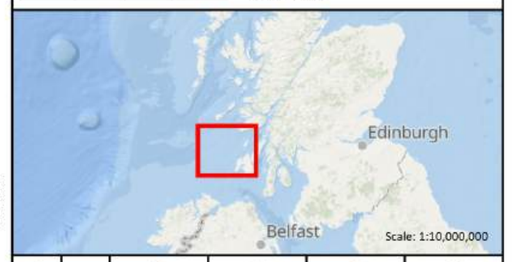
Windfarm Development Area

Option Agreement Area

Infrastructure and Other Marine Users Study Area

N

0 5 10 Kilometres



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
2	09/08/2024	AB	GC	CB	PB

DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000055		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:300,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 17.1: Infrastructure and Other Marine Users Study Area

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Enhancing Society Together

ScottishPower Renewables

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17.7 EXISTING ENVIRONMENT

864. This section describes the infrastructure and other marine users receptors, using publicly available data sources (**Section 17.4**) deemed of relevance to the Study Area (**Section 17.6**). This sets the context for the identification of mitigation measures (**Section 17.8**) and scoping of potential impacts (**Section 17.9**) which then feeds into the consideration of cumulative effects (**Section 17.10**) and potential transboundary impacts (**Section 17.11**).

865. **Figure 17.2** provides locations of the identified infrastructure and other marine users receptors present in the existing environment with a description of these being provided in the subsequent sections.

17.7.1 Offshore Windfarm Developments

866. There are no operational Offshore Windfarms (OWFs) or windfarms at planning application stage within the Study Area, at the time of writing.

867. The closest OWF development with a secured seabed lease, acquired in May 2023 CES's Innovation and Targeted Oil & Gas leasing round, is the Malin Sea OWF located 29 km to the south of the Study Area.

868. The closest proposed OWF developments to the Study Area, are the Shearwater One and Haven Offshore Array both located partially within Republic of Ireland waters.

869. The proposed Shearwater One OWF (located within the Study Area) and Haven Offshore Array OWF (located 22 kilometres (km) from the Study Area) and information about their development status at the time of writing is limited.

870. Based on the information available, however, it is apparent that the Haven Offshore Array applied in 2022 for a foreshore licence to undertake a geophysical campaign, data from which was used to identify the potential spatial boundary of the Haven Offshore Array. In relation to Shearwater One, no seabed rights have ever been applied for or granted in relation to that project.

17.7.2 Ministry of Defence

871. The Study Area is situated within several MoD navy and submarine exercise areas (X5626: Mackenzie, X5539: Orsay, X5543: Colonsay). Additional exercise areas extend for the entirety of the west coast of Scotland. Temporary marine activity restrictions can be implemented by the MoD in these areas to coincide with scheduled exercises.

872. Similar aviation exercise areas are also present within the wider area. Information on aviation activity within the vicinity of the OAA is provided in **Chapter 15 Military and Civil Aviation**. This includes MoD aviation activity and designated danger areas.

17.7.3 Subsea Cables

873. One charted subsea cable is located within the infrastructure and other marine users Study Area. This charted subsea cable is the electrical interconnector cable between the Islands of Colonsay and Islay.

17.7.4 Wave and Tidal

874. There are no wave or tidal projects identified within the infrastructure and other marine users Study Area.

875. The closest tidal project in the wider area is the Oran na Mara project located between Islay and Jura approximately 14 km to the east of the infrastructure and other marine users Study Area. The Oran na Mara project is being developed by Nova Innovation Limited and is currently at the pre-application planning stage at the time of writing this Scoping Report.

17.7.5 Aquaculture

876. There are two shellfish aquaculture sites located within the Study Area, one located near Colonsay ('The Strand') and one located near Islay ('Islay'). Both shellfish aquaculture sites are located to the east of the WDA boundary at 13 km and 12 km, respectively.

17.7.6 Offshore Oil and Gas Operations

877. There are no existing oil and gas licence blocks, activities or infrastructure within the infrastructure and other marine users Study Area, nor within the wider west coast Scotland region.

878. The closest offshore oil and gas operations and associated infrastructure are located in the Irish Sea more than 100 km from Study Area.

17.7.7 Carbon Capture and Storage

879. There are no carbon capture and storage sites within the Study Area nor the wider west coast Scotland region. All proposed carbon capture and storage activities are situated within the North Sea region.

17.7.8 Dredging and Disposal Sites

880. There are no active offshore dredging or disposal sites identified within Study Area.

881. The closest open dredging and disposal sites are the Portnahaven and Port Ellen sites located approximately 11 km and 29 km to the south-east of the infrastructure and other marine users Study Area.

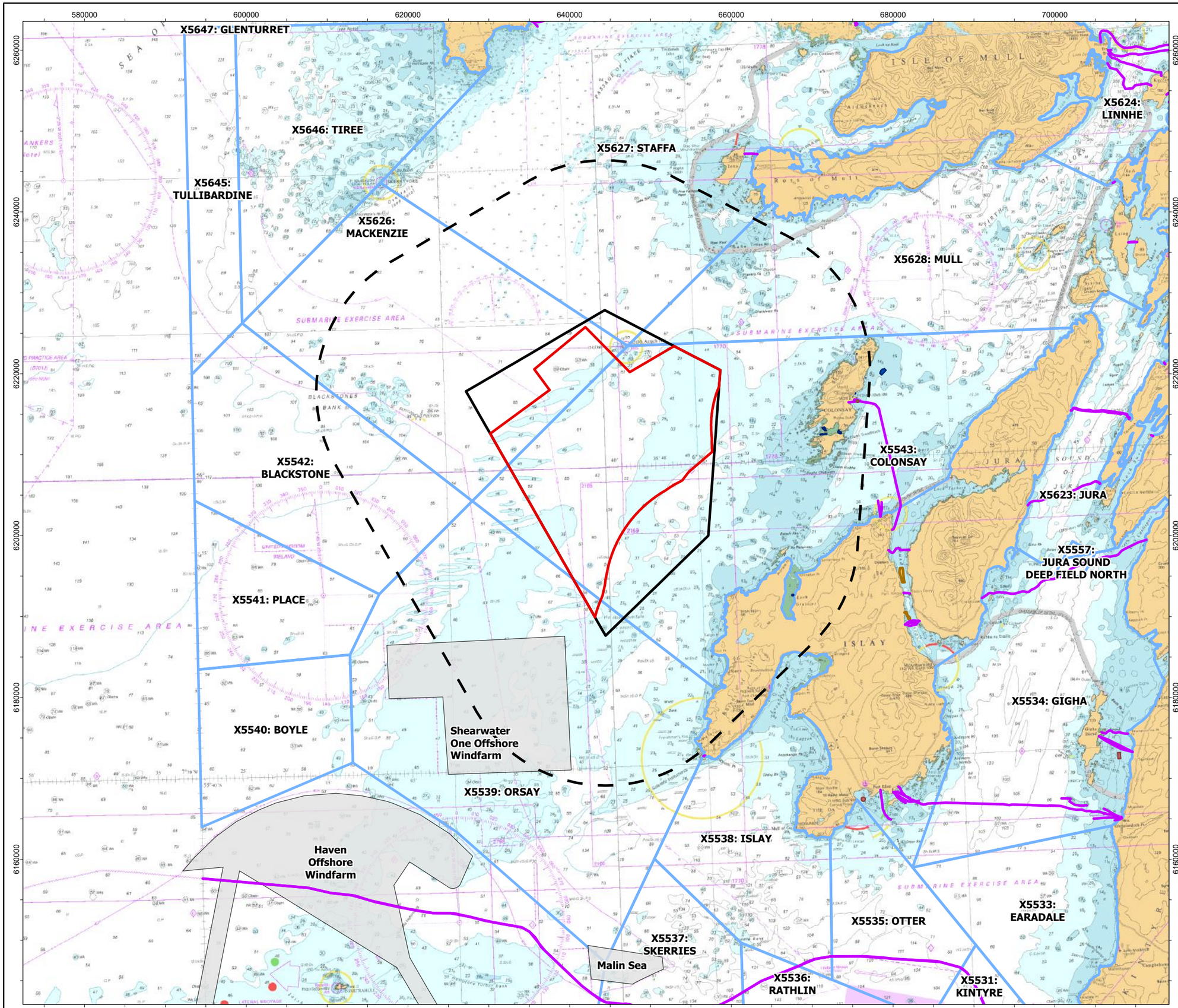
17.7.9 Marine Aggregates and Mining

882. There are no licences for marine aggregate extraction identified within the Study Area nor within the wider west coast Scotland region.

17.7.10 Recreational Charter Angling and Wildlife Tours

883. The Study Area is situated within an area that is used for recreational charter angling and wildlife tours from local islands. Recreational charter angling and wildlife tours are subject to seasonal variations to coincide with suitable weather to undertake the activities.

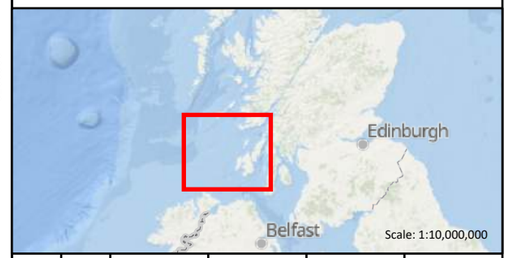
884. Further information on the recreational vessel activity is provided in **Chapter 13 Shipping and Navigation**.



- Windfarm Development Area
- Option Agreement Area
- Infrastructure and Other Marine Users Study Area
- Other nearby Windfarm Development Areas
- Navy and submarine exercise area
- Tidal Site
- Disposal Site
- Aquaculture
- Submarine cable

N

0 5 10 20 Kilometres



REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
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DRAWING NUMBER	MCW-GEN-GIS-MAP-RHS-000069		
DATUM	ETRS89	PROJECTION	UTM Zone 29N
SCALE	1:450,000	PAGE SIZE	A3
PROJECT TITLE	MachairWind		

Figure 17.2: Existing Environment - Infrastructure and other Marine Users

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17.8 MITIGATION MEASURES

885. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA on infrastructure and other marine users. These measures described in **Table 17.3** will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good practice.

Table 17.3 Indicative embedded mitigation measures for infrastructure and other marine users

ID	Parameter	Description of Mitigation Measure
M-8	Cable Plan	Development of, and adherence to, a Cable Plan (incorporating a Cable Burial Risk Assessment (CBRA)). The Cable Plan will confirm planned cable routeing, burial, and any additional external cable protection, and will set out methods for post-installation cable monitoring. Furthermore, this plan will detail environmental sensitives and design considerations to mitigate, as far as practicable, the effects of inter-array cable laying and associated protection during installation and operation of the Windfarm Development Area (WDA) infrastructure. The Applicant plans to bury cables to a minimum a target burial depth of 0.5 m.
M-10	Unexploded Ordnance	Development of an Unexploded Ordnance (UXO) Threat and Risk Assessment.
M-13	Scottish Marine Wildlife Watching Code	The Scottish Marine Wildlife Watching Code (Scottish Natural Heritage (SNH), 2017) approach will be followed for all Project vessels.
M-18	Navigational Safety Plan	Development of, and adherence to, a Navigational Safety Plan. This plan will describe measures put in place related to navigational safety, including information on safety zones, charting, construction buoyage, temporary lighting and marking, and means of notification of activities associated with the WDA to other sea users.
M-19	Notice to Mariners	Advanced warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher webpage. All notices will be uploaded to the Project website.
M-20	Lighting and Marking Plan	Development of, and adherence to, a Lighting and Marking Plan (LMP). This plan will set out the marine and aviation navigational lighting and marking measures to be applied during the construction and operation of the WDA.
M-23	Safety Zones	Application for and use of Safety Zones of up to 500 metres (m) during construction, major repairs and decommissioning phases. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation during construction, operation and maintenance (O&M), and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards. Safety zones during the operational phase are also being considered. The Environmental Impact Assessment (EIA) will include an assessment of the proposed approach to Safety Zones at the point of application.
M-24	Dropped Objects	Dropped objects on the seabed during works associated with the WDA which may pose a hazard will be reported in line with the Marine Directorate - Licensing Operations Team (MD-LOT) procedures. Objects will be recovered where they pose a hazard to other marine users and where recovery is possible.
M-25	Marking	All WDA infrastructure will be appropriately marked on the United Kingdom Hydrographic Office Admiralty Charts.

ID	Parameter	Description of Mitigation Measure
M-26	Search and Rescue	Development of a Search and Rescue (SAR) Checklist in consultation with the Maritime and Coastguard Agency to ensure compliance with Marine Guidance Note 654 and its annexes. This will be completed post consent.
M-27	Emergency Response and Cooperation Plan	Development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP). This plan ensures co-operation with the Maritime and Coastguard Agency (MCA) by detailing the design parameters of the WDA, emergency contact details, and processes to be followed.
M-28	Guard Vessels	Where appropriate, guard vessels will be used to ensure adherence with Safety Zones (M-23) or advisory passing distances.
M-29	Marine Coordination Centre	A marine coordination centre will be implemented to manage project vessels throughout construction, O&M and decommissioning.
M-31	Vessel Marine Regulations	Compliance of all Project vessels with international marine regulations as adopted by the Flag State, notably Convention on International Regulations for Preventing Collisions at Sea IMO, 1972/77) and International Convention for the Safety of Life at Sea (IMO, 1974).
M-32	Vessel Management Plan	Development of, and adherence to, a Vessel Management Plan. This plan will provide the procedures for management and coordination of vessels to mitigate the impact of Project vessels.
M-34	Development Specification and Layout Plan	Development of, and adherence to, a Development Specification and Layout Plan. The layout of the Wind Turbine Generators (WTGs) will be finalised post consent. Consultation with the MCA and Northern Lighthouse Board (NLB) will be undertaken to ensure that the specific WTG layout is compatible with potential SAR activity (M-26).
M-35	Failures of Lighting and Marking	Failures of the lighting and marking in the WDA will be appropriately reported and rectified as soon as practicable. Interim hazard warnings (i.e. Notice to Mariners (M-19)) will be put in place as required.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solutions for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

886. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts to infrastructure and other marine users will be assessed with this mitigation in place.

17.9 SCOPING OF POTENTIAL IMPACTS

887. A range of potential impacts on infrastructure and other marine user receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

888. **Table 17.4** outlines the impacts on infrastructure and other marine users which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data become available.

Table 17.4 Potential impacts scoped in or scoped out for infrastructure and other marine users

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impacts on other Offshore Windfarm developments	✘	✘	✘	No pathway for effect – The Shearwater One Offshore Windfarm (OWF) is located within the Study Area however it does not have an existing seabed lease agreement and there is insufficient information on which to base an assessment. The closest OWF project to the Windfarm Development Area (WDA) with an existing seabed lease agreement is the Malin Sea OWF which is 29 km to the south of the Study Area. Therefore, potential impacts on other OWF developments have been **scoped out** of the Environmental Impact Assessment (EIA), for all phases.
Impacts on subsea cables	✘	✘	✘	No pathway for effect – although the electrical interconnector cable between the Colonsay and Islay is located within the Study Area, the 12 km distance to the east of the WDA boundary means that no potential impacts will occur. Therefore, potential impacts on subsea cables have been **scoped out** of the EIA, for all project phases.
Impacts on wave and tidal sites	✘	✘	✘	No pathway for effect – the closest wave and tidal site is between Islay and Jura 14 km to the east of Study Area. Therefore, potential impacts on wave and tidal sites have been **scoped out** of the EIA, for all phases.
Impacts on aquaculture sites	✘	✘	✘	No pathway for effect – although both shellfish aquaculture sites, 'The Strand' and 'Islay' are located within the Study Area, these sites are located at a distance of 13 km and 12 km respectively to the east of the WDA boundary meaning that no potential impacts will occur. Both shellfish aquaculture sites are situated outside the Zone of Influence (ZoI) for Suspended Sediment Concentrations (SSCs) as defined by the maximum 23 km tidal excursion extent in a southerly direction so no potential impacts from Suspended Sediment Concentrations (SSCs) will occur. See **Chapter 6 Marine Physical Environment** for further information on the tidal excursion distance. Therefore, potential impacts on aquaculture sites have been **scoped out** of the EIA, for all phases.
Impacts on offshore oil and gas operations	✘	✘	✘	No pathway for effect – there are no offshore oil and gas operations in the Study Area or wider region. Therefore, potential impacts on offshore oil and gas operations have been **scoped out** of the EIA, for all phases.
Impacts on carbon capture and storage sites	✘	✘	✘	No pathway for effect – there are no carbon capture and storage sites in the Study Area or wider region. Therefore, potential impacts on carbon capture and storage sites have been **scoped out** of the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impacts on dredging and disposal sites	✘	✘	✘	No pathway for effect – the closest dredging and disposal sites are the Portnahaven and Port Ellen disposal sites located approximately 11 km and 29 km respectively to the south-east of the Study Area. Therefore, potential impacts on dredging and disposal sites have been **scoped out** of the EIA, for all phases.
Impacts on marine aggregates and mining site	✘	✘	✘	No pathway for effect – there are no marine aggregate or mining sites in the Study Area or wider region. Therefore, potential impacts on marine aggregates and mining sites have been **scoped out** of the EIA, for all phases.
Impacts on Ministry of Defence maritime navigational interests	✓	✓	✓	The presence of vessels during construction, Operation and Maintenance (O&M) and decommissioning, and the presence of the WDA infrastructure may disturb and displace military activities within specific designated navy and submarine exercise areas (X5626: Mackenzie, X5539: Orsay, X5543: Colonsay). Therefore, potential impacts on Ministry of Defence (MoD) maritime navigational interests have been **scoped into** the EIA, for all phases.
Impacts on recreational charter angling and wildlife tours	✓	✓	✓	The construction and decommissioning of the WDA infrastructure and implementation of safety zones around vessels may displace recreation vessels. Similarly, O&M activities may also displace recreation vessels due to presence of infrastructure and implementation of safety zones around vessels. There may also be a potential beneficial effect during O&M, if the WDA infrastructure were to provide a fish aggregating effect. Therefore, potential impacts on recreational charter angling and wildlife tours have been **scoped into** the EIA, for all phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

17.10 POTENTIAL CUMULATIVE EFFECTS

889. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA and OfTDA to affect infrastructure and other marine user receptors. The approach to assessment of potential cumulative impacts is set out in **Chapter 4 Approach to Scoping and EIA**.

890. Potential impacts to be taken forward for consideration in the Cumulative Effects Assessment (CEA) will be in line with those described for the WDA-alone assessment and OfTDA appraisal. Impacts assessed as negligible adverse significance (or lower) will not be taken forward to CEA and it is possible that some will be screened out on the basis that the impacts are highly localised or the risk of effects occurring is reduced, given management measures will be in place for the Project and other plans and projects.

17.11 POTENTIAL TRANSBOUNDARY IMPACTS

891. There are no infrastructure and other marine users associated with European Economic Area (EEA) states within the Study Area. Therefore, impacts on transboundary receptors, and transboundary effects are **scoped out** from further consideration in the EIA.

17.12 APPROACH TO IMPACT ASSESSMENT

892. The impact assessment methodology for the infrastructure and other marine users chapter will follow the procedures described in **Chapter 4 Approach to Scoping and EIA** as well as guidance documents presented in **Section 17.2**.

17.12.1 Definitions

893. For each potential impact, the assessment identifies receptors within the Study Area which are sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of impacts given receptors. The definitions of sensitivity and magnitude for the purpose of the infrastructure and other marine users assessment are provided in **Table 17.5** and **Table 17.6**.

Table 17.5 Definition of sensitivity

Sensitivity	Definition
High	High value activity/activity fundamental to the operator or infrastructure that is of international or national economic importance. No redundancy available in the event of impact. Asset very sensitive to the impact. For example, gas pipeline, electrical infrastructure or telecommunication cable supporting United Kingdom (UK) or European activity or nationally important aggregates area where extraction company has no access to areas of equal quality aggregates.
Medium	Medium value activity. Impact to asset would significantly reduce operators' activities but not result in complete failure to continue operations. Limited redundancy available. Asset regionally important. Asset has limited tolerance of impact. For example, gas pipeline, electrical infrastructure or telecommunication cable, where asset owners have some potential for redundancy planning. Aggregates areas where extraction company has some, but limited access to equal quality aggregate.
Low	Low value activity. Impact to asset would have limited implications on operator/public either due to the availability of redundancy or limited pathway for impact. Asset has some tolerance of impact. For example, electrical or telecommunication cable with ability to undertake redundancy planning to limit impact. Aggregates area where extraction company has access to large area of equal quality aggregate.
Negligible	Low value activity, operators' activities would not be significantly reduced by impact. Asset generally tolerant of impact. Limited impact to asset owners or local community in case of damage or failure.

Table 17.6 Definition of magnitude

Magnitude	Definition
High	Loss of resource and / or quality and integrity of receptor; severe damage to key characteristics, features or elements. For example, accidental damage to asset resulting in permanent or long-term inoperability or complete loss of access to economically important asset.
Medium	Loss of resource, but not adversely affecting integrity of resource; partial loss of / damage to key characteristics, features or elements. For example, damage to an asset that results in either short term, complete inoperability or long term reduced functionality. Partial loss of access to economically important asset, or short-term complete loss of access.
Low	Some measurable change in attributes, quality or vulnerability, minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. For example, accidental damage to asset resulting in short term reduction of functionality but not complete loss of function. Short term disruption to access of asset.
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements, and / or slight alteration to activity.

17.12.2 Significance of effect

894. The assessment of significance of an effect is a function of the sensitivity of the receptor and the magnitude of the impact. The determination of significance is guided by the use of significance of effect matrix, as shown in **Table 17.7**. Definitions of each level of significance are provided in **Table 17.8**.

Table 17.7 Significance of effect matrix

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Table 17.8 Definition of effect significance

Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which is likely to be important considerations because they affect the achieving national objectives (e.g. Marine Plans) or could result in breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No Change	No impact, therefore, no change in receptor condition.

17.13 SCOPING QUESTIONS TO CONSULTEES

895. The following questions are posed to consultees to help frame and focus their response to the infrastructure and other marine users chapter which will in turn inform the Scoping Opinion:

- Do you agree with the data sources used to characterise the infrastructure and other marine users baseline?
- Are there any further desktop datasets which you would recommend are included?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the WDA on infrastructure and other marine user receptors?
- Have all the potential impacts on infrastructure and other marine users resulting from the WDA been identified in this Scoping Report?
- Do you agree with the impacts that have been scoped in or scoped out for further assessment in the EIA?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

17.14 REFERENCES

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18 SOCIO-ECONOMICS

18.1 INTRODUCTION

896. This chapter considers the scope of potential impacts and likely significant effects (LSE) on socio-economics that may arise from the construction, Operation and Maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA). This also includes consideration of tourism and recreation. Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the entire Project.

897. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects on socio-economics from the Environmental Impact Assessment (EIA).

898. This chapter should be read in conjunction with the following Scoping Report chapters:

- **Chapter 12 Commercial Fisheries** - the Project could have potential impacts on the socio-economics of existing commercial fisheries operations of which is considered further in the commercial fisheries chapter.
- **Chapter 13 Shipping and Navigation** - the Project could potentially impact existing shipping operations which are described further in the shipping and navigation chapter.
- **Chapter 16 Seascape, Landscape and Visual Impacts** - the Project's location could have a socio-economic impact on local communities with these communities identified within the Seascape, Landscape and Visual Impact Assessment (SLVIA) chapter.
- **Chapter 17 Infrastructure and Other Marine Users -** the Project may have potential impacts on existing marine infrastructure and other marine users of which socio-economics may be a consideration**.**

899. Key inter-relationships between this chapter and those listed above, will be considered where relevant in the EIA.

18.2 LEGISLATION, POLICY AND GUIDANCE

900. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 18.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for socio-economics.

901. In addition to the guidance documents listed, it is understood that the Scottish Government is in the process of developing guidance on the assessment of the socio-economic impacts of offshore wind energy projects. It is expected that this will be published before submission of the EIA. If available, this will be considered within the EIA. The Applicant will engage with the Marine Directorate - Science, Evidence, Digital and Data (MD-SEDD) team throughout the pre-application phase to ensure that any methodologies applied are in line with developing guidance.

Table 18.1 Summary of relevant legislation, policy and guidance for socio-economics

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Policy	
National Planning Framework 4 (Scottish Government, 2023)	The National Planning Framework 4 (NPF4) sets out Scotland's spatial principles, regional priorities, national developments and national planning policy. NPF4 presents Sustainable Places, Liveable Places and Productive Places to achieve national outcomes including benefits to the environment, communities, and health. NPF4 contains a notable focus on tackling both the climate and nature crises. **The key references are:** **Policy 11: Energy** – *"Development proposals will only be supported where they maximise net economic impact, including local and community socio-economics benefits such as employment, associated business and supply chain opportunities…"* **Policy 25: Community Wealth Building** – *"To encourage, promote and facilitate business and industry uses and to enable alternative ways of working such as home working, live-work units and micro-businesses…"* **Policy 29: Rural Development** – *"To encourage rural economic activity, innovation and diversification whilst ensuring that the distinctive character of the rural area and the service function of small towns, natural assets and cultural heritage are safeguarded and enhanced…"* **Policy 30: Tourism** – *"To encourage, promote and facilitate sustainable tourism development which benefits local people, is consistent with our net zero and nature commitments, and inspires people to visit Scotland…"*
Offshore Wind Policy Statement (Scottish Government, 2020)	Sets out the Scottish Government's ambitions for the future of offshore wind in Scotland.
National Strategy for Economic Transformation. (Scottish Government, 2022a)	Sets out the priorities for the Scottish economy, as well as how to achieve a wellbeing economy.
National Performance Framework (Scottish Government, 2022b)	Sets out a framework for what a successful country would look like, providing a range of measures to assess a proposed project against.
The Offshore Wind Sector Deal. (Business, Energy and Industrial Strategy (BEIS), 2020)	Sets out the economic opportunities associated with offshore wind, including United Kingdom (UK) Government targets on the share of UK content.
National Marine Plan (Scottish Government, 2015)	Covers the management of both Scottish onshore and offshore waters. **The key references are:** **GEN 1: General Planning Principle –** *"There is a presumption in favour of sustainable development and use of the marine environment when consistent with the policies and objectives of this Plan."* **GEN 2: Economic Benefit** – *"Sustainable development and use which provides economic benefit to Scottish communities is encouraged when consistent with the objectives and policies of this Plan."* **GEN 3: Social Benefit –** *"Sustainable development and use which provides social benefits is encouraged when consistent with the objectives and policies of this Plan."* **GEN 4: Co-Existence -** *"Proposals which enable coexistence with other development sectors and activities within the Scottish marine area are encouraged in planning and decision making processes, when consistent with policies and objectives of this Plan."* **GEN 18: Engagement** – *"Early and effective engagement should be undertaken with the general public and all interested stakeholders to facilitate planning and consenting processes."*

Relevant Legislation, Policy, or Guidance	Relevance to the Assessment
Economic Strategy Refresh: 2024-2034 (Argyll and Bute Council, 2024a)	Provides an updated strategy to enable medium to longer-term economic and social recovery for Argyll and Bute.
Argyll and Bute Local Development Plan 2 (Argyll and Bute Council, 2024b)	This plan has specific policies which are relevant to the receptors discussed in this chapter. **The key references are:** **Policy 22: Economic Development –** *"Tourism makes an important contribution to the Argyll and Bute economy; every part of Argyll and Bute has the potential to benefit from the further growth of tourism…"* **Policy 23: Tourism Development, Accommodation, Infrastructure and Facilities –** *"In the green belt tourism development should only relate to farm diversification schemes such as the conversion of existing traditional farm buildings, or be woodland related activities or outdoor recreational uses which are compatible with an agricultural or natural setting…"* **Policy 24: Existing Tourism Uses –** *"Where a tourism use has been permitted by this LDP2, or where existing facilities form part of the tourism network identified in the proposals maps changes of use or redevelopment to non-tourism uses will only be supported where it is demonstrated…"* **Policy 25: Tourism Development Opportunities –** *"The Tourism Development Opportunities identified in Diagram 6 contain significant potential for the sustainable growth of the Argyll and Bute tourism industry…"* **Policy 52: Community Plans, Local Place Plans and Locality Plans –** *"The planning authority may approve Community plans, Local Place Plans and Locality Plans, or elements thereof, for use as a material planning consideration…"*
Guidance	
Defining 'Local Areas' for assessing impacts of offshore renewables and other marine developments: Guidance Principles (Marine Scotland, 2022a)	Outlines the approach that should be taken when considering what the geographic scope of socio-economic receptors should be.
General Advice for Socio-Economic Impact Assessment, Marine Analytical Unit (Marine Scotland, 2022b)	Outlines the methodology that should be applied for economic impact assessments and the scope of social impacts that should be considered.
Green Book: Appraisal and Evaluation in Central Government (HM Treasury, 2022)	Provides guidance on economic impact assessments, including the consideration of additionality and discounting.
Scottish Offshore Wind Strategic Investment Assessment (SOWEC, 2021)	Provides recommendations and investment priorities to scale up Scottish capacity and capability necessary to deliver a step change in the ability of Scotland's supply chain to grow and win offshore wind work.

18.3 CONSULTATION

902. **Table 18.2** describes the consultation activities relevant to socio-economics that have been undertaken to date. As outlined in **Section 5.3.3.6**, the Applicant is committed to continuing engagement with the local supply chain as the project progresses to better understand businesses' existing market capability and ambitions for the future.

Table 18.2 Consultation activities relevant to socio-economics

Date	Locations	Stakeholders	Engagement Summary
July 2023	Scottish Association for Marine Science, Oban	Various – approximately 100 representatives across shipbuilding, fabrication, safety, transport, and innovation sectors	The Applicant hosted a 'Meet the Buyer' event in partnership with DeepWind Cluster, Highlands and Islands Enterprise, Argyll and Bute Council. This event provided businesses with an overview of the project in terms of key characteristics and timelines. The Applicant hosted a networking session and informative talks from businesses within the local area, in addition to a 'meet the expert' session, where the local supply chain could discuss their areas of interests and learn about the specialist products and services required in offshore wind development. During this event, interested parties were encouraged to register their details on the Project's supply chain database.
November 2023	Campbeltown	DM Fabrication Ltd	The Applicant met with businesses at their bases in Campbeltown and Machrihanish, following their attendance at the July 2023 'Meet the Buyer' event. The purpose of the meeting was for the Applicant to better understand businesses' current and future ambitions in supporting the offshore wind sector. The Applicant provided an update on indicative timelines of the Project and anticipated development activities, including information on the planned Project port feasibility study and developing skills development strategy.
	Machrihanish.	Machrihanish Airbase Community Company (MACC) Ltd	
December 2023	Campbeltown	McFadyen Contractors Ltd	

903. Consultation on socio-economics, related to the potential impact of construction and O&M activities, has been undertaken prior to preparation of this Scoping Report as part of the Project's Economic and Social Scenarios: Opportunities and Impacts report (BiGGAR Economics, 2024). The consultees included stakeholders including Highlands and Islands Enterprise, Argyll and Bute Council, community members, individuals working in public, private and third sector organisations with an interest in the economic and social resilience of the key Study Areas. All contributors are listed in **Appendix K Economic and Social Scenarios Opportunities and Impacts**.

904. Interviews were undertaken with individuals from potential host communities identified for the Project's possible construction phase base location, and O&M base location(s) to explore numerous existing challenges of importance to each community, which included the following topics:

- Housing;
- Labour Market;
- Communities;
- Infrastructure and local services;
- Habitability; and
- Interconnecting influence on other places.

905. **Figure 18.1** provides an overview of the issues of importance to communities as discussed in the Project's Economic and Social Scenarios: Opportunities and Impacts report (BiGGAR Economics, 2024).

Figure 18.1 Issues of importance to communities

906. Consultees highlighted that the Project presents opportunities to address skills challenges, support sustainability efforts, community development and stimulate economic activity. However, there is a need to acknowledge and, where possible, limit existing constraints in infrastructure, labour supply, and public services. Opportunities can arise from the challenges and consultees consider that the Project has the potential to bring positive and continuous benefits to the 'local areas' identified, fostering economic growth, sustainability, and community wellbeing (BiGGAR Economics, 2024).

18.4 EXISTING DATA SOURCES

907. **Table 18.3** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA. Some of these datasets will be updated when the EIAR is prepared. The latest data publications will be referred to.

Table 18.3 Summary of key datasets and information sources

Dataset	Description	Author
2018-based Population Projections for Scottish Areas	Population projections for Scotland and each of its 32 local authorities, broken down by age.	National Record of Scotland (NRS), 2024

Dataset	Description	Author
2020-based Principal Population Projections	Population projections for Scotland from 2020 to 2045.	NRS, 2024
Mid-2022 Population Estimates Scotland	Mid 2022 population estimates, broken down by age for Scotland and relevant local authorities.	NRS, 2024
International Passenger Survey	Annual publication of international overnight tourism visits and nights by number, value, and purpose, with 2019 as the latest year not affected by Covid-19. May be updated before drafting the Environmental Impact Assessment Report (EIAR).	Office for National Statistics (ONS), 2020
Business Register and Employment Survey 2021	Provides a breakdown of employment by sector for Scotland and relevant local authorities in 2021.	ONS, 2022
Annual Survey of Hours and Earnings 2022	Provides a breakdown of employment by sector for Scotland and relevant local authorities in 2022.	ONS, 2023a
Annual Population Survey 2022	Provides statistics on characteristics of populations, including economic activity rate and unemployment rate.	ONS, 2023b
2021-based Principal Population Projections	Principal Population Projections, from 2021 to 2046, for the United Kingdom (UK), broken down by age.	ONS, 2024
Offshore Wind Skills Intelligence Report	Provides information on the existing offshore wind labour force across the UK as well as the skills that are expected to be needed up to 2030.	Offshore Wind Industry Council, 2023
Offshore Wind Operation and Maintenance Opportunity	Discusses the potential Operation and Maintenance (O&M) opportunities in offshore wind by 2030, with a detailed breakdown of annual spending and associated opportunities in the UK.	Offshore Renewable Energy Catapult, 2020
Offshore wind: Sector Deal	Sets out the economic opportunities associated with offshore wind, including UK Government targets on the share of UK content.	BEIS, 2020
Offshore Wind Policy Statement	Sets out the Scottish Government's ambitions for the future of offshore wind in Scotland.	Scottish Government, 2020
National Strategy for Economic Transformation	Sets out the priorities for the Scottish economy, as well as how to achieve a wellbeing economy.	Scottish Government, 2022a
National Performance Framework	Sets out a framework for what a successful country would look like, providing a range of measures to assess a proposed project against.	Scottish Government, 2022b
National Planning Framework 4	National Planning Framework 4 (NPF4) establishes a framework for spatial priorities in Scotland.	Scottish Government, 2023
Annual Growth Sector Statistics	Provides economic statistics, such as employment and Gross Value Added (GVA), on growth sectors identified by the Scottish Government, including sustainable tourism.	Scottish Government, 2024
Great Britain Tourism Survey 2019	2019 Annual publication of domestic overnight tourism visits and nights by number, value, and purpose. 2019 is the latest year not affected by Covid-19. **Note**: May be updated before drafting the EIAR.	VisitBritain, 2020

908. No site-specific surveys have been undertaken to inform this chapter, and no surveys are intended to be undertaken to support the EIA. There is sufficient secondary data available for the compilation of a baseline against which the potential impacts can be assessed.

909. Consultation (as described in **Section 18.3**) will be used to facilitate the discussion on baseline data, interim results, assessment method and outputs.

18.5 SITE-SPECIFIC SURVEY DATA

910. It is considered that no additional baseline information is required to inform this chapter, as there is sufficient existing data available to provide a suitable baseline for scoping and the EIA.

18.6 SOCIO-ECONOMICS STUDY AREA

911. The relevant Study Areas are onshore. This is because the organisations, individuals and communities that might be impacted by the Project activities are based in onshore locations, including coastal and rural areas.

912. The socio-economic Study Areas for the assessment of effects on employment and economy are defined in line with the guidance on the identification of 'local areas' for offshore developments published by Marine Scotland (Marine Scotland, 2022a). This guidance identified six principles for identifying local Study Areas for offshore developments:

- **Principle 1 (Dual Geographies)**: The local area for the supply chain and investment impacts should be separate from the local area(s) for wider socio-economic impacts, including tourism and recreation;
- **Principle 2 (Appropriate Impacts)**: The appropriate impacts to be considered for assessments should be identified before defining the local areas;
- **Principle 3 (Epicentres)**: The local areas should include all the epicentres of the appropriate impacts;
- **Principle 4 (Accountability)**: The local areas used in the assessment should comprise of pre-existing economic or political geographies (community councils, local authorities, development agencies) to enhance accountability;
- **Principle 5 (Understandable)**: The local areas should be defined in such a way that they are understandable to the communities they describe; and
- **Principle 6 (Connected Geography)**: The local area for the supply chain and investment impacts should consist of connected (including coastal) pre-existing economic or political geographies.

913. The epicentres of impact associated with the infrastructure and activities for the Project include the locations of the construction phase and O&M phase ports, the location of any large manufacturing facilities, and locations on land, with visibility of the WDA infrastructure.

914. The socio-economic effects will be assessed at the level of Scottish and UK economies, considering the commitments outlined in the Supply Chain Development Statement (SCDS), focusing on the supply chain engagement and skills development to build the capacity.

915. At this stage, potential port locations and supply chain opportunities have been identified in the MachairWind Development Economic and Social Scenarios: Opportunities and Impacts report (BiGGAR Economics, 2024). These locations could be considered as host locations in the construction phase and / or O&M phase.

916. No decisions have been made on the port locations where supply chain companies would operate from, however, a short list of locations may be available by the time the EIA is undertaken. In addition, the assessment will take into consideration ‘local Study Areas’ based on the potential location of the grid connection, which is currently anticipated to be in South Ayrshire and other local areas that could be relevant to the socio-economic assessment. There will be a revision of the local Study Areas before the assessment is undertaken.

917. For tourism and recreation, the primary focus will also be onshore activity that is potentially affected by the construction, O&M, and decommissioning phases of the Project. In addition, there will also be the potential for marine recreation to be affected by the WDA and Offshore Transmission Development Area (OfTDA). These could occur if the vessels used by the Project impact on the ability of marine recreation users to pursue these activities, including recreational sailing or sea angling.

18.7 EXISTING ENVIRONMENT

918. This section describes the socio-economic receptors, using publicly available data sources (**Section 18.4**), deemed of relevance to the Study Areas (**Section 18.6**). The description of the existing environment receptors sets the context for the identification of mitigation measures (**Section 18.8**) and scoping of potential impacts (**Section 18.9**) which then feeds into consideration of cumulative effects (**Section 18.10**) and potential transboundary impacts (**Section 18.11**).

18.7.1 Socio-economic Baseline

919. The focus of the socio-economic baseline will be the analysis of the key indicators that will determine the sensitivity of the receptors and the potential magnitude of any change:

- Population and demographics;
- Labour market indicators, including employment levels, skills and salaries;
- Industrial structure;
- Tourism and Recreation;
- Housing market indicators; and
- Productivity and economic output indicators.

920. The geographic scope of the baseline will consider the Study Areas that have been identified in **Section 18.6.** This will include the UK, Scotland, and local areas.

921. The working age population in Scotland is projected to decrease over time (National Record of Scotland (NRS), 2024) and so the Scottish economy requires new drivers of growth. The offshore renewables sector represents a substantial opportunity for the Scottish and UK economies. This is highlighted in the strategic objectives of both the Scottish and UK Governments.

18.7.2 Strategic Overview

922. The strategic baseline is provided in the sections below. This will be updated in the EIA to reflect revisions to existing strategies or any local strategies after the revision of the local Study Areas identified.

18.7.2.1 National Performance Framework

923. Scotland's National Performance Framework (Scottish Government, 2022b), first published in 2018, sets out the ambitions of the Scottish Government across a range of economic, social, and environmental factors. The framework includes 'increased wellbeing' as part of its purpose and combined measurement of how well Scotland is doing in economic terms with a broader range of wellbeing measures. The National Performance Framework is designed to give a more rounded view of economic performance and progress towards achieving sustainable and inclusive economic growth and wellbeing across Scotland.

924. The aims for Scotland set out in the National Performance Framework are:

- Create a more successful country;
- Give opportunities to all people living in Scotland;
- Increase the wellbeing of people living in Scotland;

- Create sustainable and inclusive growth; and
- Reduce inequalities and give equal importance to economic, environmental, and social progress.

18.7.2.2 National Planning Framework 4

925. In 2023, the Scottish Government published the National Planning Framework 4 (NPF4) (Scottish Government, 2023), which set out Scotland's spatial strategy to 2045. It affirms the importance of Scotland's transition to a net zero economy through green investment and green jobs, with wind energy highlighted as playing a significant role in the coming years. It states that renewable energy developments will only be supported where they maximise net economic impact, including local and community socio-economic benefits, such as employment, associated business, and supply chain opportunities.

18.7.2.3 National Strategy for Economic Transformation

926. In March 2022, the Scottish Government released the National Strategy for Economic Transformation (Scottish Government, 2022a), which set out its ambition for Scotland's economy over the next ten years. The Scottish Government's vision is to create a wellbeing economy where society thrives across economic, social and environment dimensions, which delivers prosperity for all Scotland's people and places. Of particular importance is the ambition to be greener, with a just transition to net zero, a nature positive economy and a rebuilding of natural capital.

927. A key longer-term challenge identified in the strategy is to address deep seated regional inequality, which includes rural and island areas that face problems such as a declining labour supply and poorer access to infrastructure and housing. The transition to net zero presents a further challenge of delivering positive employment, revenue, and community benefits.

928. To deliver its vision and address the economy's challenges, five programmes of action have been identified (with a sixth priority of creating a culture of delivery), including:

1. Establishing Scotland as a world class entrepreneurial nation;
2. Strengthening Scotland's position in new markets and industries, generating new, well-paid jobs from a just transition to net zero;
3. Making Scotland's businesses, industries, regions, communities and public services more productive and innovative;
4. Ensuring that people have the skills they need to meet the demands of the economy, and that employers invest in their skilled employees; and
5. Reorienting the economy towards wellbeing and fair work.

929. The strategy notes that Scotland has substantial energy potential and that it has developed a growing green industrial base. This provides a strong foundation for securing new market opportunities arising from the transition to net zero, for example in the hydrogen economy and in the decarbonisation of heating systems, where Scotland may be able to secure first-mover advantage and will need continuing investment and support. Renewable energy also has a role to play in supporting productive businesses and regions across Scotland.

18.7.2.4 Offshore Wind Policy Statement

930. The Scottish Government's 2020 Offshore Wind Policy Statement (Scottish Government, 2020) highlights the substantial potential of Scotland's waters for offshore wind and the importance of the sector in the transition to net zero.

931. When the policy statement was published in October 2020, the ScotWind leasing round was expected to lead to an additional 11 Gigawatts (GW) of offshore wind capacity by 2030, generating substantial economic impacts in Scotland's offshore wind supply chain. In contrast, the ScotWind

leasing round may now potentially lead to a maximum additional 28 GW of offshore wind capacity if all projects are developed.

18.7.2.5 UK Government Offshore Wind Sector Deal

932. The UK Government's Offshore Wind Sector Deal (Department for Business, Energy and Industrial Strategy (BEIS), 2020) aims to ensure that UK companies can benefit from the opportunities presented by the expansion of the offshore wind sector, enhancing the competitiveness of UK firms internationally and sustaining the UK's role as a global leader in offshore wind generation, as outlined in the offshore wind sector deal. Offshore wind is also expected to play a significant role in the transition to net zero, creating green jobs as part of the UK Government's Net Zero Strategy, 'Build Back Greener'.

18.7.2.6 Offshore Wind Industrial Growth Plan

933. The Offshore Wind Industrial Growth Plan (RenewableUK, 2024) aims to grow the offshore wind supply chain to accelerate the delivery of offshore wind alongside growing the market share and providing technology leadership for the UK. The Industrial Growth Plan sets out priorities, objectives, actions and investment needs in the key technologies to deliver these priorities.

18.8 MITIGATION MEASURES

934. Embedded mitigation to minimise negative socio-economic effects and enhance positive effects (in particular those associated with the supply chain) are being considered as part of the development and design process. These measures described in **Table 18.4** will evolve as the EIA progresses, in response to consultation, and in compliance with regulatory requirements and good industry practice.

Table 18.4 Indicative embedded mitigation measures for socio-economics

ID	Parameter	Description of Mitigation Measure
M-44	Supply Chain Development Statement	Adherence to a Supply Chain Development Statement (SCDS). As part of the ScotWind bidding process, the Applicant provided a SCDS, which outlines a 'commitment' scenario and an 'ambition' scenario for the level of supply chain content to be secured within Scotland and the United Kingdom (UK). To enhance the positive socio-economic effects associated with the supply chain, the Applicant places a strong focus on supply chain engagement and skills development to build capacity across Scotland. The SCDS commitments will form a Contracted Position Statement when the Applicant enters a lease with Crown Estate Scotland.
M-45	Employment of a Community Engagement Manager	Employment of a locally-based Community Engagement Manager to identify community priorities and assist with local community development initiatives throughout the development of the Project.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

935. Embedded mitigation measures include stakeholder engagement, including with local authorities and private, public and third sector organisations.

936. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts on socio-economics will be assessed with this mitigation in place.

18.9 SCOPING OF POTENTIAL IMPACTS

937. A range of potential impacts on socio-economics receptors may occur during the construction, O&M and decommissioning phases of the WDA. The socio-economic impacts that are considered are those defined in the general advice published by the Marine Analytical Unit in 2022 (Marine Scotland, 2022b), which highlights some commonly identified impacts which could occur because of the development of an Offshore Windfarm (OWF).

938. Scoping is based on a combination of:

- The definition of the Project at the scoping stage;
- Mitigation measures, as described in **Section 18.8**;
- The level of understanding of the baseline at the scoping stage;
- The existing evidence base for socio-economics effects due to the Project;
- Relevant policy; and
- The professional judgement of qualified economists and social researchers.

939. The social impacts that are considered in this section include those defined in the general advice published by the Marine Analytical Unit in 2022 (Marine Scotland, 2022b)**.** A short list of construction locations and O&M ports may be identified by the time the EIA is undertaken; therefore, it may be possible to identify areas of impact and undertake scenario planning for impact for the construction base and O&M base. It will therefore be possible to consider the nature and scale of the impacts affecting communities, including:

- What impacts may occur and at what scale;
- The sensitivity of the communities that these impacts may occur in; and
- How these impacts may be felt across these communities.

940. **Table 18.5** outlines the socio-economics impacts which are proposed to be scoped in or out of the EIA, alongside justification. These may be refined through consultation activities and as additional project information, and site-specific data becomes available.

Table 18.5 Potential impacts scoped in or scoped out for socio-economics

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Increase in employment and Gross Value Added	✓	✓	✓	Economic impacts associated with the expenditure of the Project and supply chain requirements will be assessed. Employment opportunities may include direct jobs created, jobs within tier 1 suppliers (companies the Project will contract directly) and the wider supply chain and employment supported by broader induced multiplier effects. Therefore, potential impacts and effects on increase in employment and Gross Value Added (GVA) have been **scoped into** the Environmental Impact Assessment (EIA), for all phases.
Changes to housing	✓	✓	✓	Change in the level of demand for accommodation because of the Project and its demographic impacts will be assessed. Employment opportunities created may encourage people to move, increasing the population of the Study Area, particularly the working age population. This would increase demand for accommodation, although it is also possible that additional housing is developed in the Study Area to meet the increase in demand. Therefore, potential impacts and effects on changes to housing have been **scoped into** the EIA, for all phases.
Changes to labour market	✓	✓	✓	Direct, indirect, and induced employment associated with the Project could generate new job opportunities accessible to the population of the Study Areas and diversify the economic base. The effects of such changes could include increased competition for labour for existing economic sectors and an expansion in the range and type of opportunities available to employees. Therefore, potential impacts and effects on changes to labour market have been **scoped into** the EIA, for all phases.
Impacts on communities	✓	✓	✓	Changes to the working age population and / or employment opportunities could impact on communities, including their sustainability, community development and changes to the demographic structure. Therefore, potential impacts and effects on impacts on communities have been **scoped into** the EIA, for all phases.
Changes to infrastructure and other local services	✓	✓	✓	There could be changes in level of demand for services because of the Project and its demographic impacts if employment opportunities lead to increases in the working age population. Increased economic activity could also heighten demand on infrastructure and stimulate investment in infrastructure, including in port locations. Therefore, potential impacts and effects on changes to infrastructure and other local services have been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impacts on habitability	✓	✓	✓	The concept of habitability is particularly relevant for island communities. There are seven themes embedded as important aspects of habitability: a prosperous population, trust and participation among community members, access to clean water, healthy ecosystems, an attractive environment, sustainable energy sources and a strong local economy. Changes to habitability may include demographic impacts, provision of sustainable energy sources, clean water, and the participation among community members. Therefore, potential impacts and effects on impacts on habitability have been **scoped into** the EIA, for all phases.
Interconnecting influence on other places	✓	✓	✓	Consideration will be given to the influence of the Project in other places that may not directly experience economic and social impacts. These may include changes related to the power capacity, infrastructure development and supply chain opportunities in locations outside the defined local Study Areas. Therefore, potential impacts and effects on interconnecting influence on other places have been **scoped into** the EIA, for all phases.
Socio-cultural effects	✓	✓	✓	Changes to the working age population and / or employment opportunities could lead to changes in perceptions of community wellbeing, including quality of life and community cohesion. Therefore, potential impacts and effects on socio-cultural effects have been **scoped into** the EIA, for all phases.
Changes to tourism	✓	✓	✓	Changes to the tourism economy will be assessed, in particular the potential influence on visitor behaviour. Increased onshore activity has the potential to affect visitor infrastructure and visitor attractions located close to ports and harbours. Therefore, potential impacts and effects on changes to tourism have been **scoped into** the EIA, for all phases.
Changes to commercial fisheries	✓	✓	✓	The socio-economic consequences of the findings of the commercial fisheries assessment will be considered. This will include the potential economic impact of any changes to the scale of commercial fishing will be assessed. Therefore, potential impacts and effects on changes to commercial fisheries have been **scoped into** the EIA, for all phases.
Changes to shipping and marine recreation	✓	✓	✓	The socio-economic consequences of the findings of the shipping and navigation assessment will be considered. This will include any changes to economic activity because of any effects on activity in the shipping sector and marine recreation. Therefore, potential impacts and effects on changes to shipping and marine recreation have been **scoped into** the EIA, for all phases.

Potential Impact	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Impact on whisky sector	✓	✓	✓	Changes to economic activity because of the Project may affect activity in the whisky industry, particularly for Islay and Jura. This could include competition for labour and port resources. There is also potential for increasing economic resilience and critical mass, to the benefit existing sectors, such as whisky. Therefore, potential impacts and effects on the whisky sector have been **scoped into** the EIA, for all phases.
Cumulative impacts	✓	✓	✘	Cumulative effects from other projects and other large capital developments. Therefore, potential impacts and effects on cumulative impacts have been **scoped into** the EIA, for the construction and O&M phases.
Transboundary impacts	✓	✓	✘	Transboundary effects on non-United Kingdom (UK) supply chain. Therefore, potential impacts and effects on transboundary impacts have been **scoped into** the EIA, for the construction and O&M phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

18.10 POTENTIAL CUMULATIVE EFFECTS

941. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the WDA, OfTDA and OnTDA to affect socio-economics receptors. The approach to assessment of potential cumulative impacts is set out in **Chapter 4 Approach to Scoping and EIA**.

942. Cumulatively, the development of the ScotWind projects is expected to represent a substantial increase in demand at the Scottish level for the industries that will be involved in the construction of these projects. As one of potentially many OWF projects, the Project will contribute to the cumulative case for potential local or inward investment by making it more financially attractive to set up new manufacturing and fabrication facilities in Scotland, as opposed to relying on overseas facilities. Consideration will also be given to the cumulative effects on port facilities during both the construction and O&M phases of the Project.

943. The decommissioning timetable of other capital projects, particularly OWF projects, is not known at this stage. The baseline assessment of port capabilities and constraints is anticipated to change over time as ports invest in new facilities to feed the decommissioning demand. Therefore, the CEA will not consider decommissioning impacts.

18.11 POTENTIAL TRANSBOUNDARY IMPACTS

944. The following transboundary effects have been identified as potential occurrences resulting from activities associated with the Project's construction, O&M, and decommissioning phases:

- Socio-economic effects taking place outside of the UK, relating to non-UK supply chain during the construction, O&M and decommissioning phases of the Project. These will be imports from outside of the UK and are expected to be positive.

18.12 APPROACH TO IMPACT ASSESSMENT

945. The assessment of socio-economic receptors will comply with the general approach set out in **Chapter 4 Approach to Scoping and EIA**. This will include the consideration of the confidence value of the assessment and inter-relationships of impacts on individual receptors as well as the specific approach to assessment for this topic provided below.

18.12.1 Economic Impact Methodology

946. To assess the socio-economic effects of the Project the focus will be on the direct and indirect (supply chain) effects, in line with the UK Offshore Wind Sector Deal (BEIS, 2020). In addition to this, the assessment will also consider the effects of staff spending and the economic impact that this subsequent increase in demand stimulates (the induced effect).

947. The economic impacts will be considered for each socio-economic Study Area and will be reported in terms of:

- **Gross Value Added (GVA)**: this is a measure of economic value added by an organisation, industry or region and is typically estimated by subtracting the non-staff operational costs from the turnover of an organisation;
- **Years of Employment**: this is a measure of employment which is equivalent to one person being employed for a year and is typically used when considering short to medium term employment impacts, such as those associated with the construction phase of the Project; and
- **Jobs**: this is a measure of employment which considers the headcount employment in an organisation or industry. This measure is used when considering long term impacts such as the jobs supported during the O&M phase of the Project.

948. The socio-economic assessment will consider the lowest, realistic levels of expenditure associated with the Project, since that would represent the 'worst-case' scenario in terms of the expected positive socio-economic effects. This will take account of the 'Commitment' scenario in the SCDS submitted as part of the ScotWind leasing process, though may be revised to reflect subsequent revisions of the SCDS which will take account of any changes or developments in the local supply chain.

949. The impact assessment will take account of deadweight, leakage, displacement, and substitution. Sensitivity analysis will also be undertaken to account for risk, uncertainty, and optimism bias, where they could have implications for the economic impacts.

950. The assessment will include elements of the Project. Full details are discussed in **Chapter 3 Project Description, Site Selection and Alternatives**. The analysis will cover all Project phases (construction, O&M, and decommissioning).

951. The impacts during the construction phase will be based on the actual expenditure that has occurred to date as well as the planned expenditure associated with this phase. In addition to the total impact over the period, the assessment will also consider the timings of impacts during this phase to understand the peaks and troughs of activity.

952. The impacts during the O&M phase for the Project will be based on projected O&M expenditure.

953. In instances where impacts are expected to occur over several years, such as the O&M phase or the decommissioning phase, a discount rate will be applied. This allows impacts that occur sooner to be valued more highly than impacts that occur in the future, a concept known as time preference. In this instance a discount rate of 3.5% will be chosen, which is in line with the UK Government's Green Book (HM Treasury, 2022). On this basis it is expected that the decommissioning phase impacts will be substantially lower than for the construction phase.

18.12.2 Social Impact Assessment Methodology

954. This section outlines the methodology that will be applied to potential impacts that have been scoped into the assessment considering relevant responses from the pre-scoping consultation undertaken **Section 18.3**.

18.12.2.1 Housing

955. The potential impacts on housing are one of the key topics that coastal communities are likely to be concerned about (Scottish Government, 2022c). The demographic changes that result from the employment opportunities have the potential to change the level of demand for housing.

956. Pre-scoping consultation with community organisations highlighted that housing supply, particularly adequate and affordable housing, is a major concern for the communities across the west coast and highlands of Scotland that might host an O&M base or a construction site for the Project. The consultees were positive in their views about the beneficial role the development could play in mitigating these, along with developments in other sectors (BiGGAR Economics, 2024).

957. In June 2023, Argyll and Bute Council declared a housing emergency following a rise in homelessness post-pandemic and a lack of housing choice. In May 2024, the Scottish Government declared a housing emergency. Declaring a housing emergency is considered to help focus resources locally and nationally and justify future decision making.

958. The Project's potential effects on housing will vary considerably between communities. The sensitivity of any housing market to changes in demand because of the Project will be determined by factors including:

- The population of the community, including the wider travel to work area;
- The availability of housing or other accommodation within the community;

- The scale of the overnight tourism sector in the community;
- The ability of the housing market to adjust supply to respond to changes in demand; and
- The relative level of housing affordability in the area.

959. Similarly, the sensitivity of any change will be determined by the peak level of additional accommodation demand in each area, relative to the baseline accommodation provision. The magnitude of any change in housing demand would also be determined by the demographic changes because of the Project. This would be determined by the baseline labour supply in each of the potential areas and the relative size of any transient labour population.

18.12.2.2 Labour Market

960. The consultees highlighted the potential that the Project has to provide new job opportunities and diversify the economic base locally which is currently relying on a small number of industries (for example, whisky on Islay) and a small number of employers (BiGGAR Economics, 2024).

961. The labour market impact will be discussed as part of the economic impact assessment however, the sensitivity of receptors will be determined by the trends in the industrial structure of the Study Areas and the magnitude by any demographic change and employment distribution across industries.

18.12.2.3 Communities

962. Pre-scoping consultation (BiGGAR Economics, 2024) focused on the benefits and impacts associated with the Project and the opportunities to enhance or mitigate them considering the community development, sustainability, and demographic challenges. The main opportunities identified from the discussions included:

- The encouragement of people, particularly young, to return to their local areas providing stability;
- The improvements in the development of infrastructure that enhance connectivity, housing standards and individual and community wellbeing;
- The attraction of working age population and families to study, live and work in local areas supporting a thriving community and public services;
- The creation of training opportunities such as apprenticeships; and
- The mitigation of fuel poverty and support of net-zero targets through energy supply benefits from the Project.

963. The potential community impacts will be assessed as far as possible, including the scale of any impact and its potential to be significant at the local areas of the construction base and the O&M base.

964. The sensitivity of each of the receptors will be determined by the trends in demographics in the potential host communities and projections estimated for how these demographics will change over time, and how the demographics of the workforce would relate to different communities considering various age groups. The magnitude will be determined by the change relative to the current population and the wider community benefits provided from the Project.

18.12.2.4 Infrastructure and Other Local Services

965. Consultees indicated that offshore wind development has the potential for both positive and negative impacts on port activity in the local areas, and investment in port infrastructure and cooperation between ports could help to support the development and address existing constraints (BiGGAR Economics, 2024).

966. The demographic changes that could result from the employment opportunities and the investment in port infrastructure, could result in changes to the level of demand for other services. This will include:

- Public and private sector services;
- Educational services;
- Health services and social support;
- Police, fire, recreation, transport; and
- Local authority finances.

967. The assessment of the effect on these services will also be determined by factors of sensitivity that will be specific to the potentially impacted communities. This will include the capacity of each service in each of the areas and the ability of the service to adapt to changes in demand.

968. The magnitude will also be determined by the relative demographic change in each area, which will vary based on the size of the population and the availability of labour in each of the Study Areas.

18.12.2.5 Interconnecting Influence on Other Places

969. The Project is likely to affect other areas, particularly in rural Scotland, which are outside the host communities for the construction and O&M phases of the Project. The consultees highlighted the potential areas of influence (BiGGAR Economics, 2024), including the:

- Power and grid capacity;
- Infrastructure development;
- Supply chain opportunities;
- Economic diversification; and
- Job opportunities for other industries, such as the tourism sector.

970. The assessment of the effect will also be determined by factors of sensitivity that will be specific to the wider impacted areas in Scotland. This will include the ability to adapt to changes in demand for labour in different sectors and access to services with consideration to demographic and energy grid trends.

971. The magnitude will also be determined by the relative demographic change, which will vary based on the size of the population and the availability of labour in rural Scotland.

18.12.2.6 Habitability

972. The consultation also focused on the habitability of island communities considering topics related to the trust and participation among community members, the accessibility to clean water, healthy ecosystems, attractive environment, sustainable energy sources and resilient local economies with prosperous population (BiGGAR Economics, 2024). It was established that the Project would influence various aspects of habitability in the long term which are directly linked to the other impacts discussed in this section, such as the impact on communities and socio-cultural effects.

18.12.2.7 Socio-cultural Impacts

973. The activity surrounding the construction of an OWF have impacts on the lives of residents near areas of activity, which can affect the character of a place. The introduction of a temporary economic activity, even though short-lived, can exert social and cultural influences on a community.

974. In 2022, the Scottish Government published social research by Diffley Partnership (Scottish Government, 2022c) that considered the social impacts that coastal communities with experience of OWFs have had. This research found that the net perception of these communities was that OWFs have had a positive impact on their quality of life, community relations, and community character.

Most respondents felt that the OWF projects have had no impact on these socio-cultural attributes. This is shown in **Table 18.6**, which indicates that 63% of respondents felt that the development of offshore wind projects had no impact on their quality of life, 59% felt it had no impact on community relations and 55% felt it had no impact on community character.

Table 18.6 Responses from coastal communities regarding socio-cultural impact of offshore windfarms

What impact, if any, do you think that offshore windfarms in your area have had on …	Total Positive Impact	No Impact	Total Negative Impact	Net Positive/ Negative
… Quality of Life?	25%	63%	4%	+ 21%
… Community Relations?	16%	59%	7%	+ 9%
… Community Character?	21%	55%	9%	+ 12%

975. The factors which affect how people feel about community or quality of life impact of offshore wind will depend on a wide variety of existing community characteristics and the personal experience on individuals. These will be particular to the communities in which the impacts occur.

976. The sensitivity of communities on socio-cultural effects will be very specific to the communities themselves and the impacts that could occur in each Study Area. Some of the factors that could contribute to the sensitivity of communities to specific impacts are:

- Wellbeing;
- Community cohesion;
- Agency (empowered communities may be able to engage more effectively with the Project at an early stage); and
- Socio-economic characteristics.

977. The magnitude of any change in socio-cultural receptors will be dependent on the specific impact that will be assessed. Some of the factors that could contribute to the magnitude of socio-cultural impacts are the gross changes in perception, initial perceptions of offshore wind, scale of impacts contributing to socio-cultural effects and the timing of assessment.

978. Care should be taken when assessing those impacts based on an individuals' perception. Perception based impacts are also liable to change over time, particularly as more details of the Project emerge. Many socio-cultural impacts are also secondary effects of other impacts that will be identified in the EIAR.

18.13 SCOPING QUESTIONS TO CONSULTEES

979. The following questions are posed to consultees to help frame and focus their response to the socio-economic scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the Project on socio-economics receptors?
- Have all the socio-economic impacts resulting from the Project been identified in this Scoping Report?
- Do you agree with the socio-economic impacts that have been scoped in / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed approach to assessment in the EIA?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

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19 CLIMATE CHANGE

19.1 INTRODUCTION

980. This chapter considers the scope of potential impacts and likely significant effects (LSE) on climate change that may arise from the construction, operation and maintenance (O&M) and decommissioning of the Windfarm Development Area (WDA).

981. Climate change must be considered within the EIA in accordance with the Environmental Impact Assessment (EIA) Directive 2014/52/EU which was transposed into the Electricity Works (EIA) (Scotland) Regulations and the Marine Works (EIA) (Scotland) Regulations in 2017. The climate change chapter in the EIAR will include consideration of the potential WDA impacts on climate change, as well as the impacts of climate change on the infrastructure associated with the WDA. Therefore, this chapter of the Scoping Report will comprise two separate assessments:

1. **A whole-life Greenhouse Gas (GHG) assessment** – which quantifies the GHG savings as a result of the WDA activities, accounting for emissions released during its lifecycle. Additionally, an in-combination GHG assessment will be undertaken to assess the GHG emissions of the Project as a whole. The in-combination GHG assessment will include whole-life emissions from the WDA and the Offshore Transmission Development Area (OfTDA) and Onshore Transmission Development Area (OnTDA) which are subject to separate EIA and consent applications (see **Sections 1.3**). Further details on the in-combination GHG assessment are outlined in **Section 19.5.** The outcome of the in-combination GHG assessment will allow the determination of the net effect of the Project through the provision of renewable electricity to the National Electricity Transmission System, and how this contributes to the United Kingdom's (UK's) decarbonisation targets; and
2. **A Climate Change Resilience (CCR) assessment** – which will evaluate future trends in climate change and the vulnerability and resilience of the WDA infrastructure to such change.

982. The GHG and CCR assessments have differing approaches in terms of the Study Area used, the approach to baseline and potential impacts. Therefore, **Section 19.5** focuses on the GHG assessment, whilst the approach to the CCR assessment is provided in **Section 19.6**.

19.2 LEGISLATION, POLICY, AND GUIDANCE

983. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 19.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for climate change.

Table 19.1 Summary of relevant legislation, policy and guidance applicable to climate change

Relevant Legislation, Policy and Guidance	Relevance to the Assessment
Greenhouse Gas Assessment	
Legislation	
The United Nations Framework Convention on Climate Change, 1992	The United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty which established a global climate governance framework and solidified climate change as an agenda item for future agreements and policies. The United Nations Framework Convention on Climate Change facilitated intergovernmental climate change negotiations such as the Conference of the Parties.

<table>
<tr><th>Relevant Legislation, Policy and Guidance</th><th>Relevance to the Assessment</th></tr>
<tr><td>The Kyoto Protocol, 1987</td><td>Following from the United Nations Framework Convention on Climate Change, the Kyoto Protocol committed industrialised countries to limit and reduce their Greenhouse Gas (GHG) emissions in accordance with individual targets to reduce the rate and extent of global warming.

Annex A of the Kyoto Protocol defined key GHGs as follows:

• Carbon dioxide;
• Methane;
• Nitrous oxide;
• Hydrofluorocarbons;
• Perfluorocarbons;
• Sulphur Hexafluoride; and
• Nitrogen Trifluoride.</td></tr>
<tr><td>The Climate Change Act 2008</td><td>The Climate Change Act 2008 provides the legal basis for the UK's long-term response to tackling climate change. The 2050 Target Amendment Order introduced in 2019 revised the UK's target to net zero by 2050, with an interim target of 78% emissions reduction by 2035 compared to 1990 levels. The Act requires the UK Government to set legally binding carbon budgets to limit GHG emissions in a given time period. These budgets are set by the Climate Change Committee in five-year periods as illustrated below:
<table>
<tr><th>Budget Period</th><th>Carbon Budget (Mt of carbon dioxide equivalent)</th><th>Reduction Relation to 1990 Levels</th></tr>
<tr><td>1st carbon budget (2008 to 2012)</td><td>3,018</td><td>26%</td></tr>
<tr><td>2nd carbon budget (2013 to 2017)</td><td>2,782</td><td>32%</td></tr>
<tr><td>3rd carbon budget (2018 to 2022)</td><td>2,544</td><td>38%</td></tr>
<tr><td>4th carbon budget (2023 to 2037)</td><td>1,950</td><td>52%</td></tr>
<tr><td>5th carbon budget (2028 to 2032)</td><td>1,725</td><td>58%</td></tr>
<tr><td>6th carbon budget (2033 to 2037)</td><td>965</td><td>77%</td></tr>
<tr><td>7th carbon budget (2038 to 2042)</td><td colspan="2">To be set in 2025</td></tr>
<tr><td>Net zero target</td><td colspan="2">At least 100% emission reduction by 2050</td></tr>
</table></td></tr>
<tr><td>Climate Change (Scotland) Act 2009</td><td>Scotland has its distinct climate change legislation, the Climate Change (Scotland) Act 2009, which was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act in 2019. Scotland has committed to achieving net zero by 2045, with a series of interim and annual targets that are more ambitious than the UK's targets. Unlike the UK's five-yearly carbon budgets, the Scottish Government sets budgets yearly.

The Interim emission reduction targets relative to 1990 levels are as follows:

• At least 56% by 2020;
• At least 75% by 2030; and
• At least 90% by 2040.</td></tr>
</table>

Relevant Legislation, Policy and Guidance	Relevance to the Assessment
The Paris Agreement, 2015	The Paris Agreement entered into force in 2016 and was ratified by the UK Government at Conference of the Parties 22. It is a legally binding international treaty with an overarching goal of '*holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels'*. The Paris Agreement requires countries to submit national climate action plans known as Nationally Determined Contributions, with each successive Nationally Determined Contributions reflecting increasing decarbonisation ambitions.
Policy	
National Planning Framework 4 (Scottish Government, 2023a)	The National Planning Framework 4 (NPF4) sets out Scotland's spatial principles, regional priorities, national developments and national planning policy (Scottish Government, 2023a). NPF4 presents Sustainable Places, Liveable Places and Productive Places to achieve national outcomes including benefits to the environment, communities, and health. NPF4 contains a notable focus on tackling both the climate and nature crises. **The key references are:** **Policy 1: Tackling the Climate and Nature Crises** – *"When considering all development proposals significant weight will be given to the global climate and nature crises…"* **Policy 2: Climate Mitigation and Adaptation** – *"Development proposals will be sited and designed to minimise lifecycle greenhouse gas emissions as far as possible…"* **Policy 11: Energy** – *"Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported…"*
The Scottish Government National Marine Plan (Scottish Government, 2015)	The following general policies apply to this climate change assessment: **The key reference is:** **GEN 5: Natural heritage:** *"Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change. Development and users of the marine environment should seek to address climate change through:* ***- Mitigation**: Marine planners and decision makers should seek to facilitate a transition to a low carbon economy. They should consider ways to reduce emissions of carbon and other greenhouse gases…* ***- Adaptation**: Marine planners and decision makers should be satisfied that developers and users have sufficient regard to the impacts of a changing climate and, where appropriate, provide effective adaptation to its predicted effects…"*
Scotland's Climate Change Plan (Scottish Government, 2020)	The Scottish Government publishes Climate Change Plans to set out the pathway to achieving its GHG emission reduction targets via the Climate Change (Scotland) Act 2009. The most recent version, the 2018-2032 Update published in December 2020, sets out the Scottish Government's approach to tackling the climate emergency which was declared in 2019.
The UK Net Zero Strategy 2021 and British Energy Security Strategy, 2022	The UK Net Zero Strategy and British Energy Security Strategy apply to Scotland and provide a national commitment to the provision of low-carbon, secure and affordable energy sources, including an ambition to deliver up to 50 Gigawatts (GW) of offshore wind capacity by 2030.
UK Climate Change Strategy 2021 – 2024 (UK Government, 2021)	The latest UK Climate Change Strategy aids UK exporters and suppliers through the transition to net zero by increasing support to clean growth and climate adaptation, reducing GHG emissions and understanding and mitigating climate-related financial risks. The Strategy highlights the importance of transforming the financial system to boost innovation and transition away from high carbon sectors.

Relevant Legislation, Policy and Guidance	Relevance to the Assessment
Argyll and Bute Local Development Plan 2 (Argyll and Bute Council, 2024)	The Argyll and Bute Local Development Plan 2 (LDP2) 2024 outlines the council's willingness to support renewable energy developments that are consistent with the principles of sustainable development and demonstrate no adverse effect on the environment. LDP2 also outlines the criteria that all wind turbine developments will be assessed against. **The key references are:** **Policy 4: Sustainable Development –** *"In preparing new development proposals, developers should seek to demonstrate the following sustainable development principles, which the planning authority will also use in deciding whether or not to grant planning permission…"* **Policy 6: Green and Blue Infrastructure –** *"Where appropriate new non householder developments shall adequately demonstrate how green and blue infrastructure has been integrated into the design of the proposal from the outset. In particular, but not limited to, proposals should demonstrate…"* **Policy 9: Sustainable Design –** *"Development proposals should demonstrate consideration of and where possible utilisation of: Renewable sources of energy; and sustainable design and construction methods in terms of embodied energy; conversion and re-use; and adaptability…"* **Policy 30: The Sustainable Growth of Renewables –** *"The Council will support renewable energy developments where these are consistent with the principles of sustainable development and it can be adequately demonstrated that there would be no unacceptable environmental effects, whether individual or cumulative, on local communities, natural and historic environments, landscape character and visual amenity, and that the proposals would be compatible with adjacent land use."* **Policy 55: Flooding –** *"Development on the functional flood plain (land with greater than 0.5% (1 in 200) probability of flooding in any year) will be considered contrary to the objectives of this plan, except in the limited circumstances set out in part c) of this policy. Development elsewhere will be subject to assessment as set out in parts a) and b) of this policy, as relevant…"* **Policy 56: Land Erosion –** *"Within land erosion risk areas, new development, other than the categories specified in (i) and (ii) below shall be resisted; exceptions may be made if the proposal successfully demonstrates that the level of risk is acceptable having regard to the nature of the development proposed, operational considerations and land erosion remedial measures…"*
Guidance	
Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022)	The guidance document presents guidelines for undertaking GHG assessments, evaluating the significance of a development's GHG emissions in an Environmental Impact Assessment (EIA) context, and approach to mitigation.
PAS2080: Carbon Management in Buildings and Infrastructure (BSI, 2023)	The British Standards Institution (BSI) guidance document provides specifications for the management of whole-life carbon for built environment projects and best practice measures to enable further emission reductions.
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (World Resource Institute and World Business Council for Sustainable Development, 2015)	The guidance document provides requirements for the preparation of GHG emission inventories and the consideration of direct and indirect GHG emissions (Scope 1, 2 and 3 emissions).

Relevant Legislation, Policy and Guidance	Relevance to the Assessment
GloMEEP: Port Emissions Toolkit (2018)	The guidance document provides a methodology for calculating vessel emissions during various operating modes, such as in transit and manoeuvring.
Climate Change Resilience (CCR) Assessment	
Legislation	
The Climate Change Act 2008 and Climate Change (Scotland) Act 2009	The Climate Change Act 2008 requires the UK Government to undertake a Climate Change Risk Assessment every five years and identify key climate risks and opportunities to national communities and economic sectors. The UK government produced its latest Climate Change Risk Assessment in 2022 (Department for Environment, Food & Rural Affairs (Defra), 2022). The Climate Change (Scotland) Act 2009 poses a similar requirement for the preparation of strategic programmes for climate change adaptation following the publication of each UK Climate Change Risk Assessment. The third UK Climate Change Risk Assessment was published in 2022, followed by the third National Adaptation Programme (Defra, 2023), which outlines priority adaptation actions to be taken. The Scottish Climate Change Adaptation Programme 2019-2024 identifies specific actions for Scotland, including a need for resilient infrastructure systems.
Policy	
National Planning Framework 4 (Scottish Government, 2023a)	As a long-term vision for spatial development, NPF4 supports the enhancement of the climate resilience of existing and future developments. NPF4 requires developments to be sited and designed to adapt to current and future risks from climate change (Policy 2). **The key references are:** **Policy 1: Tackling the climate and nature crises** – *"When considering all development proposals significant weight will be given to the global climate and nature crises…"* **Policy 2: Climate mitigation and adaptation -** *" Development proposals will be sited and designed to minimise lifecycle greenhouse gas emissions as far as possible…"* **Policy 11: Energy –** "*Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported…"*
Guidance	
Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (IEMA, 2020)	The guidance document provides a methodology for characterising the climate baseline and assessing a development's vulnerability and resilience to climate change in the EIA process.
Technical Guidance on the Climate Proofing of Infrastructure in the period 2021-2027 (European Commission, 2021)	The guidance document outlines climate adaptation considerations for infrastructure projects and a risk assessment methodology for integration into impact assessments.
Climate Change Risk Assessment Guidance (C40 Cities, 2018)	The guidance document includes a Climate Hazard Taxonomy based on the United Nations Disaster Risk Reduction classification, which provides the basis for identifying and screening climate hazards. Although geared towards cities, the approach is largely applicable to all built environment projects.

19.3 EXISTING DATA SOURCES

984. **Table 19.2** sets out the information and data sources that have been used to inform this chapter and will also be used to inform the EIA. They primarily consist of publicly available datasets and reports from government and industry sources.

Table 19.2 Summary of key datasets and information sources

Dataset	Description	Author
Greenhouse Gas Reporting Conversion Factors	Emission conversion factors (2023) suitable for United Kingdom (UK) based operations for various activities such as fuel consumption. If available, a more up to date version will be used whilst undertaking the Environmental Impact Assessment (EIA).	Department for Energy Security and Net Zero (DESNZ), 2023a
Digest of UK Energy Statistics	2023 statistics for the UK power sector, including the operational Greenhouse Gas (GHG) intensity of each fuel or generation source. If available, a more up to date version will be used whilst undertaking the EIA.	DESNZ, 2023b
Valuation of Energy Use and GHG Emissions from Appraisal	Treasury Green Book Supplementary Guidance. Providing current and projected operational GHG intensity of grid electricity. If available, a more up to date version will be used whilst undertaking the EIA.	DESNZ, 2023c
UK Territorial GHG Emissions National Statistics	Estimates of annual GHG emissions from activities occurring within the UK's borders. If available, a more up to date version will be used whilst undertaking the EIA.	DESNZ, 2023d
Scottish GHG and Energy Statistics	Statistical publications relating to energy and GHG emissions in Scotland. If available, a more up to date version will be used whilst undertaking the EIA.	Scottish Government, 2023b
Reducing the UK's Carbon Footprint Report	Estimated lifecycle carbon intensity of various forms of electricity generation.	Climate Change Committee (CCC), 2013
UK Carbon Budget	National carbon budgets used to contextualise the Project's GHG emissions. If available, a more up to date version will be used whilst undertaking the EIA.	CCC, 2020
Blue Carbon Report	Research on the blue carbon potential of Scotland's coastal and marine environment, including the carbon sequestration rate by habitats.	The Scottish Parliament, 2021
Scottish Blue Carbon – a literature review of current evidence for Scotland's blue carbon habitats	Research on the blue carbon potential of Scotland's coastal and marine environment, including the carbon sequestration rate by habitats.	NatureScot, 2023
Inventory of Carbon and Energy Database	Emission factors for embodied carbon in materials used during construction and replacement or repair activities.	Jones and Hammond, 2019

Dataset	Description	Author
Life Cycle GHG Emissions of Utility Scale Wind Power: Systematic Review and Harmonization	GHG emission benchmark for offshore wind projects to inform assumptions used in the GHG assessment regarding the likely contribution of emission sources to the GHG footprint of the Windfarm Development Area (WDA).	Dolan and Heath, 2012
Life Cycle Costs and Carbon Emissions of Offshore Wind Power		Thomson & Harrison, 2015
UK Climate Projection Database and supporting reports	Climate change projection data and summaries for the UK for various climate variables such as air temperature and precipitation. Note: UK Climate Projection data is most applicable to onshore and coastal areas.	Met Office, 2016a
		Met Office 2016b
UK Climate Averages and Regional Climate Summaries	Historical climate observations and current climate conditions for the UK.	Met Office, 2023
Intergovernmental Panel on Climate Change Sixth Assessment Report	Current state of knowledge on the climate science and possible climate futures report.	Intergovernmental Panel on Climate Change (IPCC), 2021
Marine Climate Change Impacts Partnership Reports	A collection of evidence reviews and summary reports on climate change effect in the marine environment. The most up to date reports will be used whilst undertaking the EIA.	Marine Climate Change Impacts Partnership (MCCIP), 2024
Offshore Energy Strategic Environment Assessment 4	Observed meteorological conditions at seas around the UK.	Department for Business, Energy and Industrial Strategy (BEIS), 2022
New York State Energy Research and Development Authority Offshore Wind Climate Adaptation and Resiliency Study	Review of key climate factors to the offshore wind sector and opportunities for climate resilience.	ICF International, Inc, 2021

19.4 SITE-SPECIFIC SURVEY DATA

985. It is considered that no additional baseline information needs to be gathered specifically from the site to inform this chapter, as there are sufficient existing data sources available to provide an environmental baseline to inform scoping and EIA.

986. However, cross-disciplinary engagement with the engineering team and other relevant EIA topic leads will help refine the assessment and identify suitable mitigation measures.

19.5 GREENHOUSE GAS ASSESSMENT

987. As outlined in **Section 19.1**, this climate change chapter consists of two assessments: the GHG assessment and the CCR assessment. This section is focused on the GHG assessment of the WDA which considers its potential impact on climate change.

19.5.1 GHG Assessment – Study Area

988. All GHG emissions will affect the same receptor, the global atmosphere, as opposed to directly affecting any specific local receptor. Emissions which are released or avoided due to activities associated with the WDA will have the same global effect on atmospheric GHG concentration and its net effect on climate change regardless of where they occur. Accordingly, the Study Area of the

GHG assessment is not geographically defined (Institute of Environmental Management and Assessment's (IEMA), 2022).

989. The scope of the GHG assessment will be limited to quantifying direct and indirect GHG emissions arising from the WDA over the Project's full lifecycle: construction (including upstream emissions associated with the sourcing, manufacturing, and transport of construction materials), O&M, and decommissioning.

990. The Study Area for the GHG assessment will encompass GHG emitting activities, including carbon benefits beyond the infrastructure system such as avoided emissions from exported electricity. As the Project will supply renewable electricity to the UK National Electricity Transmission System, the GHG assessment will also account for emissions savings from the displacement of electricity generation which would have otherwise been generated using a more GHG intensive source**.**

19.5.2 GHG Assessment – Existing Environment

991. This section characterises the GHG receptors, using publicly available data sources (**Section 19.3**) deemed of relevance to the Study Area (**Section 19.5.1**). The description of the existing environment receptors sets the context for the identification of mitigation measures (**Section 19.5.3**) and scoping of potential impacts (**Section 19.5.4**) which then feeds into consideration of cumulative effects (**Section 19.5.5**) and potential transboundary impacts (**Section 19.5.6**).

992. The GHG assessment evaluates the significance of the effect of GHG emissions, either released or avoided by a development based on requirements set by international climate commitments, national policies and best industry practice. To contextualise the assessment, national carbon budgets and relevant existing and emerging net zero policies, targets and performance standards will be reviewed and compared against the predicted GHG impacts.

993. The WDA will generate renewable electricity, replacing an equivalent amount of electricity that would otherwise be produced by alternative energy sources. The focus of the GHG assessment will be to determine the amount of electricity generated by the WDA and its contribution towards Scotland's and the UK's national emission reduction and long-term net zero targets.

994. The avoided GHG emissions from the WDA's electricity generation will be estimated by considering a 'Do Nothing' scenario, where the Project is not constructed.

995. The 'Do Nothing' scenario will be established for the GHG assessment, which will assume that the Project is not constructed, and that the electricity would otherwise be generated by using natural gas. This is an approach advocated for offshore windfarm projects by RenewableUK (2022) to calculate potential carbon savings.

996. To provide context for the magnitude of GHG emissions reported in the assessment and the evaluation of their effect on climate change, the baseline review will cover the carbon budgets and targets relevant to each WDA phase, as well as recent national emissions statistics for Scotland and the UK, the emission contribution of the electricity sector and the lifecycle GHG intensities of various forms of electricity generation.

19.5.3 GHG Assessment – Mitigation Measures

997. Embedded mitigation measures will be considered as part of the design process to reduce the impact of the WDA GHG emissions on climate change. These measures will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good industry practice.

998. IEMA guidance (2022) highlights the importance of embedded mitigation in minimising GHG emissions from a proposed development. The IEMA GHG Management Hierarchy sets out a

structure to eliminate, reduce, substitute, and compensate such emissions. The GHG assessment will consider mitigation measures which are incorporated into the design of the WDA and will identify opportunities for further emission reductions where practicable, in line with the GHG Management Hierarchy.

999. The suitability of potential mitigation measures will be dependent on factors such as technical feasibility and cost. Measures may include minimising vessel traffic or embodied carbon through the efficient use of materials.

1000. In addition, the PAS 2080 guidance document *'PAS 2080:2023 Carbon management in buildings and infrastructure (2023)'* will be reviewed to outline best practice carbon management measures for further consideration.

1001. The Project has adopted a Sustainability Strategy that will review and identify potential measures to reduce or minimise GHG emissions through the on-going design process, construction, O&M and decommissioning phases.

19.5.4 GHG Assessment – Scoping of Potential Impacts

1002. For the GHG assessment, a range of potential impacts on climate change receptors may occur during the construction, O&M, and decommissioning phases of the WDA.

1003. Potential impacts considered in the GHG assessment include direct and indirect emissions released as a result of the activities associated with the WDA during the construction, O&M, and decommissioning phases. The provision of renewable electricity will also result in avoided emissions by displacing electricity generation which would have otherwise been generated using GHG-intensive sources.

1004. GHG emissions released or avoided by the WDA may occur outside the spatial boundary of the WDA, and the UK's territorial boundary, such as upstream emissions from the manufacturing of windfarm components. Therefore, given that GHG emissions affect the climate system wherever they occur, and the need to avoid 'carbon leakage' overseas when reducing UK emissions, such emissions are included in the WDA GHG assessment. The PAS2080 lifecycle modules outlined in **Table 19.3** for the potential emission sources are categorised into the following stages for an infrastructure development:

- Before use (A0-A5);
- Use (B1-B9);
- End of life (C1-C4); and
- Supplementary information beyond the infrastructure lifecycle (D).

1005. The scoping exercise for the GHG assessment identifies emission sources which are included/excluded from the assessment boundary and are presented in accordance with the PAS2080 lifecycle modules.

1006. **Table 19.3** outlines the GHG emissions sources which are proposed to be scoped in or out of the EIA, alongside justification.

Table 19.3 Potential impacts scoped in or scoped out for the greenhouse gas assessment

Potential Emission Sources	Phase* Scoped in (✓) / out (x)			Justification	PAS2080 Lifecycle Module
	C	O&M	D		
Operational energy use	✘	✘	✘	The energy requirements for the Windfarm Development Area (WDA) are assumed to be delivered entirely by its renewable electricity generation. As there are no anticipated Greenhouse Gas (GHG) emissions associated with the WDA, the operational energy use is **scoped out** of the GHG assessment for all phases.	B6: Operational Energy Use
Operational water use	✘	✘	✘	The water requirements for the WDA are anticipated to be negligible and the associated emissions are not likely to be significant. Operational water use for the WDA is **scoped out** of the GHG assessment for all phases.	B7: Operational Water Use
Other operational processes	✘	✘	✘	The operation of additional processes could result in GHG emissions. However, the other processes associated with the WDA are anticipated to result in negligible GHG emissions and are therefore **scoped out** of the GHG assessment for all phases.	B8: Other Operational Processes
User's emissions	✘	✘	✘	End users will consume electricity generated by the WDA but do not interact with the infrastructure. Emissions from user activities are not relevant to the WDA and are **scoped out** of the GHG assessment for all phases.	B9: User's Utilisation of Infrastructure
Avoided emission	✓	✓	✓	The WDA enables the avoidance of GHG emissions associated with conventional electricity generation such as natural gas-powered plants by providing renewable electricity to the National Electricity Transmission System. The avoided emissions will consider the WDA's emissions during its lifecycle. The avoided emissions due to the WDA are therefore **scoped into** the GHG assessment for all phases.	D: Benefits and loads beyond the Infrastructure System
Design and engineering pre-construction emissions	✓	✘	✘	Emissions from the design and engineering activities before construction are not likely to be significant. These activities are anticipated to be primarily office-based. However, pre-construction surveys and activities such as geotechnical surveys and seabed preparation will be considered if relevant data to the WDA is available. Emissions from these activities are **scoped into** the GHG assessment for the construction phase only.	A0: Preliminary Studies, Design and Engineering
Embodied carbon in construction materials	✓	✘	✘	There will be embodied carbon in materials used during the construction of the WDA such as the Wind Turbine Generators (WTGs) and foundations. Where embodied carbon is emissions arising from raw materials extraction and manufacturing of WDA materials and components. Embodied carbon in construction materials is **scoped into** the GHG assessment for the construction phase only.	A1: Raw Materials Supply A2: Transport to Manufacturing Site A3: Manufacturing

Potential Emission Sources	Phase* Scoped in (✓) / out (x)			Justification	PAS2080 Lifecycle Module
	C	O&M	D		
Construction transport fuel and energy consumption	✓	✘	✘	Fuel and energy will be consumed through the transport of materials, equipment, and personnel to and from the WDA using road vehicles, marine vessels and helicopters, where applicable. Construction transport fuel and energy consumption is **scoped into** the GHG assessment for the construction phase only.	A4: Transport to/from Construction Site
Construction activities fuel and energy consumption	✓	✘	✘	Fuel and electricity will be consumed by plant and equipment during the offshore activities associated with the WDA and is therefore **scoped into** the GHG assessment for the O&M phase only.	A5: Construction
Habitat disturbance/loss	✘	✓	✘	The presence of the WDA during its operational life may result in seabed/habitat disturbance or loss, resulting in impacts to blue carbon. Habitation disturbance and loss associated with the WDA is **scoped into** the GHG assessment for the O&M phase only.	B1: Use
Operational fuel and energy consumption	✘	✓	✘	Fuel and electricity consumption during the WDA operational life includes operational and maintenance transport via marine vessels and road vehicles and embodied carbon in materials used for spare parts during repair and replacement events. Operational fuel and energy consumption are **scoped into** the GHG assessment for the O&M phase only.	B2: Maintenance B3: Repair B4: Replacement B5: Refurbishment
Decommissioning activities	✘	✘	✓	The decommissioning activities of the WDA may result in emissions from sources such as demolition and deconstruction activities, and transportation emissions. Decommissioning activities for the WDA are **scoped into** the GHG assessment for the decommissioning phase only.	C1: Deconstruction C2: Transport to/from Site C3: Waste Processing for Recovery C4: Disposal
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.					

19.5.5 GHG Assessment – Potential Cumulative Effects

1007. The only receptor for the GHG assessment is the global atmosphere. GHG emissions and removals, wherever they occur, have the potential to contribute to climate change, and therefore their effects are global and cumulative by nature.

1008. The IEMA guidance (2022) states that the effects of GHG emissions from specific cumulative projects should be individually assessed, as there is no basis for selecting which projects to assess cumulatively over any other. As such, no additional consideration of cumulative effects is required for the GHG assessment.

19.5.6 GHG Assessment – Potential Transboundary Impacts

1009. As the receptor for the GHG assessment is the global atmosphere, GHG impacts are transboundary by nature. Emissions and removals considered in the GHG assessment will be contextualised under international climate commitments such as the Paris Agreement (2015). As such, no additional consideration of transboundary effects is required for the GHG assessment.

19.5.7 GHG Assessment – Approach to Impact Assessment

1010. The GHG assessment will be undertaken in accordance with the guidance documents provided in **Table 19.1**.

1011. The GHG assessment for the WDA will be structured as follows:

- Emissions from pre-construction activities of the WDA;
- Emissions from the construction of the WDA;
- Emissions from the O&M of the WDA;
- Avoided emissions from the provision of renewable electricity into the National Electricity Transmission System during operations associated with the WDA;
- Emissions from the decommissioning of the WDA; and
- A summary of lifecycle emissions across the construction, O&M and decommissioning phases of the WDA.

1012. GHG emissions will be calculated using a standard calculation-based methodology, which involves multiplying activity data supplied by the design team with the representative emissions factors, and where applicable, calorific, load and global warming potential factors. Industry benchmarks and assumptions based on professional judgment will be used where data gaps exist. Subject to data availability, end-of-life emissions during decommissioning and emissions from spare parts used during repair and replacement events will be estimated using industry benchmarks from the GHG footprint of offshore wind projects (Thomson and Harrison, 2015).

1013. Although the principal assessment in the WDA EIAR will consider the overall GHG impacts of the WDA, the GHG emissions released or avoided by the electricity generation from the WDA will also be considered. The effect significance will be summarised in the climate change chapter.

19.5.7.1 Assessment Criteria

1014. The receptor for the GHG assessment is defined as the global atmosphere. The receptor's sensitivity will be characterised as high, given that any net reduction of GHG emissions will support decarbonisation efforts in line with national and international climate commitments.

1015. The magnitude of impacts is not defined, as the effect significance for the GHG assessment is not determined by the magnitude of emissions alone (IEMA, 2022). However, GHG emissions values (both in terms of emissions released and avoided) will be calculated and expressed as tonnes of carbon dioxide equivalent to account for the difference in global warming potential between GHGs. Global warming potential factors will be obtained from the most recent Intergovernmental Panel on

Climate Change (IPCC)'s Assessment Report 100-year estimates. GHG emissions will be calculated using a lifecycle approach in alignment with PAS 2080 modules and presented both by the phases of the WDA and over the whole lifecycle of the WDA.

1016. Significance criteria for the assessment will be adapted from IEMA's guidance (2022), which recognises that: 'when evaluating significance, all new GHG emissions contribute to a negative environmental effect. However, some projects will replace existing development or baseline activity that have higher GHG profiles. The significance of a project's emissions should therefore be based on its net impacts, which may be positive, negative, or negligible'.

1017. The IEMA guidance provides relative significance descriptions to assist assessments of GHG emissions in an EIA context. Section VI of updated guidance (IEMA, 2022) describes five distinct levels of significance (major adverse, moderate adverse, minor adverse, negligible, and beneficial), which are not based solely on whether a project emits GHG emissions, but on how the project makes a relative contribution towards achieving a science-based transition towards net zero.

1018. To assist in evaluating significance of the GHG impacts associated with the WDA, comparisons to the UK Carbon Budgets and relevant existing and emerging net zero policies, targets and performance standards will be undertaken. The assessment will conclude whether and how the WDA contributes to or undermines the UK's emission reduction efforts and trajectory towards net zero.

1019. Additional parameters will be calculated to contextualise the predicted carbon benefits, including the GHG intensity of electricity generated and the GHG payback period (RenewableUK, 2022). For the EIA, major adverse, moderate adverse and beneficial effects will be considered as significant.

19.5.7.2 In-Combination with the Offshore Transmission Development Area and Onshore Transmission Development Area Assessment

1020. As the WDA forms an element of the wider Project, in-combination GHG emissions from the construction, O&M and decommissioning of infrastructure associated with the OfTDA and OnTDA, which are subject to separate consent applications and EIA (see **Section 1.3**), will be considered in the GHG assessment for the WDA.

1021. The in-combination assessment will be undertaken to evaluate the net contribution of the Project to climate change, which will be presented as an appendix to the climate change EIAR chapter.

1022. The Study Area for the in-combination assessment will encompass all GHG emitting activities, including avoided emissions, associated with the construction, O&M and decommissioning of the WDA, OfTDA and OnTDA.

1023. Likely emission sources and lifecycle GHG emissions associated with the OfTDA and OnTDA will be estimated using project assumptions and industry benchmarks from literature such as the Royal Institution of Chartered Surveyors Whole Life Carbon Assessment Standard for the Built Environment, 2nd edition (2023) and The Institution of Structural Engineers How to Calculate Embodied Carbon guidance, 2nd edition (2022).

1024. The indicative emission of the OfTDA and OnTDA will be combined with the calculated lifecycle emissions for the WDA to determine the likely total emissions for the Project as a whole. To evaluate the overall effect significance of the Project, the assessment criteria will also be used in the in-combination assessment.

1025. It should be noted that the emission footprint of the OfTDA and OnTDA will be calculated during the preparation of their respective EIARs using up to date Project-specific activity data (commensurate with the level of detail available at the time of writing the assessment). Therefore, a staged approach will be adopted for the in-combination assessment.

1026. The in-combination assessment will be refined in the subsequent EIARs to incorporate the GHG emissions calculated for the OfTDA and OnTDA. The overall GHG impacts of the Project will therefore be confirmed in the final EIAR submitted once the emission footprints of all the Project components have been calculated.

19.6 CLIMATE CHANGE RESILIENCE ASSESSMENT

1027. As outlined in **Section 19.1**, this climate change chapter consists of two assessments: the GHG assessment and the CCR assessment. This section is focused on the CCR assessment which evaluates the vulnerability and resilience of the WDA and its receptors to the projected effects of climate change.

19.6.1 CCR Assessment - Study Area

1028. This section describes the Study Area for the CCR assessment and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described (**Section 19.6.2**) and the EIA will be conducted.

1029. The Study Area for the CCR assessment is defined as the WDA.

1030. The CCR assessment will be informed by historical observations and future projections of climate variables. The spatial resolution of gathered data will provide representative coverage of the WDA (The Met Office, 2016a).

1031. The temporal boundary of the CCR assessment will be defined by the Project phases i.e., construction, O&M, and decommissioning.

1032. To characterise the future baseline climate, representative time periods will be identified in alignment with the WDA phases. Data on climate change projections will be presented for each time period to reflect changes in climate change severity and capture the likely climate conditions during each phase.

19.6.2 CCR Assessment - Existing Environment

1033. This section characterises the CCR receptors, using publicly available data sources (**Section 19.3**) of relevance to the Study Area (**Section 19.6.1**). This sets the context for the identification of mitigation measures (**Section 19.6.3**) and scoping of potential impacts (**Section 19.6.4**) which then feeds into the consideration of cumulative effects (**Section 19.6.5**) and potential transboundary impacts (**Section 19.6.6**).

1034. The current baseline for the CCR assessment will be defined using historical climate data and meteorological records maintained by the Met Office. Climate averages from 1991 to 2020 will be obtained from the nearest onshore climate station to the WDA which is Colonsay: Homefield (56.0745, -6.2391), for climate parameters such as temperature, precipitation, and wind (The Met Office, 2023). This will be supplemented with regional climate characteristics (The Met Office, 2016b), based on observations recorded from 1981 to 2010, and baseline information from the Offshore Energy Strategic Environment Assessment 4 (Department for Business, Energy and Industrial Strategy (BEIS), 2022) which provides meteorological conditions at sea for various offshore regions surrounding the UK. The WDA is situated closest to the Western Scotland climate region and sits within Regional Sea 7.

1035. Climate change projections will be used to characterise climate within the Study Area, with changes to climate variables serving as indications of likely climate hazards. The Met Office's UK Climate Projections (UKCP) database provides probabilistic climate change projections for the UK at a spatial resolution of 25 kilometres (km) grid squares, covering a period from 1961 to 2100. Probabilistic

projections provide a broad range of possible climate outcomes and account for uncertainties present in climate models.

1036. UKCP data uses Representative Concentration Pathways which depicts future atmospheric GHG concentration based on various emission reduction scenarios. For the CCR assessment, projection data will be obtained for Representative Concentration Pathways 2.6 (stringent mitigation scenario) and Representative Concentration Pathways 8.5 (worst-case scenario) and presented at three probability levels where applicable: 10th percentile, 50th percentile (median) and 90th percentile. In line with best practice (IEMA, 2020), this approach would provide a robust overview of the future baseline climate.

1037. It should be noted that the majority of the UKCP data is land based and therefore does not provide coverage of the offshore area in which the WDA is located. However, to describe projected changes in air temperature, precipitation, and wind at a local scale, it is assumed that projections for the grid cell closest to the WDA would be broadly representative of the Study Area. Marine climate change projections such as changes in sea temperature, sea level, tides and storm surges will be obtained from the Met Office's UKCP Marine Projections and Marine Climate Change Impacts Partnership (MCCIP), reports (MCCIP, 2024). Where information gaps exist, these will be supplemented using other available literature sources.

1038. Climate change projections are commonly provided as time series data. For the CCR assessment, the data will be processed and presented as climate averages over specific time periods. It is assumed that these time periods will provide sufficient temporal coverage of the Study Area. The construction, O&M and decommissioning phases of the WDA will be segmented into multiyear time periods (typically 20-to-30-year periods), depending on data availability, to illustrate difference in short term, medium term, and long-term climate change over the temporal scope of the assessment.

19.6.3 CCR Assessment - Mitigation Measures

1039. Embedded mitigation measures will be considered as part of the design process to reduce the impact of climate change on the WDA. These measures will evolve as the EIA progresses, in response to consultation, and in compliance with other regulatory requirements and good practice.

1040. The design of Offshore Windfarms (OWFs) and health and safety requirements provide an inherent degree of climate change readiness and resilience. The CCR assessment will account for the WDA technical requirements, design specifications and operational strategy which are built upon best practice engineering codes and standards in the offshore wind sector, and standard health and safety procedures outlined in relevant management plans such as the Code of Construction Practice or equivalent.

1041. Where LSE are predicted, additional mitigation will be identified from available literature sources and in collaboration with the engineering team to ensure that the WDA is resilient to impacts arising from extreme weather events and climatic conditions. Accounting for uncertainties in longer-term climate change projections and their implications for the WDA, adaptive management measures will also be reviewed in line with IEMA's (2020) guidance to ensure mitigation is implemented where and when appropriate. The CCR potential impacts will be reassessed and the 'post-mitigation' or 'residual effect' identified. The residual effect will remain the same If the impact and effect do not require mitigation (or none is possible).

19.6.4 CCR Assessment - Scoping of Potential Impacts

1042. For the CCR assessment, a range of potential impacts on climate change receptors may occur during the construction, O&M and decommissioning phases of the WDA. Potential impacts may differ in terms of type and magnitude depending on the receptor. Impact assessment will be based on the realistic worst-case scenario.

1043. The scoping exercise for the CCR assessment identifies climate hazards, selected from the C40 Taxonomy, and potential climate change impacts which may result in LSE to the WDA.

1044. **Table 19.4** outlines the climate hazards which are proposed to be scoped in or out of the CCR assessment, alongside assessment. These may be refined through consultation activities and as additional project information, and site-specific data becomes available.

Table 19.4 Potential impacts scoped in or scoped out for the climate change resilience assessment

Climate Hazard	Type of Climate Hazard	Phase* Scoped in (✓) / out (x)			Justification	Potential Climate Change Impacts to the development of the Windfarm Development Area
		C	O&M	D		
Ocean acidification	Chronic climatic change	✘	✘	✘	Ocean acidification is a climate hazard due to climate change. However, it is not likely to result in a climate change impact to the Windfarm Development Area (WDA). Therefore, it is **scoped out** of the Climate Change Resilience (CCR) assessment for all phases.	• Although ocean acidification is a climate hazard to the marine environment, it is not expected to have a significant impact on the WDA. Certain levels of acidification could increase the risk of corrosion for the WDA infrastructure. However, considering the expected lifetime of the WDA, it is unlikely that acidification levels will reach a point where they would have a notable impact.
Extreme precipitation	Extreme weather event	✓	✓	✓	Extreme weather events in the form of extreme precipitation (e.g. rain, snow, hail, fog) are anticipated over all phases of the WDA lifecycle due to climate change. As extreme precipitation may impact the WDA infrastructure and personnel. Therefore, it is **scoped into** the CCR assessment.	• Delays to programme such as inability to undertake construction or maintenance activities; • Physical damage to built assets, equipment, and vessels; • Increased maintenance, repair and replacement requirements due to faster asset deterioration; • Reduced windfarm efficiency and functioning from operational downtime; and • Occupational health and safety impacts to personnel associated with the WDA.
Storm and wind (e.g. gales, storm surge, thunderstorms)	Extreme weather event	✓	✓	✓	Extreme weather events in the form of storms and winds, with increased intensity and frequency, are anticipated due to climate change. Storms and winds may impact the WDA infrastructure and personnel during all phases of its lifecycle. Therefore, it is **scoped into** the CCR assessment for all phases.	
Extreme temperatures (e.g. cold and heat waves)	Extreme weather event	✓	✓	✓	Extreme weather events in the form of extreme temperatures such as cold and heat waves, with increased intensity and frequency, are anticipated to occur during all phases of its lifecycle. Extreme temperatures may impact the WDA infrastructure and personnel during all phases of its lifecycle. Therefore, it is **scoped into** the CCR assessment for all phases.	

Climate Hazard	Type of Climate Hazard	Phase* Scoped in (✓) / out (x)			Justification	Potential Climate Change Impacts to the development of the Windfarm Development Area
		C	O&M	D		
Changes in marine climate and extreme weather events	Chronic climatic change	✓	✓	✓	Changes to the marine and extreme weather events are anticipated due to climate change. These climate hazards may impact the WDA infrastructure and personnel during all phases of its lifecycle. Therefore, it is **scoped into** the CCR assessment for all phases.	
Sea level rise	Chronic climatic change	✓	✓	✓	Sea level rise due to chronic climatic change is anticipated to continue throughout the lifecycle of the WDA and may potentially impact its infrastructure and personnel. Therefore, it is **scoped into** the CCR assessment for all phases.	
Changes in sea conditions (e.g. wave and currents, salinity)	Chronic climatic change	✓	✓	✓	Changes in sea conditions (e.g. wave and currents, salinity) due to chronic climate change are anticipated. These changes may impact the WDA infrastructure and personnel during all phases of its lifecycle. Therefore, it is **scoped into** the CCR assessment for all phases.	
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.						

19.6.5 CCR Assessment - Potential Cumulative Effects

1045. The CCR assessment considers the vulnerability and resilience of the WDA to climate change impacts. There is potential for other plans or projects to act collectively to exacerbate or reduce the climate vulnerability and risk of the WDA. The procedure for identifying other relevant plans or projects is outlined in **Chapter 4 Approach to Scoping and EIA**.

1046. It is highly unlikely, however, that the WDA would be significantly affected by neighbouring developments. Therefore, cumulative effects are **scoped out** of the CCR assessment.

19.6.6 CCR Assessment - Potential Transboundary Impacts

1047. It is not relevant to assess transboundary effects relating to CCR as the assessment focuses on the effects of climate change on the WDA. Therefore, transboundary effects are **scoped out** of the CCR assessment.

19.6.7 CCR Assessment - Approach to Impact Assessment

1048. A four-step methodology will be adopted for the CCR assessment based on IEMA (2020) 'Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation' and the European Commission (2021) '*Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021 – 2027*'. The initial stages of the assessment will involve a screening exercise of climate hazards which the WDA may be vulnerable to and are likely to result in climate change impacts. If deemed necessary, a detailed risk assessment will be undertaken on impacts which are material to the WDA to evaluate LSE with respect to CCR.

1049. For the CCR assessment, the following key terms will be adopted, which are defined as follows:

- **Climate variable**: a measurable, monitorable aspect of the weather or climate such as temperature or wind speed;
- **Climate hazard**: a weather or climate-related event or trend in climate variable, such as storms or heatwaves, which has potential to do harm to receptors; and
- **Climate change impact**: an impact from a climate hazard, such as asset damage or failure, which affects the ability of the receptor to maintain its function or purpose.

1050. The WDA O&M phase is anticipated to be 35 years. The decommissioning phase is anticipated to have a short duration in line with construction phase. Due to the short duration of the construction and decommissioning phases, the potential for LSE from climate change is anticipated to be lowest in this phase. It is anticipated that the potential for LSE from climate change impacts would be highest over the operational lifetime of the WDA, given its duration and alignment with longer-term climate change. The CCR assessment will consider the construction, O&M and decommissioning phases of the WDA. An overview of the step-by-step approach is provided below:

19.6.7.1 Step 1: Identifying Receptors, Climate Variable and Hazards

1051. Key climate hazards relevant to the Study Area and the receptors which they affect, will be identified based on the WDA design information and a review of the current and future baseline and other available literature sources. In addition, climate variables used to quantify or contextualise the hazards will also be selected.

19.6.7.2 Step 2: Climate Vulnerability Assessment

1052. Vulnerability is defined as the degree of response to a change in the environment and the capacity to accommodate or recover from the change and is considered to be a function of sensitivity and exposure. Climate change impacts only arise when receptors are vulnerable to climate hazards. A vulnerability assessment will be undertaken whereby only hazards categorised with a medium or

high vulnerability will be taken forward in the CCR assessment. Hazards with low vulnerability will be screened out, and a non-significant effect will be concluded.

19.6.7.3 Step 3: Climate Risk Assessment

1053. The magnitude of the climate change impact, or the climate risk, will then be evaluated based on its likelihood and consequence. For climate risks identified as medium, high, or extreme, additional mitigation measures will be proposed proportionate to the degree of risk, and the residual risk will be reassessed.

19.6.7.4 Step 4: Resilience Rating

1054. The effect significance of the CCR assessment will be determined using a matrix-based approach by considering the residual risk identified in Step three and a resilience rating based on the development preparedness and adaptive capacity of the WDA to the climate change impact. The higher the resilience rating, the higher the capability of the WDA to tolerate and manage the residual climate risk.

19.7 SCOPING QUESTIONS TO CONSULTEES

1055. The following questions are posed to consultees to help frame and focus their response to the climate change chapter which will in turn inform the Scoping Opinion:

- Do you agree with the WDA definition and the approach to characterising the existing environment?
- Do you agree that all relevant data sources have been identified?
- Do you agree that all receptors and potential impacts have been identified?
- Do you agree with the GHG emission sources that have been scoped in and out?
- Do you agree with the climate hazards and resulting climate change impacts that have been scoped in and out?
- Do you agree with the proposed methodology for the GHG assessment, including the staged approach to the in-combination assessment?
- Do you agree with the proposed methodology for the CCR assessment?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?

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20 MAJOR ACCIDENTS AND DISASTERS

20.1 INTRODUCTION

1056. This chapter considers the scope of potential impacts and likely significant effects (LSE) deriving from the vulnerability of the Windfarm Development Area (WDA) to risks of relevant major accidents and disasters throughout the construction, operation and maintenance (O&M) and decommissioning phases of the WDA Given that certainty on the grid connection location will become known after submission of the WDA Scoping Report, this topic chapter only considers the WDA Study Area and existing environment. The WDA Environmental Impact Assessment Report (EIAR) will consider an appraisal of the construction, O&M and decommissioning of the WDA activities, Offshore Transmission Development Area and Onshore Transmission Development Area activities (commensurate with the level of detail that is available at the time of carrying out that appraisal). This approach will ensure a holistic view is undertaken of the whole Project.

1057. An overview of the existing environment is provided in this chapter, together with the proposed methodology and approach to assessing effects in the Environmental Impact Assessment (EIA). A long list of possible major accidents and events is presented alongside a screening exercise to determine which risks are relevant to the WDA and require further assessment.

1058. This chapter should be read in conjunction with the following chapters given the wide-range of potential hazards and risks considered within each which the WDA is vulnerable to:

- **Chapter 6 Marine Physical Environment**;
- **Chapter 7 Offshore Air Quality**;
- **Chapter 8 Benthic Ecology**;
- **Chapter 9 Fish (Including Basking Shark) and Shellfish Ecology**;
- **Chapter 10 Marine Mammals**;
- **Chapter 11 Offshore Ornithology**;
  Chapter 12 Commercial Fisheries;
- **Chapter 13 Shipping and Navigation**;
- **Chapter 15 Military And Civil Aviation**;
- **Chapter 17 Infrastructure and Other Marine Users**;
- **Chapter 18 Socio-economics**; and
- **Chapter 19 Climate Change**.

1059. Key inter-relationships between this chapter and those listed above will be considered where relevant in the WDA EIAR.

1060. The WDA EIAR will include an assessment of the likelihood of the occurrence (risk) of major accidents and disasters and the vulnerability of the environment because of any such occurrence and will reference the appropriate chapters of the EIAR.

20.2 LEGISLATION, POLICY AND GUIDANCE

1061. The overarching policy and legislation relevant to the EIA is described in **Chapter 2 Policy and Legislative Context**. **Table 20.1** sets out the relevant legislation, policy and guidance that informs the proposed scope of assessment for major accidents and disasters.

Table 20.1 Summary of relevant legislation, policy and guidance for major accidents and disasters

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Legislation	
Health and Safety at Work Act 1974	The Act defines the general duties of employers and employees for maintaining health and safety within most workplaces. It requires workplaces to provide adequate training of staff, adequate welfare provisions, a safe working environment and provision of relevant information and supervision.
The Management of Health and Safety at Work Regulations 1999	The Regulations outline what employers must do to manage health and safety and apply this to work activities. The main duty of the employer is to produce risk assessments.
Construction (Design and Management) Regulations 2015 (Health and Safety Executive (HSE), 2015a)	The Regulations outline the actions required for the health, safety and welfare of construction projects to prevent injury and ill health, applying to all building and construction work.
Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015 (HSE, 2015b)	The Regulations apply to oil and gas operations in external waters and aims to reduce risks from major accident hazards and the health and safety of the workforce.
Control of Major Accident Hazards Regulations (HSE, 2015c)	These regulations aim to prevent and mitigate the effects of major accidents involving dangerous substances which can cause serious harm to people and/or the environment.
The Marine Works (Environmental Impact Assessment) Scotland Regulations 2017	The Regulation requires significant risks to the receiving communities and environment, for example through major accidents and disasters, to be considered. Similarly, significant effects arising from the vulnerability of the Windfarm Development Area (WDA) to major accidents and disasters should be considered.
The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017	The Regulation requires consideration of major accidents and disasters within Environmental Impact Assessment (EIA).
Policy	
The Civil Contingencies Act 2004 and the Civil Contingencies Act 2004 (Contingency Planning) (Scotland) Regulations 2005	The Civil Contingencies Act 2004 establishes a framework for civil protection, setting out roles and responsibilities on organisations who play a role in preparing for and responding to emergencies.
Guidance	
The International Organisation of Standardisation 31000: 2009. Risk Management – principles and guidelines (ISO, 2009)	This provides principles and guidelines on risk management and can be applied to a range of activities and any type of risk.
Major Accidents and Disasters in EIA: A Primer (Institute of Environmental Management and Assessment, 2020)	This Primer aims to increase awareness of major accidents and disasters within EIA and its application, offering an assessment methodology.
Guidelines for Environmental Risk Assessment and Management Green Leaves III (Defra, 2011)	This provides guidelines for the assessment and management of environmental risks.
Offshore Major Accident Regulator Memorandum of Understanding between The Offshore Petroleum Regulator for	This aims to promote high levels of protection from major accidents for people and the environment.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Environment and Decommissioning and The Health and Safety Executive	

1062. The following definitions are relevant to this chapter (Institute of Environmental Management and Assessment (IEMA), 2020):

- 'Major accidents' are defined as 'events that threaten immediate or delayed serious environmental effects to human health, welfare and the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.' (IEMA, 2020).
- A 'disaster' is a sudden accident or natural catastrophe that causes great damage or loss of life. These can be natural or can be man-made hazards (e.g. caused by accidental loss of containment) or external hazards (e.g. act of terrorism) which result in consequences for people or the environment.
- For a 'risk' to arise there must be a hazard that consists of a 'source' (e.g. high rainfall); a 'receptor' (e.g. people, property, environment); and a pathway between the source and the receptor (e.g. flood routes).
- 'Vulnerability' describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Directive, the term refers to the 'exposure and resilience' of the development to the risk of a major accident and disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.
- A 'receptor' refers to the specific component of the environment that could be adversely affected if the source reaches it. Environmental receptor is specifically defined as: features of the environment that are subject to assessment under Part 1 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, namely 'population, human health, biodiversity (for example, fauna and flora), land (for example, land take), soil (for example, organic matter, erosion, compaction, sealing), water (for example, hydromorphological changes, quantity and quality), air, climate (for example, greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.' For the purposes of this scoping report the receptors relevant to the WDA have been grouped into the following:
  - Population and human health;
  - Designated sites (International, National and Other);
  - Scarce habitats;
  - Widespread habitat;
  - Particular species; and
  - The marine environment.
- 'Serious danger to human health' relates to the people present in the potentially affected areas, either permanently or for prolonged periods of time. This excludes workers operating at the facility.
- 'Serious damage to human populations' is harm which would be considered substantial e.g., deaths, multiple serious injuries or a substantial number requiring medical attention.
- 'Serious damage to the environment' is loss or significant detrimental impact on populations of species or organisms, harm or loss of valued sites (including designated sites), valued cultural heritage sites, contamination of drinking water supplies, ground or groundwater, or permanent or long-lasting harm to environmental receptors that cannot be restored through minor clean-up or restoration efforts.

- 'As Low As Reasonably Practicable' (ALARP) is used in assessment of major accidents and disasters and involves 'weighing a risk against the trouble, time and money needed to control it' noting that 'ALARP describes the level to which risks can be expected to be controlled'.

20.3 CONSULTATION

1063. No consultation has been undertaken to date for major accidents and disasters. It is envisaged that relevant engagement may occur with organisation such as the Maritime and Coastguard Agency (MCA) and Northern Lighthouse Board (NLB) through the EIA process. Further detail and a justification for this approach is provided in **Table 20.4**.

20.4 EXISTING DATA SOURCES

1064. Information and parameters regarding the design, infrastructure, approach and methods for construction, O&M and decommissioning of the WDA infrastructure will be required to undertake an assessment of major accidents and disasters. This will be developed as the project design is refined and the EIA process progresses. Additionally, there will be a reliance on data collated for the chapters identified in **Section 20.1** to inform this assessment.

20.5 SITE-SPECIFIC SURVEY DATA

1065. It is considered that no additional baseline information needs to be collected to inform this chapter, as there are sufficient existing data sources available to provide an environmental baseline to inform scoping and EIA.

20.6 MAJOR ACCIDENTS AND DISASTERS STUDY AREA

1066. This section describes the major accidents and disasters Study Area and how it has been defined. The purpose of a Study Area is to set the geographical boundary within which the existing environment is described in **Section 20.7**.

1067. The Study Area for individual hazards will be determined in relation to the impact pathways, the distances to the receptors or from examination of the scale of impacts from examples of historic incidents where available. The geographic scope may reach beyond the WDA boundary where there is potential for interaction. Professional judgement has informed the temporal scope of the Study Area relating to the hazards, for all phases of the WDA, with the potential for interaction within the WDA.

20.7 EXISTING ENVIRONMENT

1068. This section characterises the receiving environment and receptors for major accidents and disasters in the Study Area (**Section 20.6**). This sets the context for the identification of mitigation measures (**Section 20.8**) and scoping of potential impacts (**Section 20.9**) which then feeds into the consideration of cumulative effects (**Section 20.10**) and potential transboundary impacts (**Section 20.11**).

1069. The existing environment has been characterised in the chapters listed in **Section 20.1**.The receiving environment for major accidents and disasters will vary depending on the type and scale of the event in question. The scope of the major accidents and disasters chapter is determined by the nature of the potential major accidents and disasters which could be associated with the Study Area.

1070. The future major accidents and disasters baseline will likely evolve in relation to several factors throughout the lifecycle of the WDA. Climate change is likely to lead to changes in sea state (e.g., storms and waves), increased occurrences of extreme weather, and rising sea levels. Predictions for changes in climate until the end of the 21st century are available from The United Kingdom Climate

Projections (UKCP), 2021. The impacts of climate change are set out in more detail in **Chapter 19 Climate Change**.

1071. In terms of shipping and navigation risks, a Navigational Risk Assessment will be undertaken as part of the EIA process and is discussed further in **Chapter 13 Shipping and Navigation**.

1072. There are likely to be advances in technology over the lifecycle of the WDA, with potential for further reductions in risks to safety and the environment, or to introduce new hazards with the introduction of novel technology. However, novel technologies would be implemented following appropriate risk assessment processes.

20.7.1 Potential Receptors

1073. Major accidents and disasters are those with the potential to have serious consequences for the receptors affected. The thresholds of what constitutes a major accident or disaster varies by receptor, and the definitions of the thresholds for the relevant receptors is provided in **Table 20.2**.

1074. The likelihood of a serious event occurring is examined when determining whether a hazard constitutes a major accident or disaster. Events of high consequence with a high likelihood of occurring are determined to be high risk and are unacceptable for any development and are designed out (an example may be infrastructure that did not comply with design codes causing a major failure). These are therefore outside the scope of this report. Low impact events which do not meet the criteria listed in **Table 20.2** are not considered a major accident or disaster and are therefore outside the scope of this report. Hazards were identified using the National Risk Register, professional judgement, and a review of available literature.

1075. The level of harm considered to represent a major accident or disaster is also presented. The thresholds for receptors to be considered under a major accident and disaster have been determined using industry good practice based upon Criteria for notification of a major accident to the European Commission under Article 18(1) of Seveso III Directive and Regulation 26 of the COMAH Regulations 2015 (cited in Institute of Environmental Management and Assessment (IEMA), 2020).

Table 20.2 Major accidents and disasters receptors to be considered in the Windfarm Development Area Environmental Impact Assessment Report

Receptor Group	Receptors Included	Major Accident or Disaster Threshold
Population and human health	Construction workers, operations and maintenance workers, and other marine users	For the public and other marine users: • Substantial number (five or more) of people requiring medical attention or any serious/life-changing injuries. Events of this magnitude may also involve some damage to housing, with low numbers of people being displaced. Potential for localised interruption to utilities and damage to infrastructure. For workers: • Multiple life changing injuries or fatalities.
Designated Sites (International, National and Other)	Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar Sites, Sites of Special Scientific Interest (SSSIs), Marine Conservation Zones (MCZs), Marine Protected Areas (MPAs)	For SSSIs the thresholds are: • Greater than 0.5 ha adversely affected, or greater than 10% of the area of the site affected (whichever is the lesser); or • Greater than 10% of an associated linear feature adversely affected; or • Greater than 10% of a particular habitat or population of individual species adversely affected. For SACs, SPAs, MPAs and Ramsar sites, the thresholds are: • Greater than 0.5 ha or 5% of the area of the site adversely affected (whichever is the lesser), or greater than 5% of an associated linear feature adversely affected; or • Greater than 5% of a particular habitat or population of individual species adversely affected.
Scarce Habitats[18]	Biodiversity Action Plan (BAP) habitats, Habitats of Principal Importance (HPI)	Damage to 10% of the area of the habitat or 2 ha (whichever is the lesser).
Widespread habitat[19]	Land/water used for agriculture, forestry, fishing or aquaculture	Contamination of 10ha or more of land which, for one year or more, prevents the growing of crops or the grazing of domestic animals or renders the area inaccessible to the public because of possible skin contact with dangerous substances; or Contamination of any aquatic habitat which prevents fishing or aquaculture, or which similarly renders it inaccessible to the public.

[18] Scarce habitats are not deemed applicable for the WDA.
[19] Widespread habitat will focus on water-based habitat as land-based habitats are not deemed applicable to the WDA.

Receptor Group	Receptors Included	Major Accident or Disaster Threshold
Particular species	Particular species covers all species, both flora and fauna, found in the United Kingdom (UK) and includes common species, International Union for Conservation of Nature (IUCN) Red List species and other protected or priority species, including rare species	For common species, where reliable estimates of population numbers exist, the death of, or serious sub-lethal effects within, 1% of any species would be significant. For common plant species, the death of, or serious sub-lethal effects within 5% of the ground cover would be considered a major accident. For species listed in the Habitats Directive annexes, the Annexes of the Birds Directive, the Schedules of the Wildlife and Countryside Act 1981 (and amendments), all Red Data Book species and priority species under the UK Biodiversity Action Plan, the threshold may be lower than 1% or 5%, and liaison with the appropriate statutory conservation organisation should be used to determine the appropriate threshold. Moreover, for all species, where reliable estimates of population numbers do not exist, liaison with the statutory authority will be necessary to determine appropriate thresholds. Any loss of an IUCN Red List species (or an IUCN Red List species site).
Marine environment	Non-estuarine marine waters, sub-littoral zones, benthic community adjacent to the coast and fish spawning grounds	Permanent or long-term damage to: • An area of 2 ha or more of the littoral or sub-littoral zone, or the coastal benthic community, or the benthic community of any fish spawning ground; or • An area of 100 ha or more of the open sea benthic community. Or a count of: • 100 or more dead sea birds (excluding gulls); or • 500 dead sea birds of any species; or • Five dead or significantly injured/impaired sea mammals of any species.

20.8 MITIGATION MEASURES

1076. Embedded mitigation measures will be considered as part of the design process to reduce the vulnerability of the WDA to major accidents and disasters. These measures described in **Table 20.3** will evolve as the WDA EIAR progresses, in response to consultation, and in compliance with other regulatory requirements and good practice.

Table 20.3 Indicative embedded mitigation measures

ID	Parameter	Description of Mitigation Measure
Project Specific Risks		
M-3	Pollution from Ships	Compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 and adherence to the “OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic”.
M-9	Invasive Non-Native Species	Adherence to the International Convention for the Control and Management of Ships’ Ballast Water and Sediments (BWM) Convention (2004) which provides global regulations to control the transfer of potentially invasive species.

ID	Parameter	Description of Mitigation Measure
M-10	Unexploded Ordnance	Development of an Unexploded Ordnance (UXO) Threat and Risk Assessment.
M-11	Hierarchy of Unexploded Ordnance Clearance Methods	The current hierarchy of UXO clearance techniques, in order of preference, are: • Avoid (through micro-siting); • Move UXO without clearing it (if safe to do so); • Remove the UXO to an onshore facility without clearing it (if safe to do so); • Low-order clearance if above options not practicable; and • High-order clearance, if low-order clearance not possible, or in the unlikely event that low-order deflagration was unsuccessful.
M-18	Navigational Safety Plan	Development of, and adherence to, a Navigational Safety Plan (NSP). This plan will describe measures put in place related to navigational safety, including information on safety zones, charting, construction buoyage, temporary lighting and marking, and means of notification of activities associated with the Windfarm Development Area (WDA) to other sea users.
M-19	Notice to Mariners	Advanced warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher webpage. All notices will be uploaded to the Project website.
M-20	Lighting and Marking Plan	Development of, and adherence to, a Lighting and Marking Plan (LMP). This plan will set out the marine and aviation navigational lighting and marking measures to be applied during the construction and operation of the WDA. Aviation lighting and marking, as described in the LMP, will be installed in accordance with Article 223 of the United Kingdom (UK) Air Navigation Order 2016 which sets out the mandatory requirements to be followed for lighting of offshore Wind Turbine Generators (WTGs).
M-23	Safety Zones	Application for and use of Safety Zones of up to 500 m during construction, major repairs and decommissioning phases.
M-24	Dropped objects	Dropped objects on the seabed during works associated with the WDA which may pose a hazard will be reported in line with Marine Directorate - Licensing Operations Team (MD-LOT) procedures. Objects will be recovered where they pose a hazard to other marine users and where recovery is possible.
M-25	Marking	All WDA infrastructure will be appropriately marked on the United Kingdom Hydrographic Office Admiralty Charts.
M-26	Search and Rescue	Development of a Search and Rescue (SAR) Checklist in consultation with the Maritime and Coastguard Agency to ensure compliance with Marine Guidance Note 654 and its annexes. This will be completed post consent.
M-27	Emergency Response and Cooperation Plan	Development of, and adherence to, an Emergency Response and Cooperation Plan (ERCoP). This plan ensures co-operation with the Maritime and Coastguard Agency (MCA) by detailing the design parameters of the WDA, emergency contact details, and processes to be followed.
M-28	Guard Vessels	Where appropriate, guard vessels will be used to ensure adherence with Safety Zones (M-23) or advisory passing distances.
M-29	Marine Coordination Centre	Marine coordination centre will be implemented to manage project vessels throughout construction, Operation and Maintenance (O&M) and decommissioning.
M-30	Blade Tip Clearance / Air Gap	Blade tip clearance height / Air Gap of at least 22 m above mean high water springs as required by Marine Guidance Note 654.

ID	Parameter	Description of Mitigation Measure
M-31	Vessel Marine Regulations	Compliance of all Project vessels with international Marine Regulations as adopted by the Flag State, notably Convention on International Regulations for Preventing Collisions at Sea (COLREGs) IMO, 1972/77) and International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974).
M-33	Aeronautical Navigational Marking	Appropriate marking of the WDA on aeronautical charts. This will include provision of the positions and heights of structures to the Civil Aviation Authority, Ministry of Defence and Defence Geographics Centre.
M-34	Development Specification and Layout Plan	Development of, and adherence to, a Development Specification and Layout Plan. The layout of the WTGs will be finalised post consent. Consultation with the MCA and Northern Lighthouse Board (NLB) will be undertaken to ensure that the specific WTG layout is compatible with potential SAR activity (M-26).
M-35	Failures of Lighting and Marking	Failures of the lighting and marking in the WDA will be appropriately reported and rectified as soon as practicable. Interim hazard warnings (i.e. Notice to Mariners (M-19)) will be put in place as required.
M-36	Site Navigation Marking	Marking and lighting of the site following consultation with NLB and in line with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guidance G1162 (IALA, 2021) including a buoyed construction area.
M-46	Decommissioning Programme	Development and adherence to a Decommissioning Programme. This programme will identify all the items of equipment, infrastructure and materials that have been installed or drilled and describes the decommissioning solution for each whilst considering the potential environmental effects of each method alongside appropriate mitigation techniques that can be implemented.

1077. All embedded mitigation for this chapter is summarised in **Appendix A Mitigation Register**. Impacts related to major accidents and disasters will be assessed with this mitigation in place.

20.9 SCOPING OF POTENTIAL IMPACTS

1078. A range of potential hazards and risk types may occur during the construction, operation and maintenance and decommissioning phases of the WDA. This section identifies low likelihood, high consequence events with the potential to occur in the WDA that may be determined to constitute a major accident or disaster.

1079. A long list of potential hazards and risks is described in **Table 20.4** where a justification is provided for whether they are scoped in or out of further assessment in the EIA. These may be refined through consultation activities and as additional project information, and site-specific data become available.

Table 20.4 Potential hazards /risk types scoped in or out for major accidents and disasters

Potential Hazard / Risk Type	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Project Specific Hazards				
Exposed cables leading to vessel snagging	✓	✓	✘	Receptors include: Population and human health, biodiversity, material assets. There is a risk of loss of life and damage to Project infrastructure and other marine users from this hazard. Therefore, the potential for exposed cable leading to vessel snagging has been **scoped into** the Environmental Impact Assessment (EIA), for the construction and Operation and Maintenance (O&M) phase.
Seabed conditions affecting foundations	✘	✘	✘	Pre-construction surveys will ensure that foundations are secure. Therefore, the potential for seabed conditions to affect foundations has been **scoped out** of the EIA, for all phases.
Vessel interactions (e.g. collision, allision)	✓	✓	✓	Receptors include: Population and human health, biodiversity, material assets. There is a risk of loss of life and damage to Project infrastructure and other marine users from this hazard. Therefore, the potential for vessel interactions has been **scoped into** the EIA, for all phases.
Aviation collision	✓	✓	✓	Receptors include: Population and human health, biodiversity, material assets. There is a risk of loss of life and damage to Project infrastructure and other marine/land users from this hazard. Therefore, the potential for aviation collision has been **scoped into** the EIA, for all phases.

Potential Hazard / Risk Type	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Accidental spills of hazardous material	✘	✘	✘	Receptors include: Population and human health, biodiversity, air quality, water quality, material assets and land. Accidental spills and pollution events can occur from vessels and installation techniques required for the installation and operation of the WDA. As discussed in **Section 8.8**, all vessels must comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78. A Project Environmental Management Plan (PEMP) inclusive of a Marine Pollution Contingency Plan (MPCP), which will be in accordance with an Outline PEMP to be submitted with the Section 36 Application will be implemented so that all works during all phases are undertaken in line with good practice for working in the marine environment which will reduce the risk of spills and pollution events. As a result of the embedded mitigation measures that will be secured through the outline PEMP, it is considered that the risk of a spill occurring is low and with the appropriate management measures in place, should a spill occur, the risk to the marine environment is effectively mitigated. Therefore, potential impacts and effects on accidental spills and pollution events has been **scoped out** of the EIA, for all phases.
Disturbance of Unexploded Ordnance (UXO) in Project area	✓	✓	✓	Receptors include; Population and human health, biodiversity, material assets. There is a risk of loss of life and damage to Project infrastructure and other marine/land users from this hazard. Therefore, the potential for disturbance of UXO in the Project area has been **scoped into** the EIA, for all phases.
Workplace accident	✓	✓	✓	Receptors include; Population and human health, biodiversity, material assets and land. There is a risk of loss of life and damage to Project infrastructure and other marine/land users from this hazard. Therefore, the potential for workplace accidents has been **scoped into** the EIA, for all phases.
Societal Risks				
Industrial action	✘	✘	✘	The Project is no more vulnerable to this type of hazard than any other development. Therefore, the potential for industrial action has been **scoped out** of the EIA, for all phases.
Widespread public disorder	✘	✘	✘	The Project is no more vulnerable to this type of hazard than any other development. Therefore, the potential for widespread public disorder has been **scoped out** of the EIA, for all phases.

Potential Hazard / Risk Type	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Major Accidents				
Widespread electricity failures	✘	✘	✘	Events would have negligible consequence on the WDA. Therefore, the potential for widespread electricity failures has been **scoped out** of the EIA, for all phases.
Major transport accidents	✘	✘	✘	Vessel interactions (e.g. collision and allision) are scoped in under Project Specific Hazards, so it is considered major transport accidents have been adequately covered above. Therefore, the potential for other major transport accidents has been **scoped out** of the EIA, for all phases.
System failures	✘	✘	✘	Events would have negligible consequence on the WDA. Therefore, the potential for system failures has been **scoped out** of the EIA, for all phases.
Commercial failures	✘	✘	✘	Events would have negligible consequence on the WDA. Therefore, the potential for commercial failures has been **scoped out** of the EIA, for all phases.
Systematic financial crisis	✘	✘	✘	Events would have negligible consequence on the WDA. Therefore, the potential for systematic financial crisis has been **scoped out** of the EIA, for all phases.
Major fires	✘	✘	✘	Given that Offshore Substation Platforms (OSPs) are beyond the scope of this report. Therefore, the potential for major fires has been **scoped out** of the EIA, for all phases.
Human and Animal Health				
Pandemics	✘	✘	✘	Event would not affect the WDA. Therefore, the potential for pandemics has been **scoped out** of the EIA, for all phases.
High consequence infectious disease outbreaks	✘	✘	✘	Event would not affect the WDA. Therefore, the potential for high consequence infectious disease outbreaks has been **scoped out** of the EIA, for all phases.
Antimicrobial resistance	✘	✘	✘	Event would not affect the WDA. Therefore, the potential for antimicrobial resistance has been **scoped out** of the EIA, for all phases.
Animal disease	✘	✘	✘	Event would not affect the WDA. Therefore, the potential for animal disease has been **scoped out** of the EIA, for all phases.

Potential Hazard / Risk Type	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Environmental Hazards[20]				
Storms	✗	✗	✗	Damage to infrastructure from severe weather is unlikely to result in hazards with significant risk. In cases where infrastructure is damaged and turbine blades are lost to sea, this is considered unlikely to cause injury as the WDA will be unmanned (and maintenance would not occur in extreme weather). Therefore, the potential for storms has been **scoped out** of the EIA, for all phases.
Low temperature	✗	✗	✗	The design of infrastructure will consider the likely range of temperatures within which it will be operated, however extremes of temperature would affect operational efficiency rather than structural integrity. Therefore, the potential for low temperature and heatwaves has been **scoped out** of the EIA, for all phases.
Heatwaves	✗	✗	✗	
Droughts	✗	✗	✗	Events would not affect the WDA. Therefore, the potential for droughts has been **scoped out** of the EIA, for all phases.
Severe space weather	✗	✗	✗	The WDA is no more vulnerable to this type of hazard than any other developments. Therefore, the potential for severe space weather has been **scoped out** of the EIA, for all phases.
Poor air quality	✗	✗	✗	Events would not affect the WDA. Therefore, the potential for poor air quality has been **scoped out** of the EIA, for all phases.
Earthquakes/seismic activity	✗	✗	✗	The design of infrastructure will consider likely range of seismic activity for its location. Earthquakes in the United Kingdom (UK) are rare, and an earthquake powerful enough to inflict severe damage is unlikely. Therefore, the potential for earthquakes/seismic activity has been **scoped out** of the EIA, for all phases.
Environmental disasters overseas	✗	✗	✗	Events would not affect the WDA. Therefore, the potential for environmental disasters overseas has been **scoped out** of the EIA, for all phases.
Serious and Organised Crime				
Serious and organised crime – vulnerabilities	✗	✗	✗	The WDA is no more vulnerable to this type of hazard than any other development. Therefore, the potential for serious and organised crime (vulnerabilities) has been **scoped out** of the WDA EIAR, for all phases.

[20] Coastal flooding, coastal erosion, river flooding, surface water flooding and wildfires are potential hazards / risk types which have not been considered further due to the nature of the WDA activities.

Potential Hazard / Risk Type	Phase* Scoped in (✓) / out (x)			Justification
	C	O&M	D	
Serious and organised crime – prosperity	✘	✘	✘	The WDA is no more vulnerable to this type of hazard than any other development. Therefore, the potential for serious and organised crime (prosperity) has been **scoped out** of the WDA EIAR, for all phases.
Serious and organised crime – commodities	✘	✘	✘	The WDA is no more vulnerable to this type of hazard than any other development. Therefore, the potential for serious and organised crime (commodities) has been **scoped out** of the WDA EIAR, for all phases.
Malicious Attacks				
Attacks on infrastructure	✘	✘	✘	The WDA is no more vulnerable to this type of hazard than any other development. Therefore, the potential for attacks on infrastructure has been **scoped out** of the WDA EIAR, for all phases.
Attacks on transport	✘	✘	✘	The WDA is no more vulnerable to this type of hazard than any other development. Therefore, the potential for attacks on transport has been **scoped out** of WDA EIAR, for all phases.
Cyber-attacks	✘	✘	✘	The WDA is no more vulnerable to this type of hazard than any other development. Therefore, the potential for cyber-attacks has been **scoped out** of the WDA EIAR, for all phases.
Chemical, Biological or Radiological and Nuclear attacks	✘	✘	✘	The WDA is no more vulnerable to this type of hazard than any other development, therefore the potential for chemical, biological or radiological and nuclear attacks has been **scoped out** of the WDA EIAR, for all phases.
Undermining the democratic process	✘	✘	✘	The WDA is no more vulnerable to this type of hazard than any other development. Therefore, the potential for undermining the democratic process has been **scoped out** of the WDA EIAR, for all phases.
*C, O&M, D = Construction, Operation and Maintenance and Decommissioning, respectively.				

1080. Hazards from the longlist in **Table 20.4** considered for further assessment are:

- Project Specific Hazards:
  - Exposed cables leading to vessel snagging;
  - Vessel interactions (e.g. collision, allision);
  - Aviation collision;
  - Disturbance of Unexploded Ordnance (UXO); and
  - Workplace accident.

1081. Several of the hazards identified above are already considered in the relevant chapters of this Scoping Report and will be taken forward to the EIA. It is proposed that these relevant chapters (as listed below) are used to inform a summary of the risk evaluation and determination of whether the risk has been mitigated to ALARP. This summary will be provided in the EIAR major accidents and disasters chapter:

- **Chapter 8 Benthic Ecology**;
- **Chapter 13 Shipping and Navigation**;
- **Chapter 15 Military and Civil Aviation**; and
- **Chapter 10 Marine Mammals**.

20.10 POTENTIAL CUMULATIVE EFFECTS

1082. There may be potential for cumulative impacts to occur on major accident and disaster receptors due to works associated with other projects/plans and activities. The approach to assessment of potential cumulative impacts is set out in **Chapter 4 Approach to Scoping and EIA**.

1083. Offshore wind projects and other activities relevant to the assessment of cumulative effects on the Project's vulnerability to major accidents and disasters will be identified through a screening exercise. The potential effects considered in the Cumulative Effects Assessment (CEA) will be in line with those described for the projects combined appraisal, although it is possible that some will be screened out on the basis that the potential impacts are highly localised or the risk of effects occurring is reduced, given management measures will be in place for the Project and other plans and projects.

20.11 POTENTIAL TRANSBOUNDARY IMPACTS

1084. There are no major accidents and disaster receptors associated with European Economic Area states within Study Area. Therefore, impacts on transboundary receptors, and transboundary effects are **scoped out** from further consideration in the EIA.

20.12 APPROACH TO IMPACT ASSESSMENT

1085. Whilst there is no standard methodology for the assessment of major accidents and disasters within EIA, IEMA have prepared 'Major Accidents and Disasters in EIA: A Primer' (IEMA, 2020) which provides guidance on a risk-based approach. The EIA will assess the likelihood of the significant threat or hazard occurring, and the mitigation embedded to ensure a risk is ALARP (or avoided completely). The risks will be identified in respect of the potential vulnerability of the project to disaster risks, and the potential of the WDA to cause major accidents and disasters.

1086. The following approach will be undertaken during the risk assessment (Steps 1 and 2 have been carried out as part of this scoping exercise (**Section 20.9**)). The EIA will present Steps 3 and 4:

- **Step 1**: Identify hazards in a long list of possible major accidents and events. Major accidents with little relevance to the WDA will not be included (e.g., volcanic eruptions). Sources will include the UK Government National Risk Register – 2020 edition and further relevant sources. This step will also involve identification of the receptors in the existing environment.

- **Step 2**: Screening exercise to determine which risks are relevant to the WDA and require further assessment.
- **Step 3**: Risk evaluation - definition of the potential impacts that may occur from the risks and classification of the likelihood that the events may occur. Identification and evaluation of prevention, minimisation and mitigation measures.
- **Step 4**: Determination of whether the risk has been mitigated to ALARP and the identification of any residual risk, and the consequences upon the receptors in the event of a major accident or disaster.

1087. Where a pathway or linkage is established, an assessment will be carried out to determine whether embedded design measures or legal requirements, codes and standards adequately control the potential for major accidents and disasters. Reference will be made to other technical chapters of the EIAR as appropriate where further studies have been carried out.

20.13 SCOPING QUESTIONS TO CONSULTEES

1088. The following questions are posed to consultees to help frame and focus their response to the major accidents and disasters chapter which will in turn inform the Scoping Opinion:

- Do you agree with the scope proposed for the major accidents and disasters chapter of the WDA EIAR?
- Is there any further guidance and policy which you would recommend is included?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of major accidents and disasters receptors?
- Have all the potential impacts on major accidents and disasters been identified in this Scoping Report?
- Do you agree with the hazards and risks that have been scoped in or scoped out for further assessment in the EIA?
- Do you have any other matters or information sources that you wish to be presented in the EIAR?
- Do you agree with the proposed approach to setting out the major accidents and disasters in the WDA EIAR?

20.14 REFERENCES

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21 SUMMARY OF SCOPING REPORT

1089. Within this Scoping Report, the potential environmental impacts from the Windfarm Development Area (WDA) have been considered. **Table 21.1** provides a summary of the technical chapters and potential impacts that are proposed to be scoped in and scoped out of the WDA Environmental Impact Assessment (EIA).

1090. Impacts are proposed to be scoped out of the EIA where there are no likely significant effects (LSE), or where no effect-receptor pathways have been identified.

Table 21.1 Summary of potential impacts for each technical chapter

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
Chapter 6 Marine Physical Environment	Impacts on mixing and stratification.	✗	✗	✗
	Impacts on seabed morphology due to vessel indentations.	✗	✗	✗
	Impacts on water quality through the release of contaminants from suspended sediments.	✗	✗	✗
	Impacts to water and sediment quality through pollution events.	✗	✗	✗
	Impacts on Suspended Sediment Concentrations (SSCs) and transport.	✓	✓	✓
	Impacts on seabed morphology and bedload sediment transport.	✓	✓	✓
	Impacts on bedload sediment transport.	✓	✓	✓
	Impacts on waves and tidal currents.	✗	✓	✗
Chapter 7 Offshore Air Quality	Impacts of emissions from vessels.	✗	✗	✗
Chapter 8 Benthic Ecology	Accidental spills and pollution events.	✗	✗	✗
	Remobilisation of contaminated sediment during intrusive works.	✗	✗	✗
	Potential effects on designated sites.	✗	✗	✗
	Disturbance from noise and vibration.	✗	✗	✗
	Temporary Physical Disturbance / Habitat Loss.	✓	✓	✓
	Increased SSCs and sediment re-deposition.	✓	✓	✓
	Introduction of marine Invasive Non-Native Species (INNS).	✓	✓	✓

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Permanent habitat loss.	✗	✓	✓
	Interactions with Electromagnetic Fields (EMF).	✗	✓	✗
	Colonisation of introduced hard substrate.	✗	✓	✓
Chapter 9 Fish (Including Basking Sharks) and Shellfish Ecology	Remobilisation of contaminated sediment.	✗	✗	✗
	Accidental release of pollutants.	✗	✗	✗
	Temporary physical disturbance / habitat loss.	✓	✓	✓
	Increased SSCs and sediment redeposition.	✓	✓	✓
	Underwater noise and vibration.	✓	✓	✓
	Disturbance and displacement of basking shark.	✓	✓	✓
	Vessel collision for basking shark.	✓	✓	✓
	Permanent habitat loss.	✗	✓	✓
	EMF.	✗	✓	✗
	Introduction of hard substrate.	✗	✓	✗
	INNS.	✓	✓	✓
	Changes in fishing activity.	✓	✓	✓
Chapter 10 Marine Mammals	Changes to water quality.	✗	✗	✗

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Barrier effects from the presence of the WDA infrastructure during operation.	✗	✗	✗
	Direct effects from EMF.	N/A	✗	N/A
	Underwater noise during Unexploded Ordnance (UXO) clearance: auditory injury.	✓	✗	✗
	Underwater noise during UXO clearance: behavioural impacts.	✓	✗	✗
	Underwater noise during piling: auditory injury.	✓	✗	✗
	Underwater noise during piling: behavioural impacts.	✓	✗	✗
	Underwater noise from operational turbines: auditory injury.	✗	✓	✗
	Underwater noise from operational turbines: behavioural impacts.	✗	✓	✗
	Underwater noise associated with other construction and maintenance activities: auditory injury.	✓	✓	✓
	Underwater noise associated with other construction and operation and maintenance (O&M) activities: behavioural impacts.	✓	✓	✓
	Underwater noise due to the presence of vessels: auditory injury.	✓	✓	✓
	Underwater noise due to the presence of vessels: behavioural impacts.	✓	✓	✓
	Barrier effects due to underwater noise.	✓	✓	✓
	Vessel interaction (increase in risk of collision).	✓	✓	✓
	Disturbance at seal haul-out sites.	✓	✓	✓
	Changes to prey resources.	✓	✓	✓

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
Chapter 11 Offshore Ornithology	Collisions with operational Wind Turbine Generators (WTGs).	✗	✓	✗
	Displacement from the physical presence of WDA infrastructure.	✗	✓	✗
	Barrier effects from the physical presence of WDA infrastructure.	✗	✓	✗
	Temporary disturbance and displacement.	✓	✓	✓
	Indirect effects on marine bird species prey and their habitats.	✓	✓	✓
Chapter 12 Commercial Fisheries	Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the WDA.	✗	✗	✗
	Reduction in access to, or exclusion from established fishing grounds.	✓	✓	✓
	Displacement of fishing activity leading to gear conflict and increased fishing pressure on adjacent grounds.	✓	✓	✓
	Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity.	✓	✓	✓
	Increased vessel traffic associated with the WDA within fishing grounds leading to interference with fishing activity.	✓	✓	✓
	Physical presence of infrastructure and potential exposure of that infrastructure leading to gear snagging.	✓	✓	✓
Chapter 13 Shipping and Navigation	Displacement of vessels leading to increased collision risk between third-party vessels.	✓	✓	✓
	Increased vessel-to-vessel collision risk between a third-party vessel and project vessel.	✓	✓	✓
	Increased vessel to structure allision risk (powered).	✓	✓	✓
	Increased vessel to structure allision risk (drifting).	✓	✓	✓
	Reduced access to local ports, harbours and marinas.	✓	✓	✓

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Reduction of Search and Rescue (SAR) capability.	✓	✓	✓
	Reduction of under keel clearance (leading to allision/displacement).	✓	✓	✓
	Increased anchor interaction with subsea infrastructure.	✓	✓	✓
	Interference with marine navigation, communications, and position-fixing equipment.	✓	✓	✓
Chapter 14 Offshore Archaeology and Cultural Heritage	Direct impacts to heritage assets.	✓	✓	✓
	Indirect impacts to heritage assets associated with changes to marine physical processes.	✓	✓	✓
	Change to the setting of heritage assets.	✓	✓	✓
Chapter 15 Military and Civil Aviation	Impact on military Air Traffic Control (ATC) and Air Defence (AD) radars.	✗	✗	✗
	Impact on civil and military Secondary Surveillance Radar (SSR) systems.	✗	✗	✗
	Impact on weather radars.	✗	✗	✗
	Creation of an aviation obstacle environment.	✓	✓	✓
	Increased air traffic in the area related to WDA activities.	✓	✓	✓
	Impact on civil PSR systems.	✗	✓	✗
Chapter 16 Seascape, Landscape and Visual Impacts	Presence of temporary offshore construction activity, including vessel movements, cranes and lighting in the offshore seascape and in views (scoped in for coastal and onshore landscape character (including special qualities of designated landscapes), offshore visual and onshore and nearshore visual receptors).	✗	✓	✗
	Longer-term presence of WTGs in the seascape and in views (scoped in for coastal and onshore landscape character (including special qualities of designated landscapes), offshore visual and onshore and inshore receptors).	✗	✓	✗

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Presence of decommissioning activity within the seascape and in views (scoped in for coastal and onshore landscape character (including special qualities of designated landscapes, offshore visual and onshore and inshore visual receptors).	✗	✗	✓
Chapter 17 Infrastructure and other Marine Users	Impacts on other Offshore Windfarm (OWF) developments.	✗	✗	✗
	Impacts on subsea cables.	✗	✗	✗
	Impacts on wave and tidal sites.	✗	✗	✗
	Impacts on aquaculture sites.	✗	✗	✗
	Impacts on offshore oil and gas operations.	✗	✗	✗
	Impacts on carbon capture and storage sites.	✗	✗	✗
	Impacts on dredging and disposal sites.	✗	✗	✗
	Impacts on marine aggregates and mining site.	✗	✗	✗
	Impacts on Ministry of Defence (MoD) maritime navigational interests.	✓	✓	✓
	Impacts on recreational charter angling and wildlife tours.	✓	✓	✓
Chapter 18 Socio-economics	Increase in employment and Gross Value Added (GVA).	✓	✓	✓
	Changes to housing.	✓	✓	✓
	Changes to labour market.	✓	✓	✓
	Impacts on communities.	✓	✓	✓

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Changes to infrastructure and other local services.	✓	✓	✓
	Impacts on habitability.	✓	✓	✓
	Interconnecting influence on other places.	✓	✓	✓
	Socio-cultural effects.	✓	✓	✓
	Changes to tourism.	✓	✓	✓
	Changes to commercial fisheries.	✓	✓	✓
	Changes to shipping and marine recreation.	✓	✓	✓
	Impact on whisky sector.	✓	✓	✓
	Cumulative impacts.	✓	✓	✗
	Transboundary impacts.	✓	✓	✗
Chapter 19 Climate Change	Greenhouse Gas Assessment.			
	Operational energy use.	✗	✗	✗
	Operational water use.	✗	✗	✗
	Other operational processes.	✗	✗	✗
	User's emissions.	✗	✗	✗
	Avoided emission.	✓	✓	✓
	Design and engineering pre-construction emissions.	✓	✗	✗

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Embodied carbon in construction materials.	✓	✗	✗
	Construction transport fuel and energy consumption.	✓	✗	✗
	Construction activities fuel and energy consumption.	✓	✗	✗
	Habitat disturbance/loss.	✗	✓	✗
	Operational fuel and energy consumption.	✗	✓	✗
	Decommissioning activities.	✗	✗	✓
	Climate Change Risk Assessment.			
	Ocean acidification.	✗	✗	✗
	Extreme precipitation (e.g. rain, snow, hail, fog).	✓	✓	✓
	Storm and wind (e.g. gales, storm surge, thunderstorms).	✓	✓	✓
	Extreme temperatures (e.g. cold and heat waves).	✓	✓	✓
	Changes in marine climate and extreme weather events.	✓	✓	✓
	Sea level rise.	✓	✓	✓
	Changes in sea conditions (e.g. wave and currents, salinity).	✓	✓	✓
Chapter 20 Major Accidents and Disasters	Exposed cables leading to vessel snagging.	✓	✓	✗
	Seabed conditions affecting foundations.	✗	✗	✗

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Vessel interactions (e.g. collision, allision).	✓	✓	✓
	Aviation collision.	✓	✓	✓
	Accidental spills of hazardous material.	✗	✗	✗
	Disturbance of Unexploded Ordnance (UXO) in Project area.	✓	✓	✓
	Workplace accident.	✓	✓	✓
	Industrial action.	✗	✗	✗
	Widespread public disorder.	✗	✗	✗
	Widespread electricity failures.	✗	✗	✗
	Major transport accidents.	✗	✗	✗
	System failures.	✗	✗	✗
	Commercial failures.	✗	✗	✗
	Systematic financial crisis.	✗	✗	✗
	Major fires.	✗	✗	✗
	Pandemics.	✗	✗	✗
	High consequence infectious disease outbreaks.	✗	✗	✗

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Antimicrobial resistance.	✗	✗	✗
	Animal disease.	✗	✗	✗
	Storms.	✗	✗	✗
	Low temperature.	✗	✗	✗
	Heatwaves.	✗	✗	✗
	Droughts.	✗	✗	✗
	Severe space weather.	✗	✗	✗
	Poor air quality.	✗	✗	✗
	Earthquakes/seismic activity.	✗	✗	✗
	Environmental disasters overseas.	✗	✗	✗
	Serious and organised crime – vulnerabilities.	✗	✗	✗
	Serious and organised crime – prosperity.	✗	✗	✗
	Serious and organised crime – commodities.	✗	✗	✗
	Attacks on infrastructure.	✗	✗	✗
	Attacks on transport.	✗	✗	✗

Technical Chapter	Potential Impacts	Phase* Scoped In (✓) / Scoped Out (x)		
		C	O&M	D
	Cyber-attacks.	✘	✘	✘
	Chemical, Biological or Radiological and Nuclear attacks.	✘	✘	✘
	Undermining the democratic process.	✘	✘	✘


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