North Celtic Sea
Positive Energy for a Sustainable Future

North Celtic Sea Offshore Wind Project

Environmental Impact Assessment (EIA) Scoping Report

May 2023

RPS MAKING COMPLEX EASY

energia Renewables

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
A1 C01	Final	Various	AE / CW / CB/ SPD/NON	CB	10/05/2023
Approval for issue					
CB				10 May 2023	

Prepared by:

RPS

Prepared for:

North Celtic Sea Wind Limited

Dublin | Cork | Galway | Sligo
rpsgroup.com

RPS Group Limited, registered in Ireland No. 91911
RPS Consulting Engineers Limited, registered in Ireland No. 161581
RPS Planning & Environment Limited, registered in Ireland No. 160191
RPS Engineering Services Limited, registered in Ireland No. 99795
The Registered office of each of the above companies is West Pier Business Campus, Dun Laoghaire, Co. Dublin, A96 N6T7

CONTENTS

Tables

Figures

Appendices

Definitions

Term	Meaning
Bathymetry	The measurement of water depth in oceans, seas and lakes.
Benthic ecology	The study of the organisms living in and on the sea floor, the interactions between them and impacts on the surrounding environment.
Biotope	The combination of physical environment (habitat) and its distinctive assemblage of conspicuous species.
Circalittoral	The subzone of the rocky sublittoral below that dominated by algae (i.e. the infralittoral) and dominated by animals.
Cumulative impacts	'The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects' (EPA, 2022a).
Project Design	The Project Design routinely utilised for both onshore and offshore planning applications will allow for some flexibility to be considered by the planning authority in certain design options, particularly offshore, and more particularly for foundations and turbine type, where the full details of the project are not known at application submission but where sufficient detail is available to enable the assessment of potential environmental impacts to be appropriately considered during the EIA.
Designated landscape	Areas of landscape identified as being of importance at international, national or local levels, either defined by statute or identified in local development plans.
"Do-nothing" scenario	The environment as it would be in the future should the proposed Project not be developed.
"Do-something" scenario	The environment should the proposed Project be developed.
EirGrid	State-owned electric power transmission operator in Ireland.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an EIA Report.
Foreshore	The area of the land and seabed between the high-water mark (HWM) of ordinary or medium tides and the 12 nautical mile (nm) limit.
FPOD	Type of cetacean acoustic monitoring device manufactured by Chelonia Limited.
Indirect impact	'Impacts on the environment, which are not a direct result of the project, often produced away from (the site) or as a result of a complex pathway' (EPA, 2022a).
Infralittoral	The region of shallow water closest to the shore; in marine environments, usually excluding the intertidal zone.
Intertidal	The area of a seashore that is covered at high tide and uncovered at low tide.

Term	Meaning
Inter-array cables	Submarine cables linking the Wind Turbine Generators (WTGs) to the Offshore Substations (OSS(s)).
Land use	The use and management of the natural, semi-natural and built environment.
Landfall location	The landfall location is the area between the HWM and the start of onshore cabling and will contain the transition joint bay (TJB), link boxes and fibre-optic communication chamber. A construction compound will also be temporarily sited at this location.
Magnitude	The magnitude can be defined as the severity of the potential impact. It indicates whether such an impact is irreversible or reversible.
Maritime spatial planning	'A process by which the relevant Member State's authorities analyse and organise human activities in marine areas to achieve ecological, economic and social objectives" (Directive 2014/89/EU).
Mitigation measure	Measures designed to avoid, prevent or reduce impacts. Mitigation by avoidance: When no impact is caused (often through consideration of alternatives). Mitigation by prevention: When a potential impact is prevented by a measure to avoid the possibility of the impact occurring. Mitigation by reduction: When an impact is lessened.
Offshore export cables	Submarine cable(s) linking the Offshore Substations (OSS(s)) to onshore transition joint bay (TJB) located in landfall location(s).
Offshore substation (OSS)	An integral part of the electrical infrastructure which is used to switch generators, equipment, and circuits or lines in and out of a system. It also is used to change alternating current voltages from one level to another, and/or change alternating current to direct current.
Onshore cables (including joint bays)	Cable(s) linking the offshore cable(s) to the Onshore Substation (OnSS).
Onshore substation (OnSS)	Point at which the electricity generated is fed into the National Grid in a suitable manner.
Operation and maintenance (O&M) facility	A facility from which the offshore development is operated. The facility is also used for maintenance purposes for the whole development.
Qualifying Interest (QI)	QI are the Annex I habitats or Annex II species for which a Special Area of Conservation (SAC) has been designated under the Habitats Directive, or the qualifying bird species for which a Special Area of Conservation (SPA) has been designated.
Sensitive receptor	Physical or natural resource, special interest or viewer group that may experience an impact.
Sensitivity	Vulnerability of a sensitive receptor to change.
Significant effect	An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.

Term	Meaning
Special Area of Conservation (SAC)	A designated site under the European Union (EU) Habitats Directive. Under this Directive, Member States of the EU have a duty to designate sites of community importance where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or populations of species for which the site is designated.
Special Protection Area (SPA)	A designated site under the EU Directive on the Conservation of Wild Birds. Under this Directive, Member States of the EU have a duty to safeguard the habitats of migratory birds and threatened birds.
Subtidal	Area extending from below low tide to the edge of the continental shelf.
The Developer	North Celtic Sea Wind Limited.
The Project	North Celtic Sea Offshore Wind Project.
Transition Joint Bay (TJB)	A fully buried concrete chamber located as close to the high-water mark (HWM) as feasible within which the offshore cable is connected to the onshore cables.
Wind turbine generators (WTGs)	Offshore wind generator of electricity.

Acronyms

Acronym	Meaning
AA	Appropriate Assessment
ABP	An Bord Pleanála
AD	*Anno Domini*
ADCP	Acoustic Doppler Current Profiler
AIS	Automatic Identification System (in marine vessels)
AIS	Air Insulated Switchgear (in energy distribution infrastructure)
AoI	Area of Interest
BC	before Christ
BDMPS	Biologically Defined Minimum Population Scales
BERR	Business Enterprise and Regulatory Reform
BIM	Bord Iascaigh Mhara
BP	Before Present
CA	Competent Authority
CAP	Climate Action Plan
CARO	Climate Action Regional Office
CBRA	Cable Burial Risk Assessment
CDP	County Development Plan
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environment Management Plan
CFSR	Climate Forecast System Reanalysis
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CIL	Commissioner of Irish Lights
CJEU	European Court of Justice

Acronym	Meaning
COMAH	Control of Major Accident Hazards Regulations
COWRIE	Collaborative Offshore Wind Research into the Environment
CPT	Cone Penetration Testing
CRM	Collision Risk Modelling
CSO	Central Statistics Office
CTA	Control Area (in Aviation)
CTR	Control Zone (in Aviation)
DAFM	Department of Agriculture, Food and Marine
DCCAE	Department of Communications, Climate Action & Environment
DEFA	Department of Environment, Food and Agriculture (Isle of Man)
DEHLG	Department of the Environment, Heritage and Local Government
DHLGH	Department of Housing, Local Government and Heritage
DHPLG	Department of Housing, Planning and Local Government
DMRB	Design Manual for Roads and Bridges
EBA	European Boating Association
EC	European Commission
ECMWF	European Centre for Medium Range Forecasts
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement (terminology used prior to Environmental Impact Assessment Report)
EMF	Electromagnetic Field
EMODNET	European Marine Observation and Data Network
EPA	Environmental Protection Agency
EQS	Environmental Quality Standards

Acronym	Meaning
ESRI	Economic and Social Research Institute
EU	European Union
EU-IMP	EU Integrated Maritime Policy
EUNIS	European Nature Information System
FIR	Flight Information Region
FLA	Foreshore Licence Area
FLO	Fishery Liaison Officer
FSR	Flood Studies Report
FSU	Flood Studies Update
GBS	Gravity-base Structures
GCB	Green Construction Board
GHG	Greenhouse Gases
GIS	Geographic Information System (in mapping)
GIS	Gas Insulated Switchgear (in energy distribution infrastructure)
GSI	Geological Survey of Ireland
GW	Gigawatt
HDD	Horizontal Directional Drilling
HLE	Healthy Life Expectancy
HWM	High-Water Mark
IAA	Irish Aviation Authority
IALA	International Association of marine aids to navigation and Lighthouse Authorities
IAQM	Institute of Air Quality Management
IAS	Invasive Alien Species
ICES	International Council for the Exploration of the Sea
ICG	Irish Coast Guard
ICNIRP	International Commission on Non-Ionising Radiation Protection

Acronym	Meaning
ICOMOS	International Council on Monuments and Sites
ICPC	International Cable Protection Committee
IEMA	Institute of Environmental Management and Assessment
IFI	Inland Fisheries Ireland
IFPS	Instrument Flight Procedures
IGI	Institute of Geologists of Ireland
IMO	International Maritime Organisation
INFOMAR	Integrated mapping for the sustainable development of Ireland's marine resource
INSS	Irish National Seabed Survey
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
I-VMS	Inshore Vessel Monitoring System
IWDG	Irish Whale and Dolphin Group
I-WEBS	Irish Wetland Bird Survey
JNCC	Joint Nature Conservation Committee
kV	Kilovolt
kT	Kilotonne
LCU	Landscape Character Unit
LU	Lease Undertaking
LWM	Low-Water Mark
MAC	Maritime Area Consent
MarLIN	Marine Life Information Network
MBES	Multibeam Echo-Sounder
MCIB	Marine Casualty Investigation Board
MGN	Marine Guidance Note
MI	Marine Institute

Acronym	Meaning
MJA	Maritime Jurisdiction Act
MMO	Marine Management Organisation
MOW	MetOceanWorks
MPPS	Marine Planning Policy Statement
MSL	Mean Sea Level
MSO	Marine Survey Office
MUHRS	MUltichannel High Resolution Seismic
MW	Megawatt
NBDC	National Biodiversity Data Centre
NCS	North Celtic Sea
NDP	National Development Plan
NEC	National Emissions Ceiling Directive
NECP	National Energy and Climate Plan
NHA	National Heritage Area
NIS	Natura Impact Statement
NM	Nautical Mile
NMBAQC	North East Atlantic Marine Biological Analytical Quality Control
NMFS	National Marine Fisheries Service
NMPF	National Marine Planning Framework
NMS	National Monuments Service
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
NRA	National Road Authority (Roads)
NRA	Navigational Risk Assessment (Offshore)
NRW	Natural Resources Wales
NWCPO	National Waste Collection Permit Office

Acronym	Meaning
O&M	Operation and Maintenance
OnCC	Onshore Compensation Compound
OnSS	Onshore Substation
OPR	Office of the Planning Regulator
OPW	Office of Public Works
ORE	Offshore Renewable Energy
OREDP	Offshore Renewable Energy Development Plan
OREI	Offshore Renewable Energy Installation
ORJIP	Offshore Renewables Joint Industry Partnership
OSI	Ordnance Survey Ireland
OSPAR	Oslo and Paris Conventions
OSS	Offshore Substation
pNHA	Proposed Natural Heritage Area
PPA	Power Purchase Agreement
PVA	Population Viability Analysis
QI	Qualifying Interest
RBMP	River Basin Management Plan
RNA	Rotor Nacelle Assembly
RNLI	Royal National Lifeboat Institution
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SAR	Search And Rescue
SCANS	Small Cetacean Abundance in the North Sea
SCOS	Special Committee On Seals
SEA	Strategic Environmental Assessment
SFPA	Sea Fisheries Protection Authority

Acronym	Meaning
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMRU	Scottish Marine Research Unit
SNH	Scottish Natural Heritage
SO	Standard Output
SPA	Special Protection Area
SPZ	Source Protection Zone
SSS	Side Scan Sonar
STECF	Scientific, Technical and Economic Committee for Fisheries
SUDS	Sustainable Drainage System
TAV	Till derived from Acidic Volcanic rocks
TBI	Till derived from Basic Igneous rocks
TII	Transport Infrastructure Ireland
TJB	Transition Joint Bay
TLPS	Till derived from Lower Palaeozoic Shales
TP	Transition Piece
TSO	Transmission System Operator
TSS	Traffic Separation Scheme
UAA	Utilisable Agricultural Area
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
VMS	Vessel Monitoring System
WFD	Water Framework Directive

Acronym	Meaning
WHO	World Health Organisation
WTG	Wind Turbine Generator
ZTV	Zone of Theoretical Visibility

1 Introduction

RPS has been appointed by North Celtic Sea Wind Limited., part of Energia Group, to provide planning and environmental services in relation to the North Celtic Sea (NCS) Offshore Wind Project (hereafter referred to as the Project). This document has been prepared to inform the environmental impact assessment (EIA) informal scoping consultation for the onshore and offshore elements of the Project prior to the preparation of the EIA report (EIAR). As such this document provides the following, as per the 2017 European Commission (EC) guidance on scoping (EC, 2017a):

- Background and need for the Project;
- Project Description;
- Planning Policy and Legislative Context;
- EIA Scoping Process and Guidelines;
- EIAR structure and content;
- Key environmental issues and proposed scope of the EIAR; and
- Informal Scoping Consultation.

It should be noted that there are a number of illustrative graphics used in this report, it should be further noted that these graphics will change, as they are purely illustrative for the purposes of this EIA Scoping Report. Finalised graphics / images will be provided with the planning application which will be available for public scrutiny during the statutory consultation period for the planning application.

1.1 Background to the Project

Energia Group is a leading integrated Irish energy business with substantial operations in both the ROI and Northern Ireland. The Group primarily operates across three business units: Renewables, Flexible Generation, and Customer Solutions. With offices in Dublin, Galway, Cork, Belfast, Antrim, and Omagh, Energia Group supplies almost 21% of the island of Ireland's total electricity requirements and 25% of the island's total wind power meeting the energy needs of 800,000 homes and businesses with competitive electricity and gas services provided through its two retail brands Energia and Power NI. The Group supplies close to 1.3 Gigawatts of green power to the market, including power from 15 owned and invested wind farms on the island and also operates two major gas-fired power stations in north County Dublin. Energia Group employs over 1,000 people and is one of only 45 companies to have achieved the Business Working Responsibly mark from Business in the Community, the leading independently audited standard for corporate sustainability reporting (CSR) and Sustainability in Ireland._Energia Renewables, part of Energia Group, focus on renewable technology and has considerable experience in developing, constructing and operating renewables assets and is currently developing offshore wind, onshore wind, solar, hydrogen production and battery storage projects.

RPS is a leading global professional services firm of 5,000 consultants and service providers who specialise in defining, designing and managing projects across a wide range of disciplines. Operating in 125 countries across six continents, RPS is a leading provider of professional services to the offshore wind industry, delivering across the asset lifecycle. RPS has a deep experience in the delivery of onshore and offshore energy projects in Ireland and globally. RPS has recent provided environmental consultancy support on several offshore wind farm projects in the United Kingdom (UK) including Hornsea Projects One, Two and Three and East Anglia ONE.

A process which considered the suitability and feasibility of various locations along the east and south east coasts of Ireland was undertaken, which considered water depth, available area, distance from shore, seabed strata, ecological constraints, conservation sites, access to grid, port facilities, navigational channels, existing infrastructure and existing foreshore leases (and lease applications). On the basis of this process a preferred location was identified for further consideration off the Waterford coast.

Following on from the aforementioned process a Foreshore Licence application for the Project was submitted for the preferred location to the then Department of Housing, Planning and Local Government (DHLPG) (now Department of Housing, Local Government and Heritage (DHLGH)) in April 2019. This was granted in September 2021.

The Foreshore Licence is required to carry out site surveys to investigate the area and obtain baseline data in order to determine the optimum wind farm layout design, the offshore foundation locations, the offshore substation (OSS location(s), the cable design and development of cable laying methodologies, the inter-array cable routes, the cable route to shore and the optimum location for the landfall location(s). The Foreshore Licence Area (FLA) is an area of 865 km^2.

An indicative timeline for the project is provided in **Figure 1-1**.

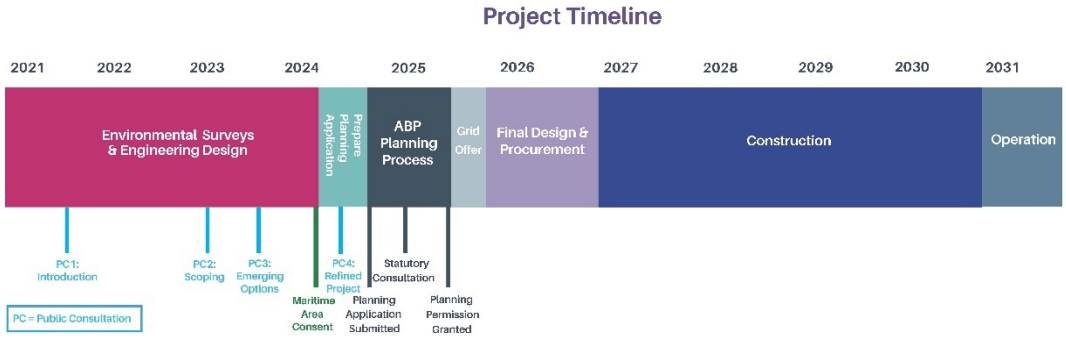


Figure 1-1: NCS Project Timeline.

In conclusion, an area offshore has been identified as being suitable for the development of an offshore wind farm array. At this stage the precise locations of the boundary of the offshore development area, offshore export cable corridor, landfall locations, onshore cable corridor and onshore substation (OnSS) have not been decided. These details will be developed by North Celtic Sea Wind Limited. and their consultants, taking into account technical and environmental considerations and input from stakeholders.

1.2 Need for the Project

Offshore wind energy is positioned to play a key role in helping to achieve national renewable energy and decarbonisation targets through the use of renewable energy sources. These targets are driven by European policy, with the EU setting overall renewable energy targets for Europe, and specific targets for each member state. The Renewable Energy Directive (2009/28/EC) established the basis for the achievement of the EU's 20% renewable energy target by 2020. Ireland's overall binding target was to achieve 16% of gross final energy consumption from renewable sources by that date. However, in 2020 renewable energy in Ireland represented 13.5% of gross final consumption[1], leaving a shortfall and indicating that Ireland had missed this target.

In 2018, the EU set further targets for beyond 2020 through the 2030 framework for climate and energy policies. These targets seek a 40% reduction in EU greenhouse gas emissions from 1990 levels and a greater contribution from renewable energy. The revised Renewable Energy Directive (2018/2001) sets a target of at least 32% for renewable energy at EU-wide level, with a review clause by 2023 for a potential upward revision of this target. In order to achieve these ambitious targets, Ireland's Climate Action Plan (CAP) 2019 sets out a target for 80% of electricity to come from renewable energy sources by 2030. Wind energy is supported by the CAP, which states that for the power generation sector, increasing both onshore and offshore wind capacity are the most economical options. The Decarbonisation Pathway to 2030 outlines that at least five gigawatts

[1]https://www.seai.ie/data-and-insights/seai-statistics/key-statistics/renewables/#:~:text=In%202020%20the%20overall%20renewable,thirds%20(66.8%25)%20in%202019

(GW) of offshore wind is required in the renewable energy mix in order to meet the 80% target. In 2022, the Government increased Ireland's offshore wind target for 2030 from 5 GW to 7 GW (DECC, 2022a).

Offshore renewable energy (ORE) is also supported at national level by Ireland's ORE Development Plan (OREDP), which identifies the Irish marine area as one of the most productive in Europe, with a potential for GW scale development from ORE technologies. ORE is also supported through Ireland's first National Marine Planning Framework (NMPF), formally established on 20 May 2021. Legislative changes, designed to streamline the foreshore consenting, development management, and environmental assessment processes were identified in the Marine Planning Policy Statement (MPPS) in June 2019, and were enacted in the form of the Maritime Area Planning Act 2021 and the Maritime Jurisdiction Act (MJA) 2021.

The need to replace fossil fuels such as gas in electricity generation, with renewables such as offshore wind is identified as a key method for reducing Ireland's reliance on imported fossil fuels and provide greater security. With this in mind, the NMPF suggests policies to prioritise and support renewables and align with the requirements of the recast Renewable Energy Directive and the ECs REPowerEU action statement, where the Commission has committed to publishing recommendations on fast permitting for renewable energy projects by May 2022 (DECC, 2022a).

Offshore wind energy development therefore has a critical role to play in contributing to national and EU targets, with the Project capable of delivering renewable energy capacity for Ireland. This will help to decarbonise our energy supply and reduce emissions – protecting the environment for current and future generations and supports Ireland's energy security in the long-term.

1.3 Emerging Policy

According to a recent Policy Statement published on 10 March 2023 entitled "*Accelerating Ireland's Offshore Energy Programme – Policy Statement on the Framework for Phase Two Offshore Wind*" published by the Department of the Environment, Climate and Communications (DECC, 2023), EirGrid "*will proactively develop offshore grid transmission infrastructure*" including offshore substations and transmission lines, which shall be used by offshore wind projects that are successful in the first 'Phase Two' auction – ORESS 2.

The Policy Statement also states that some 'Phase Two' projects (after ORESS 2) may be required to develop their own grid infrastructure.

The Policy Statement provides high-level policies in respect of 'Phase Two' grid policy. It is likely that these policies will be further developed and, ultimately, published by the CRU through a consultation and decision process. The final 'Phase Two' grid policy will likely be subject to further clarification and refinement in the coming months and will be assessed, as appropriate, as far as practically possible in the relevant environmental assessments.

2 Project Description

2.1 Proposed Location

The Project will be located in the north Celtic Sea, between 10 km and 25 km off the coast of County Waterford. Following the initial selection and feasibility process, an area within which the development of an offshore array with an output capacity of around 900MW would be suitable was identified. This area formed the basis of the initial FLA. This area was further scrutinised and refined using available geographic information systems (GIS) and input from a number of experts on the EIA team such as fish and shellfish ecology, marine mammal and megafauna, commercial fisheries, offshore ornithology, marine geology, sediments and coastal processes, marine archaeology and cultural heritage, and shipping and navigation to the Areas of Interest (AoI) shown in **Figure 2-1** of this Scoping Report. As mentioned, these AoIs have been refined over a period of time, since the conception of the Project, and have considered a number of aspects such as the following:

Offshore Considerations

- Seabed conditions;
- Vulnerable and/or protected habitats;
- Proximity to land;
- Water depth;
- Shipping lanes and fishing activity; and
- Archaeological and cultural features (shipwrecks etc.).

Onshore Considerations

- Vulnerable and/or protected habitats;
- Archaeological and cultural features (castles, burial sites etc.);
- Road constraints (*e.g.* narrow bridges, crossings)
- Density of housing and land use; and
- Proximity to the existing grid capacity and availability of grid capacity.

These AoIs will be brought forward for consideration and assessment as part of the EIA process and further refinement will take place during this process. The NCS Offshore AoI, NCS Cable Corridor AoI and NCS Onshore AoI are shown in **Figure 2-1** below.

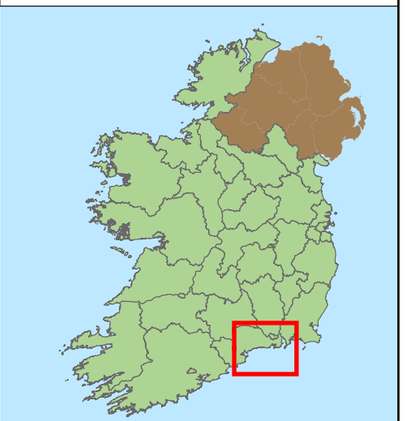
N

0 2.5 5 10 15
Kilometres

Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- 12 NM Limit

Data Source: Client



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 2-1: Location of North Celtic Sea (NCS) Area of Interest (AoI) (Onshore AoI ,Cable Corridor AoI and Offshore AoI.

RPS
West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: PK	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0008
Approved By: CB	
Scale: 1:211,647@ A3	**Projection:** ITM (IRENET95)
Date: 14/02/2023	

2.2 Project Design

A project design will be utilised in both onshore and offshore planning applications that will allow for some flexibility to be considered by the planning authority in certain design options, particularly offshore. This is especially useful where full details of a project are not able to be reasonably determined at the time of application submission, but where sufficient detail is available to enable all environmental impacts to be appropriately considered as part of the EIA process in the future development of this Project. One example of why this flexibility is required relates to offshore turbine design. Turbine design is advancing rapidly, and turbines available now may not be the best available technology at the time of construction. Therefore, to ensure the best technology is used at the time of construction an assumption, of the likely available turbine maximum (and minimum) design parameters are used.

It should be noted that the future development of this Project will be bounded by, and will comply with, that which is assessed in the EIAR.

Figure 2-2 below provides a schematic illustration of the offshore windfarm components being considered within the scope of the Project.

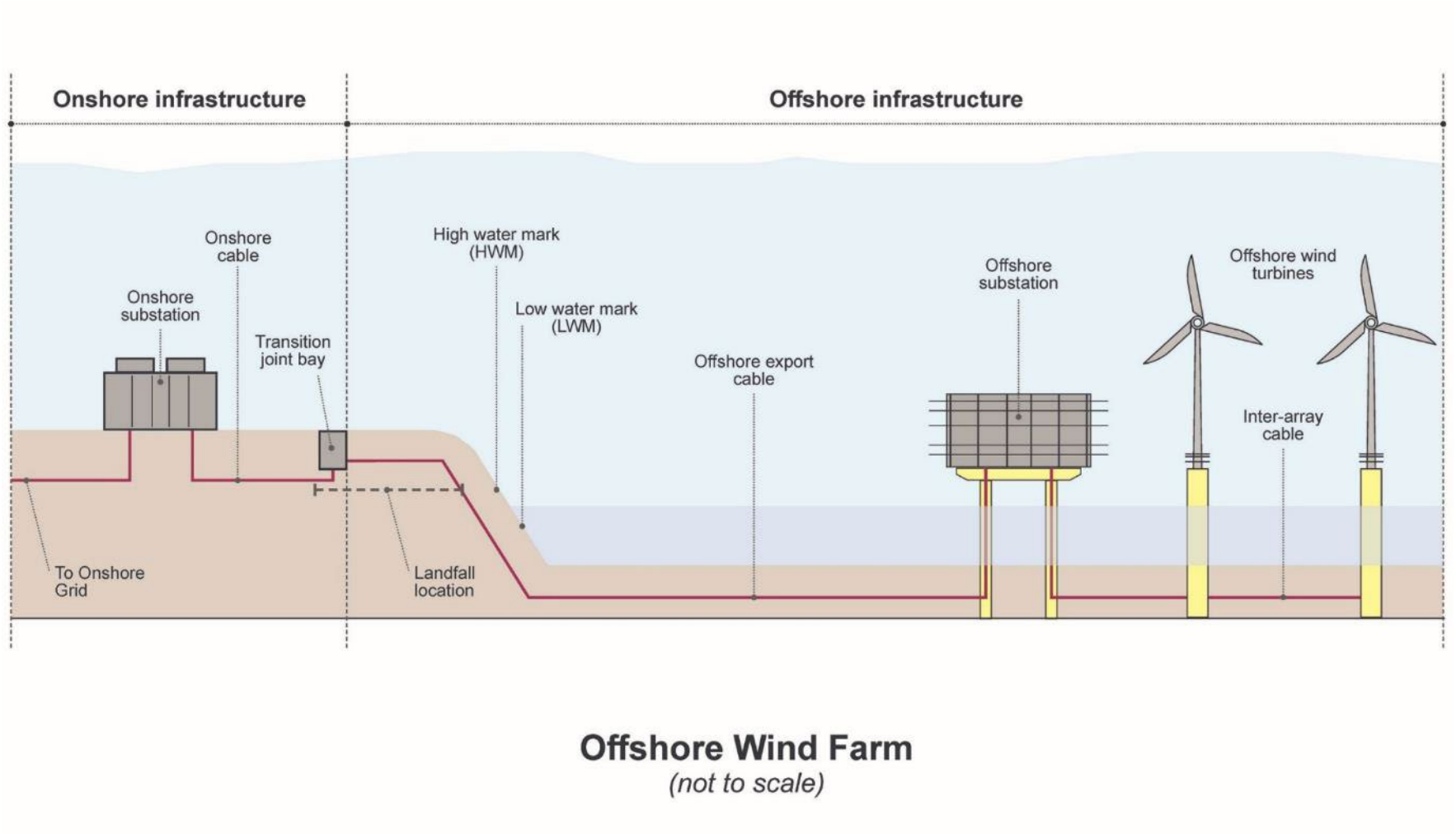


Figure 2-2: Indicative Onshore and Offshore Infrastructure being considered within the Scope of the Project.

2.3 Offshore

The key offshore elements of the Project, being those elements seaward of the high-water mark (HWM), comprise:

- Site preparation activities (pre-construction surveys and enabling works);
- Wind turbine generators (WTGs);
- Offshore Substation(s) (OSS);
- WTG and OSS foundations; and,
- Subsea cables (inter-array and export cable, including cable burial; and cable protections).

2.3.1 Site Preparation Activities

2.3.1.1 Pre-construction Surveys

Prior to construction, surveys will be carried out in order to acquire additional information on ground conditions, to improve and confirm the understanding of environmental and metocean conditions across the offshore development area, and to inform the final positioning of WTGs, OSS and the export cable route. These surveys will include geotechnical investigations (likely to involve boreholes, vibrocores and cone penetration testing (CPT)), geophysical investigations (likely to involve multibeam echo-sounder (MBES), side scan sonar (SSS), sub-bottom profiler with multichannel high resolution seismic (MUHRS) and magnetometer) and metocean surveys.

An unexploded ordnance (UXO) survey will also be carried out, utilising MBES, SSS and multi magnetometry array. Potential UXO will be inspected by remotely operated vehicle (ROV). The potential effects of these surveys to be carried out prior to construction will be considered and assessed as part of the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed Construction Environmental Management Plan (CEMP) produced by the contractor.

2.3.1.2 Enabling Works

Seabed enabling works may be required if site investigation and/or pre-construction surveys identify any obstructive seabed features prior to foundation and cable installation. Enabling works may include seabed levelling and removal of seabed obstacles identified through surveys, such as boulders, fishing nets and other debris. In the event that debris is present below the seabed surface, then excavation may be required. Seabed debris may be removed using a grab vessel or a grapnel train which is pulled along the cable route prior to cable laying.

Depending on the ground conditions (horizontality, flatness and strength/stiffness), seabed preparation might be required in advance of installation, typically comprising dredging and/or a bedding layer (gravel/rock).

Potential UXO will be inspected by ROV.

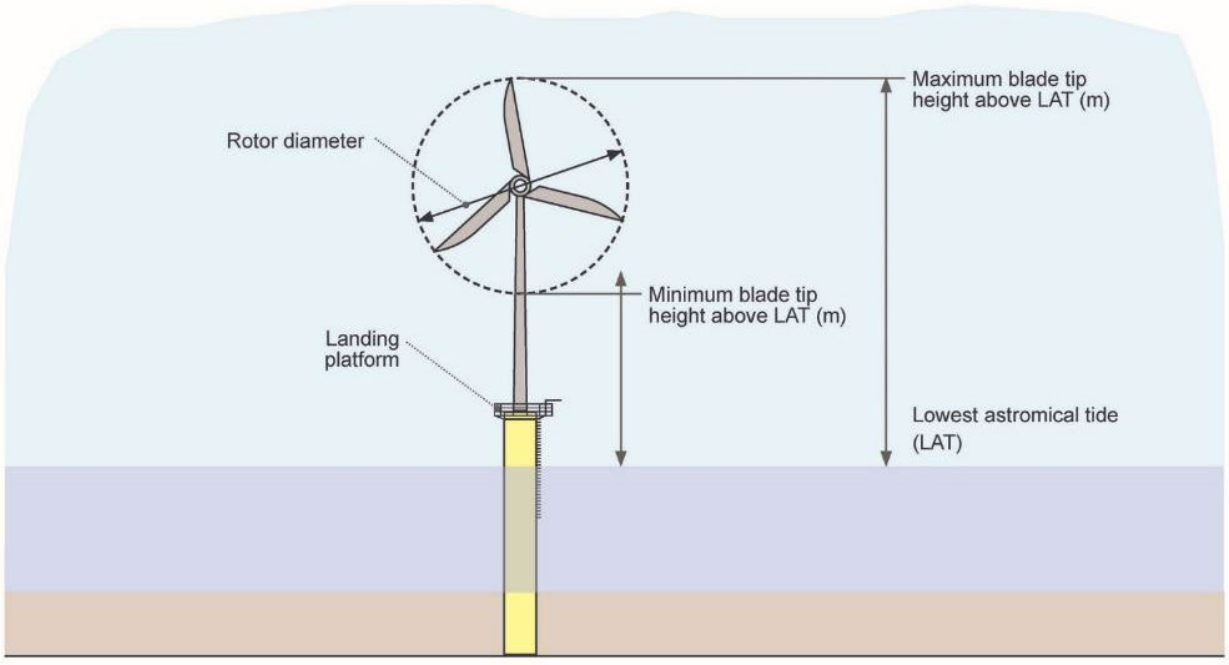
Any UXO found with a potential to contain live ammunition may be detonated on site if avoidance is not possible, with removal of any remaining debris which has the potential to represent a snagging risk to commercial fishing vessels. Techniques for UXO clearance are continuously evolving, therefore the clearance strategy and technology will be based on best industry practice and relevant guidelines at the time of clearance. The potential effects of seabed clearance works will be considered and assessed as part of the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.3.2 Wind Turbine Generators (WTG)

The Project will have a maximum of 60 WTGs. The final number of wind turbines and design of the wind farm will depend on the rated capacity and optimised layout of the individual wind turbines used. Each WTG will be the standard three-bladed, horizontal rotor axis type, designed for offshore conditions. A range of wind turbine models will be assessed. The blades will be connected to a central hub, forming a rotor which turns a shaft connected to a generator. The generator is part of the drive train, which will be located within a containing structure, known as the nacelle, situated adjacent to the rotor hub. Together it is referred to as the rotor nacelle assembly (RNA). A hoist platform is mounted on the roof of the nacelle to allow for emergency access and egress.

The nacelle will be mounted on top of a tubular steel tower structure affixed to the foundation which forms the connection to the subsea substrate. Further information on foundation design and installation is detailed in **Section 2.3.4** below. The nacelle will be able to rotate or 'yaw' on the vertical axis in order to face the incoming wind direction. The colour of the components is typically light grey apart from the hoist platform, navigation markings and the foundation. An illustration of this design can be viewed in **Figure 2-3**. For illustration purposes a monopile is presented as the foundation type, however this may vary within the foundation options presented in **Section 2.3.4**.

The potential effects of the different phases, installation, operation and decommissioning, of the wind turbines (and whole development) will be considered and assessed on a phase-by-phase basis as part of the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.



Illustrative Offshore Wind Turbine Design
(not to scale)

Figure 2-3: Typical Offshore Wind Turbine (Monopile Foundation for Illustrative Purposes Only).

2.3.3 Offshore Substation(s) (OSS)

The OSS(s) will be located within the offshore wind farm area boundary to collect and step-up the voltage from the windfarm array to a higher level suitable for exporting the electricity generated to the onshore transmission system. OSS(s) consist of a prefabricated topside structure which will house the electrical equipment necessary to regulate the voltage. Other electrical apparatus contained in the OSS will facilitate monitoring and protection of the electrical infrastructure. The OSS will comprise of a platform with multiple decks and be attached to the seabed by means of a foundation substructure. A typical offshore wind farm OSS is shown in **Figure 2-4**. For illustration purposes a jacket is presented as the foundation type.

Foundation types to be considered for the OSS(s) include monopile, jacket and gravity-bases (see **Section 2.3.4**). A range of foundation types, and their associated installation methods, will be assessed in the EIAR to provide the necessary flexibility in design.

The potential effects of the installation, operation and decommissioning of the OSS(s) will be considered and assessed in the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

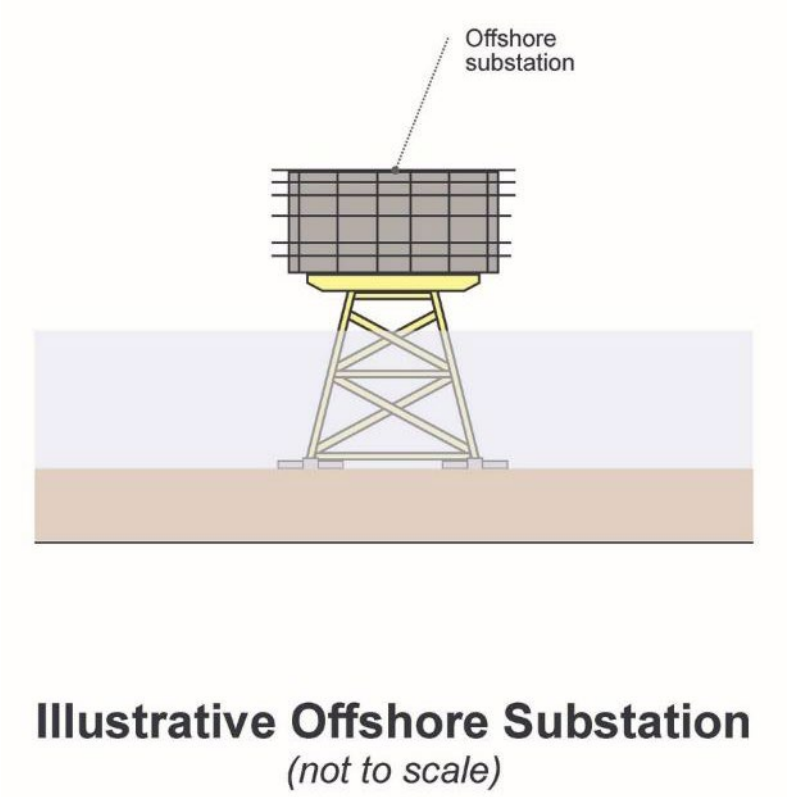


Figure 2-4: Typical OSS (Foundation Type for Illustrative Purposes Only).

2.3.4 Wind Turbine Generator (WTG) and Offshore Substation (OSS) Foundations

The WTGs and OSS(s) will be supported by foundations selected for their suitability to the seabed conditions at the site. A number of foundation types and associated installation methods will be assessed as part of the EIAR which will ensure that the required flexibility in design is maintained to allow the construction of the WTGs and OSS(s) take place regardless of the seabed conditions found. The types being considered include monopile, jacket and gravity-base foundations. A selection of typical offshore wind farm WTG and OSS foundations are shown in **Figure 2-5**, and are described in more detail below.

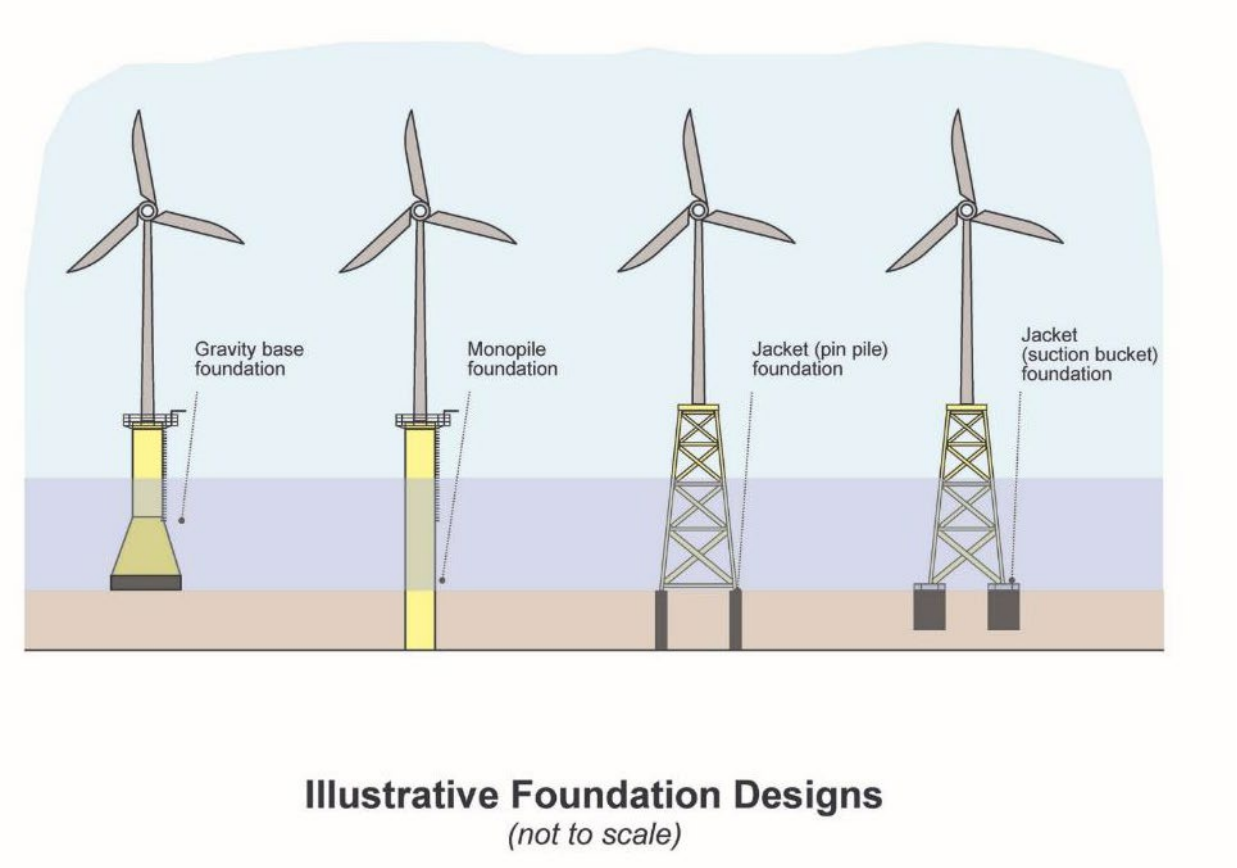


Figure 2-5: Typical offshore wind farm WTG and OSS foundation types.

2.3.4.1 Monopile Foundations

Monopile foundations typically consist of a single steel tubular section, consisting of a number of sections of rolled steel plate (called cans) which are welded together. A transition piece (TP) may be fitted over the monopile and secured via bolts or grout. The TP may include boat landing features, ladders, a crane, and other ancillary components as well as a flange for connection to the wind turbine tower. The TP is usually painted yellow, marked per relevant regulatory guidance and may be installed separately following the monopile installation. An alternative to the TP is to have boat landing features, ladders, a crane, and other ancillary components directly connected to the monopile.

The installation of monopiles typically involves structures transported to site via towing, an installation vessel or via a feeder barge. The monopiles are lifted, upended, and lowered to the seabed. Depending on the foundation design, the installation could involve drilling, grouting or driving activities. As stated above, the monopile is then often topped with the TP, when applicable.

2.3.4.2 Jacket Foundations

Jacket foundations are formed of a steel lattice construction (comprising tubular steel members and welded joints) secured to the seabed by hollow steel pin piles or suction buckets (caissons) attached to the jacket feet. The piles / buckets rely on the frictional and end bearing properties of the seabed for support. Jacket designs most commonly used in offshore wind have three or four legs, with one pile / bucket per leg. The TP and ancillary structures are most commonly fabricated as an integrated part of the jacket.

Jackets foundations are also typically transported to site via installation vessel or via feeder barge. Jacket piles can be installed using a temporary piling template which is placed on the seabed to ensure installation tolerances are met. Depending on soil conditions, piling, drilling or grouting activities might be needed. Afterwards, the jacket is lifted on to the pre-installed piles and grouting operations are performed.

Some projects use a post-pile technique, where the jacket's pile sleeves, or legs are the template or guidance for installation.

Suction bucket jackets are an alternative foundation design that are lifted and landed on the seabed, a negative pressure difference will be applied in the buckets to create a suction effect until suction buckets have reached the targeted penetration depth.

2.3.4.3 Gravity-base Foundations

Gravity-base structures (GBS) are generally concrete (or hybrid) made foundations which are transported to the site either by wet tow (tugboats), dry tow (barges) or heavy lift vessels. Towing normally occurs when the operation can be designed as weather restricted (*i.e.* 3 days maximum duration), which limits distance to site or to a shelter harbour (approx. 150 nautical miles (nm)). Once on site, the units are ballasted onto the seabed by means of an offshore crane capable to lift their full-weight, if they do not have any self-floating capability, or alternative means (smaller cranes or auxiliary devices for guiding) if they do.

The potential effects of the installation, operation and decommissioning of the foundations will be considered and assessed as part of the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.3.4.4 Scour Protection for Foundations

Foundation structures for WTGs and OSSs are potentially susceptible to seabed erosion and 'scour hole' formation due to natural hydrodynamic and sedimentary processes. Scour protection may be used to mitigate scour around foundation structures. Examples of commonly used types of scour protection are described below:

- **Rock placement:** Rock or rock-filled mesh bags are placed around the base of the foundation structure.
- **Concrete mattresses:** Prefabricated, flexible coverings made of articulated concrete blocks linked by a polypropylene rope lattice measuring several metres wide and long is placed on or around the foundation structures to stabilise the seabed and prevent erosion.
- **Artificial fronds:** Mats typically several metres wide and long, composed of lines of overlapping buoyant polypropylene fronds which create a drag barrier, preventing sediment being transported away. The frond lines are secured to a polyester webbing mesh base that is secured to the seabed by anchors.

The amount of scour protection required will vary depending on the foundation types being considered. The potential effects of the installation, operation and decommissioning of the scour protection will be considered and assessed as part of the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.3.5 Subsea Cables

2.3.5.1 Inter-array Cables

Inter-array cables carrying the electrical current produced by the WTGs will link the WTGs to an OSS(s). The array cables will consist of a number of conductor cores, usually made from copper or aluminium and integrated fibre optic cable surrounded by layers of insulation and armouring to protect the cores from external damage and to keep them watertight. No mineral oils or other fluids are contained within the cable.

A number of wind turbines will typically be connected together on the same inter-array cable, connecting those wind turbines to the OSS(s). Multiple inter-array cables will therefore connect all of the WTGs back to the OSS(s).

2.3.5.2 Offshore Export Cables

The offshore export cables (subsea cables) will transmit electricity from the OSS(s) to the landfall(s) where these cables will transition to the onshore export cable system, which will in turn connect to the existing transmission grid. The export cables will typically consist of a number of conductor cores, usually made from copper or aluminium and integrated fibre optic cable. These will be surrounded by layers of solid insulation and armouring to protect the cores from external damage and to keep the cable watertight. No mineral oils or other fluids are contained within the cable.

2.3.5.3 Cable Burial

Subsea cables can be installed into the seabed using a number of possible methods such as jetting, ploughing, cutting (where required) or be surface laid and protected with mattresses or rock placement. Jetting modifies the seabed with high-speed water jets so that the pre-laid cables sink by their own weight to a predetermined depth. For ploughing, a subsea plough is towed by the cable installation vessel to bury the cable simultaneously with the laying process. The plough lifts a wedge of soil and places the cable at the base of the trench before the wedge of soil backfills over the cable by gravity. For cutting, a mechanical trencher will physically cut a trench, usually with a series of conical picks mounted on either a wheel or as a chain on a mechanical digging boom. The typical process is for the trencher to engage with and raise the cable while deploying the wheel or chain below and then for it to progress forward digging a trench.

Subsea cables are potentially vulnerable to shipping and anchoring, trawling or other forms of active fishing, which might lead to substantial cable burial requirements.

Inter-array and export cables will be buried where feasible to do so, where burial is not possible mechanical protections will be used (**Section 2.3.5.4**). Burial depths are likely to vary across the Project area due to the differing seabed conditions and will be defined post consent by a detailed cable burial risk assessment (CBRA).

Examples of burial machines include, but are not limited to:

- Cable burial ploughs;
- Tracked cable burial machines; and
- Burial sleds.

A brief overview of the cable burial options is provided in **Table 2.1**. Each method has a varying range of maximum penetration depths depending on substrate type.

Table 2.1: Types of Burial Machines and their Operation.

Machine type	Options	Operation
Cable burial plough	Cable ploughs are available in varying types: ▪ Conventional narrow share cable ploughs ▪ Advanced cable ploughs ▪ Modular cable ploughs ▪ Rock ripping ploughs ▪ Vibrating share ploughs	Cable ploughs are towed from the host vessel where the cable may be simultaneously buried as part of the lay process or buried after cable lay. The plough lifts a wedge of soil and places the cable at the base of the trench before the wedge of soil then naturally (via gravity) backfills over the cable. Cable ploughs are capable of working in a wide range of soils. Ploughs can operate in shallow water and in water depths up to 1,500 m.

Machine type	Options	Operation
Tracked cable burial machine	Tracked cable burial machines can be equipped with the following burial tools: ▪ Jetting systems ▪ Rock wheel cutters ▪ Chain excavators ▪ Dredging systems	The tracked cable burial vehicles are typically used on shorter lengths of cable burial work. Some vehicles track over cables and straddle the cable with jetting forks. Tracked cable burial machines can be operated in shallow waters (providing motors and power packs can be cooled) and in water depths to 2,000 m.
Burial sled	Burial sleds can be equipped with the following burial tools: ▪ Jetting systems ▪ Rock wheel cutters ▪ Chain excavators ▪ Dredging systems	Burial sleds are usually operated in shallow waters for work in ports, estuaries, river crossings and shore-ends for cable systems. They are often deployed from barges or jack-ups and either have subsea power or utilise power systems which are mounted on the host vessel. The range of burial tools allows the varying types of burial sled to work in most seabed conditions from sands, gravels, clays and softer rock.

The potential effects of the installation, operation and decommissioning of the inter-array and export cables will be considered and assessed as part of the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.3.5.4 Cable Protection

Where burial is not possible, *e.g.* at cable crossings and over hard ground, cable protection will be applied. Depending on the requirements of the particular location, alternative cable protection methodologies can be utilised including but not limited to:

- Concrete mattresses: prefabricated, flexible coverings made of articulated concrete blocks linked by a polypropylene rope or wire measuring several metres wide and long are placed on top of the cable for protection against direct anchor strikes.
- Rock dumping: rocks or rock-filled mesh bags are laid on top of the cable for protection. This method is generally applied in areas where there are unsuitable seabed conditions for burial, *i.e.* hard ground, or where long sections of cable need protection, *i.e.* cable crossings.
- Grout bags or sandbags: similar in use to concrete mattresses, but involves bags filled with grout and/or sand in place of the prefabricated concrete and are usually applied in smaller scale applications.
- Frond mattresses: mats generally several metres wide and long and composed of continuous lines of overlapping buoyant polypropylene fronds. Frond mattresses are used for protection by stimulating the settlement of sediment over the cable but are only suitable under certain seabed conditions, *i.e.* soft, mobile sediment environments.
- Glass reinforced plastic or metallic covers consisting of half shell sections that are bolted together forming a circular protection barrier around the cable. Additionally, rock may be placed on top to provide protection from anchors or fishing gear.

The potential effects of the installation, operation and decommissioning of the cable protection will be considered and assessed in the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.4 Onshore

The key onshore elements of the Project, being those elements landward of the HWM, comprise:

- Pre-construction surveys and enabling works;
- Landfall location(s);
- Onshore export cables;
- Onshore Substation (OnSS);
- Operation and maintenance (O&M) facility; and
- Construction compounds.

Other related projects or activities, which may be related to the Project, will be considered within the EIAR, either as part of the Project (if they are integral to the Project), or as part of the cumulative assessment, as considered appropriate once further details are known. Such related projects or activities may include a construction staging facility and network upgrades.

2.4.1 Pre-construction Surveys and Enabling Works

There will be site preparation activities required onshore. These will include:

- Pre-construction surveys and site investigations, such as, topographic surveys, utility surveys, and ground investigations;
- The removal of hedgerows, walls and fencing may be required on the offline/offroad sections (*i.e.* off the public road network); and,
- Site preparation civil works, such as drainage, site levelling and construction of site access arrangements and associated site fencing.

The effect of these potential impacts will be considered and assessed in the EIAR. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.4.2 Landfall Location(s)

Landfall is the point at which the offshore submarine export cables cross the HWM. The landfall location is the area between the HWM and the start of onshore cabling and will contain the transition joint bay (TJB), link boxes and fibre-optic communication chamber. A construction compound will also be temporarily sited at this location.

The offshore export cables will be connected to the onshore underground cables within the TJB (see **Section 2.4.2.3**), located at the landfall location. An indicative illustration of the landfall location is provided in **Figure 2-2**. The EIAR will assess a range of landfall installation options, including trenchless techniques, such as horizontal directional drilling (HDD) under the intertidal area, and temporary open trenching activities through the intertidal area. These techniques are outlined in **Sections 2.4.2.1** and **2.4.2.2** below.

The landfall location will also contain appropriate signage to indicate the location of the cable(s).

2.4.2.1 Horizontal Directional Drilling (HDD)

HDD is a trenchless technique used to install underground utilities in areas where excavation of open trenches is not possible due to surface and near surface obstacles or where minimal surface disturbance is required. Trenchless methods such as HDD may be used where feasible to bring the offshore export cable(s) on to land

facilitating installation under features such as cliffs, dunes or sea defences. This will involve drilling a long parabolic borehole underneath the Project intertidal area using a drilling rig located on land above the HWM and/or at sea from a jack-up vessel.

The process uses a drilling head controlled from the rig to drill a pilot hole along a predetermined profile based on an analysis of the ground conditions and cable installation requirements. The pilot drill bit is hydraulically powered by bentonite drilling mud fed through the pilot string. The bentonite mud transports the soil away and fills the hole behind the drill head, preventing it from collapsing and keeping the bore hole at a constant pressure. This pilot hole is then widened using a so-called reamer until the hole is wide enough to fit the cable ducts.

Directional drilling requires a working area at each end of the drill. Prior to the drilling taking place, one working area is prepared for the drilling site and another for the exit site. It is expected that the working area for the drilling site will be onshore and the exit site will be offshore. On the drilling site and exit site, respectively, a launch pit and an offshore exit pit will be required for the drilling operations. When the hole is sufficiently large to accommodate the conduit, this is deployed offshore and is attached to the wash pipe and pulled through the borehole from offshore to onshore. With the conduit pipe in place the onshore HDD rig can demobilise. A messenger wire is installed in the conduit pipe, and the landfall is ready for the cable to be pulled in from the cable-laying vessel. Once the ducts have been installed, the pits will likely be temporarily back filled until the time for cable pull-in. The entry pit will then need to be re-exposed (excavated) to pull in the cables.

The offshore export cable is installed by pulling the submarine cable through the pre-installed HDD ducts from a vessel offshore, terminating at the onshore TJB. Immediately following cable installation, the launch and exit pits will be backfilled. An indicative illustration of the HDD process is shown in **Figure 2-6**.

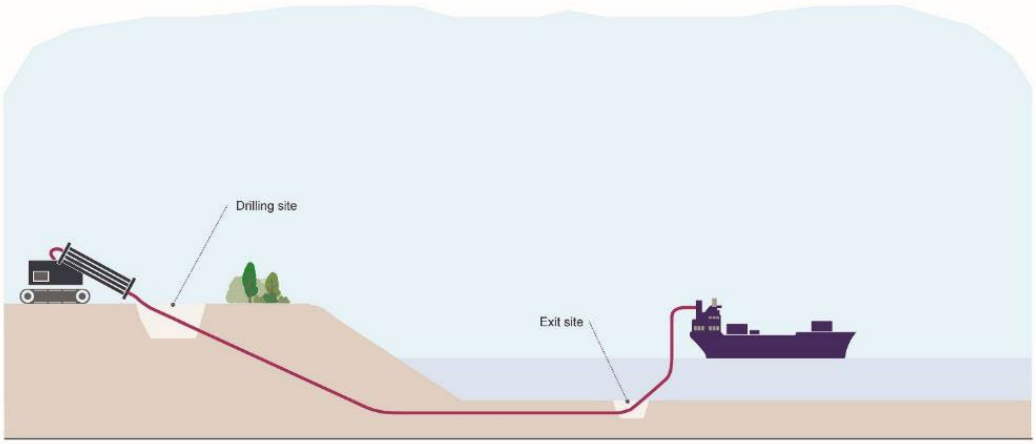


Figure 2-6: Indicative Illustration of HDD Process.

2.4.2.2 Open Trench Installation

An open trench installation method is a potential cable installation method at landfall locations dominated by sandy or gravelly soils. If the approach to shore is suitable then an open trench methodology may be used for the installation of the offshore export cable on to land. Open trench installation may be carried out using one of a number of methods.

Dredging tools, such as backhoe dredgers, ploughs, rock cutters or jetting tools, similar to those used offshore, may be applied for trench construction.

The power cable can then be pulled from the offshore installation vessel, or from winches onshore.

Alternatively, traditional mechanical excavators can also be used for cable installation, where a trench is excavated through the surf zone, and possibly protected with a sheet pile cofferdam near shore. In this process, the cable would be pulled from the offshore installation vessel using buoyancy elements to keep the cable afloat and pulled through the intertidal area on rollers before being lowered into the trench.

The post-laid cable work will include rock installation, trench backfilling and shore reinstatement.

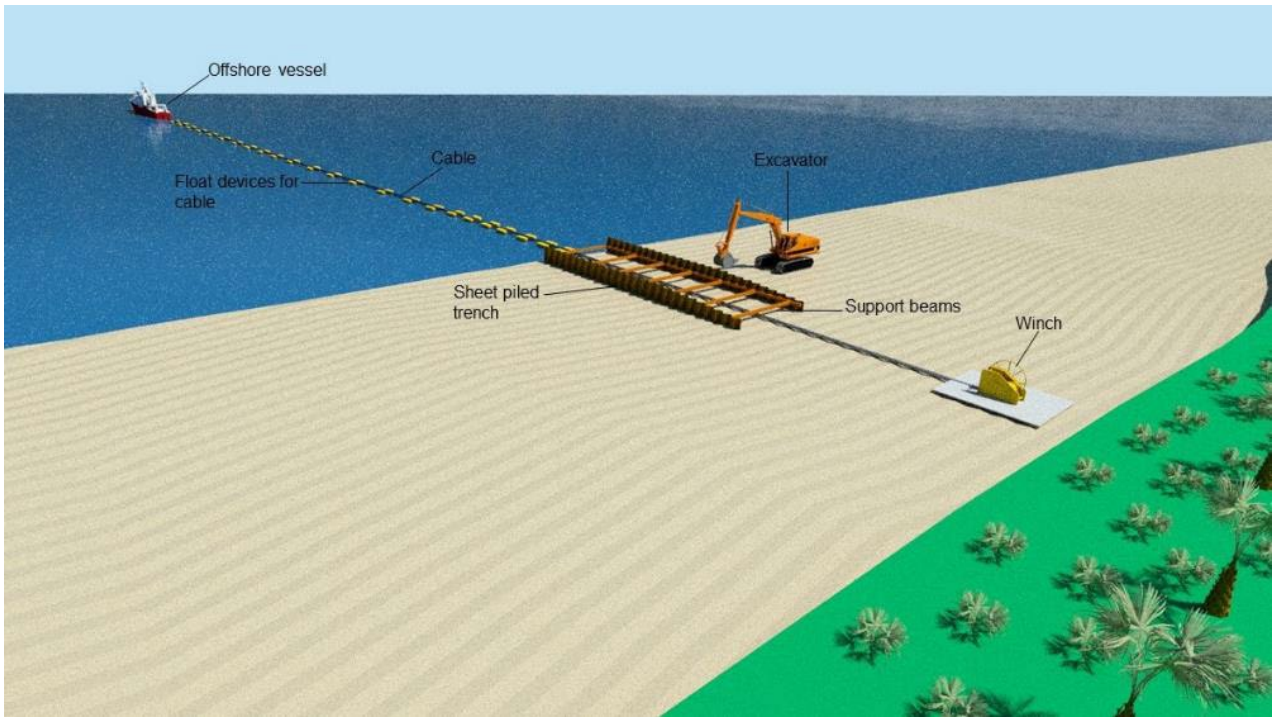


Figure 2-7: Indicative illustration of an open cut trench installation (not to scale).

2.4.2.3 Transition Joint Bay (TJB)

The offshore cables are connected to the onshore cables at a point known as the TJB. The TJB is a fully buried concrete chamber which is located on land as close as possible to the HWM to minimise the length of offshore export cable on land, while simultaneously avoiding potential for flooding. The TJB pit is dug and lined with concrete, in which the jointing of the offshore and onshore cable takes place. The TJB is constructed to ensure that the jointing can take place in a clean, dry environment, and to protect the joints once completed. Once the joint is completed, the TJB is covered and the land above reinstated.

Accessing the TJB during the operation of the wind farm is expected to be infrequent, however, link boxes and a fibre-optic communication chamber need to be located within the area defined as the landfall location and these do require access during the operational phase. The land here will also be reinstated but may have manhole covers for access.

Permanent access will be required to facilitate future O&M activities and will likely require the development of an access track from the public road.

The exact location for the TJBs is dependent on cable routes, local conditions and soil properties which will be confirmed at a later stage. **Figure 2-8**: below shows an illustration of a typical TJB.

The potential effects of the installation, operation and decommissioning of the cables and TJBs will be considered and assessed in the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

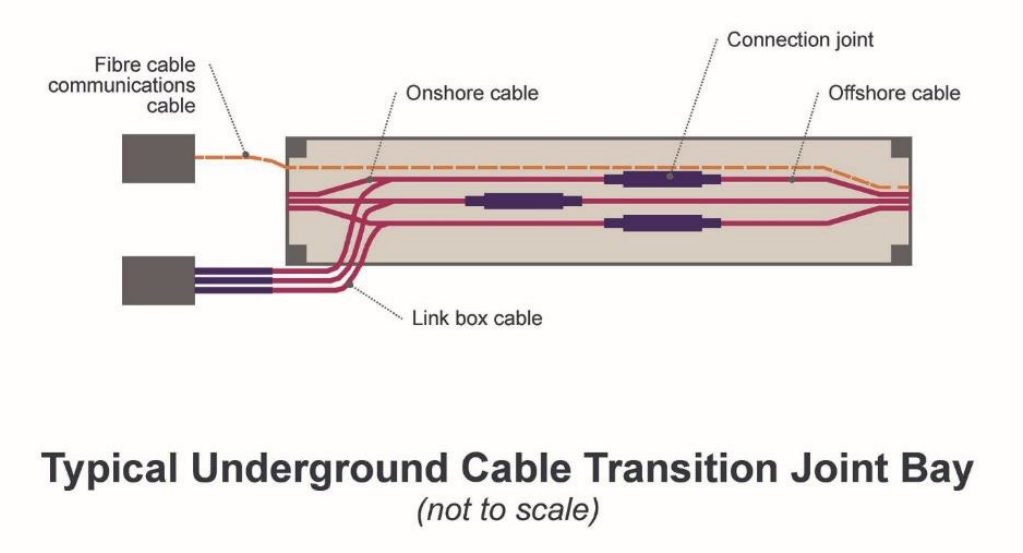


Figure 2-8: Typical Underground Cable TJB.

2.4.3 Onshore Cables

Each offshore export cable will connect to three onshore electricity cables (single phase conductors) at the TJB close to the shoreline and transfer the power onwards to the onshore compensation compound (OnCC) and onshore substation (OnSS) that will connect to the National Electricity Grid.

These onshore electricity cables will be installed in ducts and will be buried for the entirety of their length. These ducts will be laid within a trench in either trefoil or in flat formation with a maximum width of 1.7 m. Additional communications ducts will also be contained within each trench to accommodate fibre optic cables. A separation distance between each trench will be required to avoid reducing their power rating due to heating.

EirGrid, the transmission system operator (TSO) are responsible for setting the technical standards pertaining to the electrical infrastructure connecting (and including) the OSS to the National Electricity Grid. It is the policy of the TSO that, in so far as possible, high voltage onshore underground cables shall be installed under public roads to allow for standard construction methods and operational access. Where this is not feasible, it may also be necessary to route these cables offline/offroad in third party lands, subject to suitable arrangements.

Third party lands may also be required to facilitate crossing of major obstacles using specialist methodologies. Trenchless methodologies may be employed at river, rail and major road crossings.

The onshore cables will be installed in sections of 600 to 800 m in length, (depending on cable manufacturer, ESB and EirGrid specifications) with each section of cable delivered on a cable drum from which it is spooled out as it is installed.

Joint bays will be required along the onshore cable corridor(s) to connect individual lengths of cable. These are typically pre-cast concrete lined chambers, typically in the order of 8 m long, 2.5 m wide and 2 m deep and are designed to be covered over following reinstatement. Small inspection chambers with removable covers will also be located adjacent to the joint bays for inspection and earthing arrangements.

Where possible, joint bays will be located below the public road or in the verge. In the case of routes traversing third party lands, the joint bay locations will be placed on the edge of fields or boundaries where possible and will be covered over and the land reinstated to original condition. As per current EirGrid specifications, unrestricted right of way access from the nearest public road, both to the route and along the route, for the purposes of inspection, maintenance and repair must be provided through the lifetime of the cable system. Requirements regarding the cable system are subject to updates to EirGrid's specifications. A civil contractor will carry out the trenching and ducting on a phased basis (*c.* 100 linear metres of trench). At a later date, cable drums and a cable pulling winch will be transported to the joint bay locations to facilitate cable installation.

These cables will then be pulled through the ducts and jointed within the joint bays. **Figure 2-9** below shows an illustration of a typical cable trench.

The potential effects of the installation, operation and decommissioning of the onshore cables and joint bays will be considered and assessed in the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

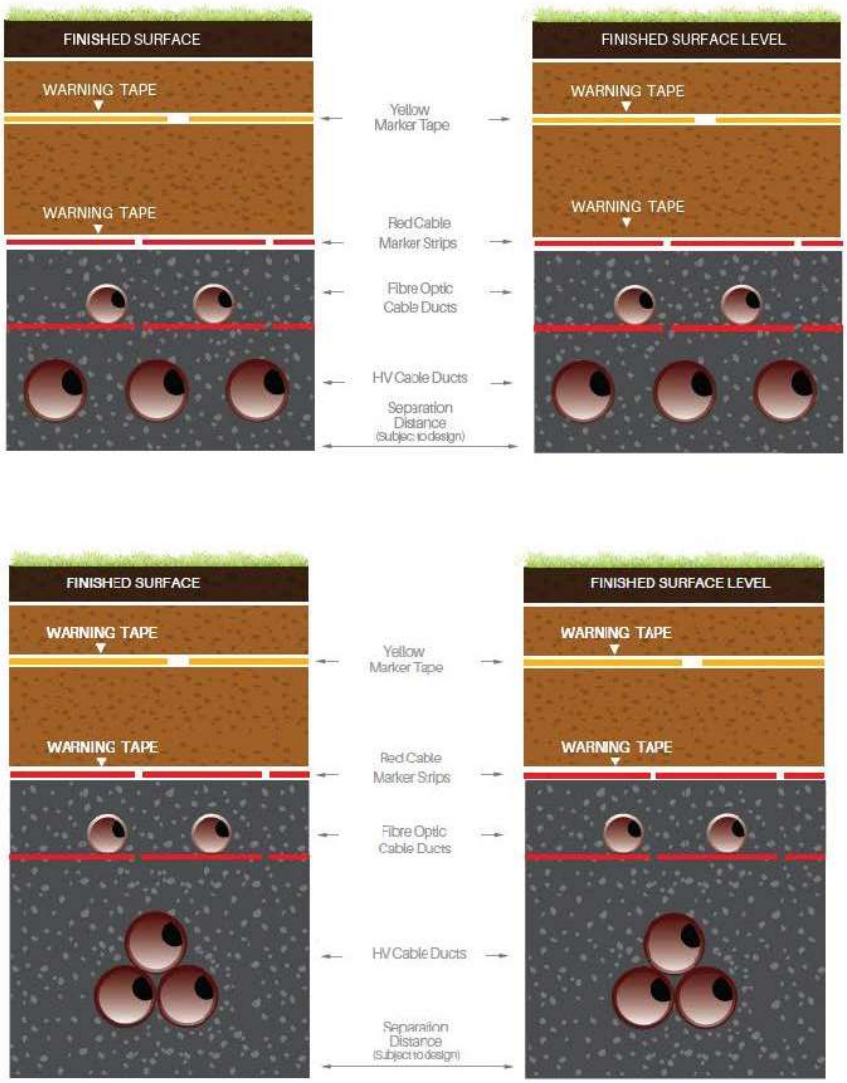


Figure 2-9: Illustration of Typical Cable Trenches with Buried Cable (Trefoil Formation and Flat Formation).

2.4.4 Onshore Substations (OnSS)

A number of options are currently being considered for the connection of the electricity generated by the Project to the National Electricity Grid. Whether the Project connects to the National Electricity Grid at a new or existing OnSS, is still to be decided. However, regardless of the approach taken by the Project to connect to the national grid, additional electrical infrastructure will need to be developed to accommodate this connection. This will include the development of a new onshore compensation compound (OnCC) and potentially the development of a new OnSS.

OnCC: This will contain electrical equipment required to ensure the connection from the windfarm complies with EirGrid's Offshore Wind Grid Code requirements. The main elements will include incoming and outgoing underground cables, electrical switchgear, compensation equipment, telecommunications infrastructure and a control building.

OnSS: Should it not be feasible to utilise an existing OnSS, it may be necessary to develop a new OnSS to facilitate the connection to the existing transmission infrastructure. This will contain the necessary equipment required to ensure the connection from the windfarm complies with EirGrid's Offshore Wind Grid Code requirements. The main elements will include incoming and outgoing underground cables, electrical switchgear, telecommunications infrastructure and a control building.

New line/cable interface towers may also be required to break into the existing 220 kilovolt (kV) overhead line to facilitate the connection to a new OnSS should this be required.

Depending on the technology chosen for the onshore switchgear, specifically either air insulated switchgear (AIS) or gas insulated switchgear (GIS), the footprint of the site required to facilitate the OnCC and OnSS will change. Both technologies are being considered and will be determined based on various criteria and local engagement.

The potential effects of the installation, operation and decommissioning of the infrastructure associated with the OnSS will be considered and assessed as part of the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.4.5 Operation and Maintenance (O&M) Facility

An O&M facility will be required for the lifetime of the Project in order to plan, manage and monitor activities from a dedicated facility. These facilities are located at a harbour, and in many cases the O&M utilises an existing building or buildings on the site. Some of the typical requirements are listed below:

- A quayside with floating landing stages for safe crew changes at any water level;
- The quayside should have land for spare parts storage and a fixed quay with easy access for appropriate machines to handle the offload and onloading of spare and discarded parts;
- Office space, welfare facilities and changing rooms, workshop area; and secure storage areas (outside and inside) can all be situated in existing buildings alongside the quayside or a short distance away; and
- Monitoring and communication infrastructure will be situated close to or integrated into the office space.

Where there are no suitable existing buildings, new ones will need to be constructed. Details regarding an O&M facility are not known at this stage of the Project. However, an assessment of O&M options is underway and a decision on the location of the O&M facility will be made shortly and the potential effects of construction or change of use, operation, and decommissioning of the O&M facility will be considered and assessed as part of the EIA process. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.4.6 Construction Compounds

A number of construction compounds will be required along the onshore cable route. It is envisaged there will be a minimum of two of these temporary compounds, one at the landfall location, the second at the grid connection site. Additional temporary compounds may also be required mid-way along the route and/or at key areas *e.g.* complex crossings. These compounds will be temporary and will only be in place for the duration of construction. They will generally be used to park construction vehicles at night, they will also have self-contained welfare facilities. The compounds will also be used to store construction materials and cables.

These compounds, even though they will be temporary in nature, will be fully considered and assessed in the EIAR. The measures to mitigate the potential effects outlined in the EIAR will be further supported in Plans such as the detailed CEMP produced by the contractor.

2.4.7 Other related Projects or Activities

Other related projects or activities can include other projects (sometimes by other developers and sometimes off site) or individual project components which occur as a direct result of the main Project (EPA, 2022a). Some of these may require parallel separate consent. The key considerations are whether such projects are integral (no matter who carries out the work) to the main Project and whether they are subject to any separate consent procedure with separate environmental assessment requirements.

As the Project progresses, the requirements (if any) for other related projects or activities will become known. Depending on the nature of these projects/activities, they will be dealt with fully in the EIAR as part of the Project, or as part of the cumulative assessment, as considered appropriate once further details are known.

Such related projects or activities may include a construction staging facility and network upgrades, which are described in further detail below.

2.4.7.1 Construction Staging Facility

A load out port will be required for the construction phase and in an ad-hoc capacity during the maintenance phase of the windfarm. During the construction phase the load out port will be used to store components of the windfarm such as turbine parts, foundations, cables, aggregate etc. The various installation vessels associated with the project will load out components from the port during the construction phase. During the lifetime of the project the load out port can be used for large component repairs although these would be sporadic in nature.

Some of the typical requirements for a load out port are listed below:

- Positioned as close to the offshore wind farm as is reasonably possible;
- With water depths sufficient to accommodate heavy lift vessels;
- Large hard standing area;
- High quay wall bearing capacity;
- Temporary office space; and
- Well served by public road/rail infrastructure.

The load out port is not known at this stage of the Project. However, an assessment of options is underway and a decision on the potential location of the load out port will be made in due course.

Other related projects or activities, which may be related to the Project, will be considered within the EIAR, either as part of the Project, or as part of the cumulative assessment, as considered appropriate once further details are known.

2.4.7.2 Network upgrades

At this point in time the location that the Project will connect to the National grid is not confirmed, although potential connection methods identified included the use of new and existing transmission substations. Given that existing substations are some distance from the coast, a new substation close to the existing 220kV overhead line is being considered. A final decision on the grid connection point will require alignment with the system operator and offshore asset owner, EirGrid. Depending on the method of connection, transmission network upgrades may be required and will be identified by EirGrid.

The finalised grid connection location and any associated network upgrades will all be considered and assessed in the EIAR, either as part of the Project, or as part of the cumulative assessment, as considered appropriate once further details are known.

2.5 Alternatives Considered

The evolution of the design phase will consider the initial site selection and feasibility process, input from the EIAR team, direction provided by An Bord Pleanála (ABP) as part of the pre-application consultation of the Maritime Area Planning Act process, and feedback from prescribed bodies and non-statutory environmental stakeholders during informal EIAR scoping consultation.

The following is taken from the list of alternatives and measures from the EC's Guidance on Scoping (EC, 2017a), which will be considered in the EIA process for this Project:

- Locations or routes;
- Processes or technologies;
- Working methods;
- Site plans and layouts;
- Design of structures;
- Types and sources of materials;
- Size of the site or facility;
- Access arrangements and routes for traffic to and from the site;
- Ancillary facilities;
- Decommissioning arrangements, site restoration, and after-use; and
- Do-nothing scenario or do-minimum alternative.

3 Planning Policy and Legislative Context

3.1 Relevant European Planning and Development Policy

In 2007 the EU adopted an Integrated Maritime Policy (EU-IMP) which seeks to provide a more coherent approach to cross-cutting maritime issues, with increased coordination between different policy areas such as blue growth, marine data and knowledge, integrated maritime surveillance, sea basin strategies and maritime spatial planning. EU-IMP encourages all coastal Member States to develop IMP and plans at a national level. This has since been supported by numerous policy initiatives and legislative measures, the most up to date of which are set out in this section.

3.1.1 European Maritime Spatial Planning Directive

In 2014, the adoption of the European Maritime Spatial Planning Directive 2014/89/EU established an EU-wide framework for maritime spatial planning. It is aimed at promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources. The Directive details the main goals and minimum requirements for Member States as follows:

- Balanced and sustainable territorial development of marine waters and coastal zones;
- Optimised development of maritime activities and business climate;
- Better adaptation to risks; and
- Resource-efficient and integrated coastal and maritime development.

The Directive defines maritime spatial planning as:

> *"… a process by which the relevant Member State's authorities analyse and organise human activities in marine areas to achieve ecological, economic and social objectives"* (Directive 2014/89/EU).

Ireland transposed the Directive through the European Union (EU) (Framework for Maritime Spatial Planning) Regulations 2016 (S.I. No. 352/2016). In so doing, it established the necessary legal basis and broad framework for Ireland to implement a National Marine Spatial Plan. A National Marine Spatial Plan, which, *inter alia*, takes into account land-sea interactions and contributes to the sustainable development of energy sectors at sea, was required to be in place by 31 March 2021.

Since the regulations were made under the European Communities Act 1972, they were strictly limited to measures required to transpose the Directive. In October 2018, the regulations were repealed and replaced by Part 5 of the Planning and Development (Amendment) Act 2018. Part 5 re-transposes the Directive in primary legislation and contains a number of measures that are additional to those required by the Directive, including:

- Adoption of the National Marine Planning Framework (NMPF) by both Houses of the Oireachtas;
- Review and replacement of the NMPF every six years;
- Obligation for marine regulatory bodies to secure the objectives of the NMPF when making policies, plans, or granting consents; and
- Enforcement powers for the Minister if the foregoing obligations are not being fulfilled.

Following a period of extensive public consultation, the Dáil passed a motion approving Ireland's NMPF on 29 April 2021 with the finalised NMPF becoming available on the 30 June 2021.

3.1.2 2030 EU Climate and Energy Framework

The 2030 EU Climate and Energy Framework provides a framework for climate and energy policies in Europe. It was agreed by EU leaders in 2018. This framework seeks a 40% reduction in EU greenhouse gas emissions from 1990 levels and a greater contribution from renewable energy. Arising from this the revised Renewable Energy Directive 2018/2001 on the promotion of the use of energy from renewable sources (recast), sets a target of at least 32% for renewable energy, at EU-wide level, with a review clause by 2023 for a potential upward revision of the EU level target.

The revised Energy Efficiency Directive 2018/200 sets a target of at least 32.5% for energy efficiency, at EU-wide level. The EU Governance of the Energy Union and Climate Action Regulation sets the overall framework for the achievement of the EU climate and energy 2030 targets.

The European Green Deal has further increased the EU's climate ambitions which aims to become climate neutral by 2050. A European Climate Law will put this political commitment into a legal obligation. The EU's 2030 emissions reduction goals have also been increased to at least a 55% cut by 2030, compared with 1990 levels. The European Green Deal provides an action plan to boost the efficient use of clean resources, restore biodiversity and cut pollution. The plan also outlines investments needed and financing tools available and explains how to ensure a just and inclusive transition. Relevant EU regulations and Directives will be updated in coming years to reflect this enhanced ambition.

To help meet the EU's goal of climate neutrality by 2050, the EC published the EU Strategy on ORE in November 2020. The Strategy proposes to increase Europe's offshore wind capacity from its current level of 12 GW to at least 60 GW by 2030 and to 300 GW by 2050. The subject proposal is wholly in accordance with the 2030 EU Climate and Energy Framework and all of the associated European laws and strategies.

3.2 National Legislation

3.2.1 Maritime Jurisdiction Act (MJA) 2021

The MJA 2021 was commenced in November 2021. The purpose of the MJA is to update and set out in one standalone enactment the law relating to the State's maritime jurisdiction, including giving further effect to relevant provisions of the 1982 United Nations Convention on the Law of the Sea, and to repeal sections 2 and 3 of the Continental Shelf Act 1968 and Part 3 of the Sea-Fisheries and MJA 2006, and to provide for related matters.

The MJA defines the extent of the maritime area of Ireland. It provides that the jurisdiction of the State includes the Irish Territorial Waters (*i.e.* the Foreshore Area between the Mean HWM and the 12 nm limit), the Irish Exclusive Economic Zone (EEZ) (the area between the 12 nm limit and the 200 nm limit) and the Agreed Continental Shelf area that pertains to Ireland. The offshore elements of the subject Project concern the Foreshore Area located in the Celtic Sea, south of Co. Waterford.

3.2.2 Maritime Area Planning Act (MAP) 2021

Following the commencement of the MJA, the MAP Act 2021 was published in 2021 and commenced in July 2022. The MAP Act provides that two separate consents are required for the development of ORE projects. Firstly, a maritime area consent ("MAC") is required to occupy the maritime area and, secondly, a development consent is required to allow for the development of that area. More specifically, a MAC must be obtained first, following which development permission can be sought under the Planning and Development Acts.

Schedule 5 of the MAP Act sets out the broad criteria that must be fulfilled in order to obtain a MAC prior to seeking development permission. These criteria that the Minister for the Environment, Climate and Communications must have regard to when deciding MAC applications include the nature, scope and duration of the occupation of the maritime area; whether the proposed maritime usage is in the public interest; whether

the applicant is a fit and proper person; the NMPF; the level of preparatory work already undertaken in relation to the Project; and the level of stakeholder engagement in relation to the Project.

A MAC is required before development permission can be sought. Once a MAC is granted and following pre-application consultation with ABP, a MAC holder may apply to ABP for permission to carry out the development in the marine area. ABP is the relevant authority for the purposes of granting permission for development of the Project.

3.2.3 Climate Action and Low Carbon Development (Amendment) Act 2021

The Climate Action and Low Carbon Development (Amendment) Act 2021 is an Act to provide, *inter alia*, for the approval of plans by the Government in relation to climate change for the purposes of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050. It provides a framework for Ireland to meet its international and EU climate commitments, most notably in the context of the Project, a 51% reduction in emissions by 2030.

The Act is acknowledged by Government as being ambitious. It nevertheless embeds the process of setting binding ambitious emissions-reductions targets into law. Furthermore, it should be noted that in assessing development applications the planning authority, in this case ABP, has the following duties: "*shall, in so far as practicable, perform its functions in a manner consistent with—*

a. the most recent approved CAP,

b. the most recent approved national long term climate action strategy,

c. the most recent approved national adaptation framework and approved sectoral adaptation plans,

d. the furtherance of the national climate objective, and

e. the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."

3.3 National Planning and Development Policy

In this Section, key national planning and development policies are set out.

3.3.1 Project Ireland 2040 – National Planning Framework (NPF)

The NPF, published in July 2018, is the primary articulation of spatial, planning and land use policy in Ireland. The framework is based on directing development to existing settlements rather than allowing the continual expansion and sprawl of cities and towns. Section 7.2 of the NPF states that the maritime economy is a key enabler of effective regional development, especially in remote coastal communities.

In order to strengthen and facilitate more environmentally focused planning at the local level, the NPF states that future planning and development will need to *"tackle Ireland's higher than average carbon-intensity per capita and enable a national transition to a competitive low carbon, climate resilient and environmentally sustainable economy by 2050, through harnessing our country's prodigious renewable energy potential."*

Significantly, the NPF contains a specific section (Section 7.5) which is entirely focused on ORE. It states that:

> *"Ireland's territorial waters present major opportunities in the blue economy and ORE sectors, which would support our transition to a zero-carbon economy.*
>
> *The development of Offshore Renewable Energy is critically dependent on the development of enabling infrastructure, including grid facilities to bring the energy ashore and connect to major sources of energy demand".*

Section 7.5 of the NPF includes the following as National Policy Objective 42:

> "*To support, within the context of the Offshore Renewable Energy Development Plan and its successors, the progressive development of Ireland's ORE potential, including domestic and international grid connectivity enhancements.*"

The implementation of the National Policy Objectives contained within the NPF are required to be further developed upon within the relevant Regional Spatial and Economic Strategies. The Project is wholly consistent with National Policy Objective 42 and relevant statements contained in Section 7.2 of the NPF as set out above as it concerns the progressive development of Ireland's ORE potential and domestic grid connectivity enhancements and all necessary enabling infrastructure.

3.3.2 National Development Plan (NDP) 2018-2027

The NDP identifies strategic priorities for public capital investment in order to underpin the implementation of the NPF. It is a strategic priority of the NDP to have a new Renewable Electricity Support Scheme to support up to 4,500 MW (*i.e.*, 4.5 GW) of additional renewable electricity by 2030.

National Strategic Outcome 8 of the NDP is to transition to a low-carbon and climate-resilient society. To achieve this the NDP recognises that Ireland's ambition must go further than a focus on achieving compliance with international commitments and recognises the importance of achieving a low-carbon, climate-resilient and environmentally sustainable economy and society. The Project is wholly consistent with National Strategic Outcome 8 and all associated national policy.

3.3.3 National Energy and Climate Plan (NECP) (Draft) 2021-2030

Ireland's first Draft NECP 2021-2030 was submitted to the EC 31 December 2018. It outlines Irelands energy and climate policies in detail for the period from 2021 to 2030 and looks onwards to 2050. The NECP is a consolidated plan which brings together energy and climate planning into a single process for the first time. NECP sets out a vision for a profound transformation of Ireland's energy systems; moving to lower emissions fuels and ultimately towards a lower reliance on fossil fuels; significantly increasing renewable generation; achieving a step change in energy efficiency performance; implementing smart and interconnected energy systems; strong regulatory structures and markets to underpin these changes; and repositioning energy consumers to have a more active role within the energy sector (NECP, 2018).

3.3.4 Marine Planning Policy Statement (MPPS)

The MPPS was published by the Department of Housing, Planning and Local Government (DHPLG) in June 2019. It sets out a vision for the development of a fully integrated Marine Planning System, based on three coherent building blocks of forward planning, development management and enforcement. It draws together multiple existing regulatory functions into an overarching framework with guiding principles, high-level objectives and milestones for the enhancement of the marine planning system in Ireland.

The MPPS outlines *"an ambitious programme of reform"* that will bring marine planning into the mainstream of Government functions, while delivering the necessary structures to complete an integrated system with identifiable planning functions. Notably, it seeks the introduction of a single development management process for the maritime area and recognises the need for ORE projects such as the Project for Ireland to meet its renewable and climate targets.

3.3.5 Climate Action Plan (CAP) 2021

The CAP 2021 was prepared by the Department of Communications, Climate Action & Environment (DCCAE) in order to tackle climate breakdown. The Plan clearly recognises that Ireland must significantly step up its commitments to tackle climate disruption. The CAP 2021 pledged a target for 80% of electricity to come from renewable energy sources by 2030. Action 115 of Climate Actions 2021 is "to facilitate the development of offshore wind, including the connection of at least 5 GW of offshore wind, based on competitive actions, to the grid by 2030" (CAP, 2021).

The 2021 Plan notes that offshore technologies are only applied at a very small level in Ireland now, however, the scale of the opportunity has been estimated to be 70 GW. The DCCAE commits to updating the plan every 12 months in a manner that is underpinned by consultation with key stakeholders. Updates to the plan will be informed, *inter alia*, by corrective actions that may be needed to stay on track toward the overall 2030 targets and the ultimate objective of achieving a transition to a competitive, low-carbon, climate-resilient, and environmentally sustainable society, and economy by 2050.

A Call for Evidence to inform the development of a revised CAP closed on 18 May 2021. The purpose of the Call for Evidence is to ensure Ireland can achieve its 2030 climate targets, prepare for climate neutrality no later than 2050 and to make Ireland a leader in responding to climate change.

In July 2022, the Government increased Ireland's offshore wind target for 2030 from 5 GW to 7 GW (DECC, 2022a).

3.3.6 National Marine Planning Framework (NMPF)

The NMPF was formally established by the Government on 20 May 2021. It contains overarching marine planning policies that are applicable to all proposals in Ireland's extensive maritime area which comprises an area of approximately 490,000 km^2. The NMPF serves as a parallel to the NPF, as it sets out the Government's long-term planning objectives and priorities for the management of our seas over a 20-year time frame.

The main driver for the NMPF is the European Maritime Spatial Planning Directive and *Harnessing our Ocean Wealth - An Integrated Marine Plan for Ireland* (Government of Ireland, 2012). Public bodies are legally obliged to secure the objectives of the NMPF. The NMPF contains numerous planning policies with which the Project is consistent, including:

- ORE Policy 1 – Proposals that assist the State in meeting the Government's target of generating at least 5 GW of offshore renewable electricity by 2030 and proposals that maximise the long-term shift from use of fossil fuels to renewable electricity, in line with decarbonisation targets should be supported. All proposals will be rigorously assessed to ensure compliance with environmental standards and seek to minimise impacts on the marine environment, marine ecology and other maritime users.
- ORE Policy 9 – A permission for ORE must be informed by inclusion of a visualisation assessment that supports conditions on any development in relation to design and layout. This consideration must be included as part of statutory environmental assessments where such assessment is required.
- ORE Policy 11 – Where appropriate, proposals that enable the provision of emerging renewable energy technologies and associated supply chains will be supported.
- Infrastructure Policy 1 – Appropriate land-based infrastructure which facilitates marine activity (and vice versa) should be supported. Proposals for appropriate infrastructure that facilitates the diversification or regeneration of marine industries should be supported.
- Employment Policy 1 – Proposals should demonstrate contribution to a net increase in marine related employment in Ireland, particularly where the proposals are:
  - In line with the skills available in Irish coastal communities adjacent to the maritime area,
  - Improve the sustainable use of natural resources,
  - Diversify skills to enable employment in emerging industries.
- Transboundary Policy 1 – Proposals that have transboundary impacts beyond the maritime area, on either the terrestrial environment or neighbouring international jurisdictions, must show evidence of consultation with the relevant public authorities, including terrestrial planning authorities and other country authorities.
- Safety at Sea Policy 1 – Proposals for installation, operation, and decommissioning of Offshore Wind Farms must demonstrate how they will:

- Minimise navigational risk between commercial vessels arising from an increase in the density of vessels in maritime space as a result of wind farm layout.
- Allow for recreational vessels within the Offshore Wind Farm (including consideration of turbine height) or redirect recreational vessels, minimising navigational risk arising between recreational and commercial vessels.

In addition to numerous overarching economic and social marine planning policy objectives as set out above, the NMPF highlights the importance of the environmental protection of the maritime area. More specifically, the NMPF sets out policies which, while not specific to wind energy, seek to support and protect environmental sensitivities, including policies in the areas of:

- Biodiversity and protected marine sites;
- Water quality;
- Underwater noise;
- Air quality; and
- Climate change.

3.4 Environmental Impact Assessment (EIA)

EIA requirements derive from EU Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC, 2011/92/EU) as well as 2014/52/EU on the assessment of the effects of certain public and private projects on the environment. The primary objective of the EIA Directive is to ensure that projects which are likely to have 'significant effects' on the environment are subject to an assessment of their likely impacts.

In the context of planning, the EIA Directive is given effect in Ireland through the Planning and Development Act 2000 (as amended) and Maritime Area Planning Act 2021. The EU (Planning and Development) (EIA) Regulations 2018 (S.I. No. 296/2018), (hereafter the EIA Regulations 2018) came into operation on 1 September 2018 and transpose Directive 2014/52/EU into Irish Law and give further effect to the 2011 Directive.

3.5 Habitats Directive Assessments

The Appropriate Assessment (AA) process is a separate but inter-related process to EIA, required under the EU Habitats Directive (92/43/EEC) for any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to AA of its implications for the site *i.e.* Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), also known as European Sites in view of the site's conservation objectives.

AA Guidelines for Planning Authorities have been published by the Department of the Environment, Heritage and Local Government (DEHLG, 2010a). In addition to the advice available from the Department, the EC has published a number of documents which provide a significant body of guidance on the requirements of AA, most notably including, 'Assessment of Plans and Projects Significantly Affecting Natura 2000 sites - Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC' (EC, 2021), which sets out the principles of how to approach decision making during the process. These principal national and European guidelines must be followed in the preparation of reports required under the Habitats Directive. The following list identifies these and other pertinent guidance documents, while **Section 4.4** outlines the assessment requirements under the Habitats Directive:

- Communication from the Commission on the Precautionary Principle, Office for Official Publications of the European Communities, Luxembourg (EC, 2000);

- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission (EC, 2007);
- Estuaries and Coastal Zones within the Context of the Birds and Habitats Directives – Technical Supporting Document on their Dual Roles as Natura 2000 Sites and as Waterways and Locations for Ports. (EC, 2009);
- AA of Plans and Projects in Ireland. Guidance for Planning Authorities. (DEHLG, 2010a);
- Department of Environment, Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on AA under Article 6 of the Habitats Directive – Guidance for Planning Authorities (DEHLG, 2010b);
- Guidance document on the implementation of the Birds and Habitats Directive in estuaries and coastal zones with particular attention to port development and dredging. (EC, 2011a);
- EC Staff Working Document 'Integrating biodiversity and nature protection into port development' (EC, 2011b);
- Marine Natura Impact Statements (NIS) in Irish Special Areas of Conservation: A working document, National Parks and Wildlife Service (NPWS), Dublin (NPWS, 2012);
- Interpretation Manual of EU Habitats. Version EUR 28. (EC, 2013);
- Guidance on Environmental Impact Statement (EIS) and NIS Preparation for ORE Projects. Department of Communications, Climate Action and Environment (DCCAE) (2017);
- EC Notice "Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC", Office for Official Publications of the European Communities, Luxembourg (EC, 2018);
- EC (2021) Commission Notice. Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC EC; and
- Office of the Planning Regulator (OPR) (2021) Practice Note PN01. AA Screening for Development Management.

3.6 Water Framework Directive (WFD) Impact Assessment

The impact of the Project on the overall ecological status of relevant water bodies (including river, transitional and coastal water bodies)) in terms of the objectives set out in Article 4(1) of the WFD will be assessed.

Article 4(1)(a) requires that, within specified time frames, Member States shall:

- Prevent deterioration of the status of all bodies of surface water; and
- Protect, enhance and restore all surface water bodies, with the aim of achieving good status.

It proposes to achieve these objectives by establishing river basin districts (RBD) in which environmental objectives will be set, including targets for surface waters. The second cycle river basin management plan (RBMP) covers the period 2018-2021; the third cycle RBMP is in draft and undergoing consultation and covers the period 2022-2027.

The European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (SI No. 272 of 2009) sets out environmental quality standards (EQS's) which may be used to classify surface water status. These are based on biological quality elements, physicochemical conditions supporting biological elements,

priority substances and priority hazardous substances. Surface waters must achieve at least Good ecological status and Good chemical status.

The ecological status falls into either High, Good, Moderate, Poor or Bad. The ecological status is determined by biological factors, supporting water quality conditions, hydrology and morphology.

Hydrology and morphology address the river flow and level and other physical conditions of the water channel such as the bed shape and substrate.

The chemical status of surface waters is either pass or fail depending on the levels or concentrations of priority substances and chemicals including heavy metals, pesticides, and hydrocarbons compared with European EQS's set to protect aquatic life.

A risk category is also assigned by the Environmental Protection Agency (EPA) based on whether or not a water body is meeting its WFD objectives. A water body is considered to be *Not at Risk* when it is achieving its environmental objectives and there is no evidence indicating a trend towards status decline. A water body *At Risk* is either not achieving its environmental objectives or is trending towards a decline in status; these water bodies are prioritised for the implementation of measures under the RBMP. Where a water body is placed under *Review*, it may show either an improving or a deteriorating trend, but more evidence is needed before it can be considered either *Not at Risk* or *At Risk* respectively. In some cases, there is not yet enough evidence to determine the risk.

A 2015 decision by the European Court of Justice (CJEU) in the so-called *Weser* case[2] established that Member States cannot authorise a project that may cause deterioration of water body status or may jeopardise the attainment of good surface water status.

This decision effectively established two key tests of WFD compliance which, by definition, must be established in advance of the Project occurring. These key tests for WFD compliance will be examined in relation to whether, as a result of the Project:

1. Deterioration of water body status may occur; or
2. Attainment of good surface water status could be jeopardised.

The concept of 'deterioration of status of a body of surface water' is not defined in the WFD. The decision in *Weser* provided the following clarifications on the way in which WFD compliance should be interpreted:

- "Deterioration of the status" of the water body includes a fall by one class of any element of the quality elements within the meaning of Annex V of the WFD, even if the fall does not result in a fall of the classification of the body of surface water as a whole; and

- If the quality element is already in the lowest class, any deterioration of that element represents a deterioration of the status within the meaning of WFD Article 4(1)(a)(i).

The decision in *Weser* also placed emphasis on the interpretation of the word "enhancement" in Article 4(1). The objectives carry not only the obligation to prevent deterioration, but also the obligation to "enhance" (Art. 4 (1)(a)) status. That is, any deterioration, even within a status class band, challenges the precise Article 4 obligation of "enhancement". Hence any degree of further deterioration of a quality element is considered a contradiction, as it drives the water body further away from achieving WFD objectives.

On the basis of the above, a WFD Assessment Report will be compiled and will accompany the EIAR in the planning submission application, this report will consider the EPA monitored sites on the relevant water bodies and assess the potential change in the water body status that the Project may have.

[2] Case C-461/13 Bund für Umwelt und Naturschutz Deutschland ECLI:EU:C:2015:433.

4 Environmental Impact Assessment (EIA)

4.1 Scoping

The objective of this informal EIA scoping process is to identify environmental topics for assessment which may be relevant to the Project, deciding what information should be contained in the EIAR and what methods should be used to gather and assess that information. Scoping is concerned with identifying those aspects of the environment where there is an interaction, either direct or indirect, positive or negative, with the Project and as a consequence where there is potential for likely and significant effects, these need to be assessed.

The process involves an assessment of a project's possible issues before deciding which should be brought forward for further consideration in the EIAR. Although scoping commences early in the process and informs the content and level of detail in the EIAR, it is noted that scoping is dynamic and only provides a starting point from which to launch an environmental assessment of the Project. It is regarded as an ongoing phase throughout the evolution of the EIAR.

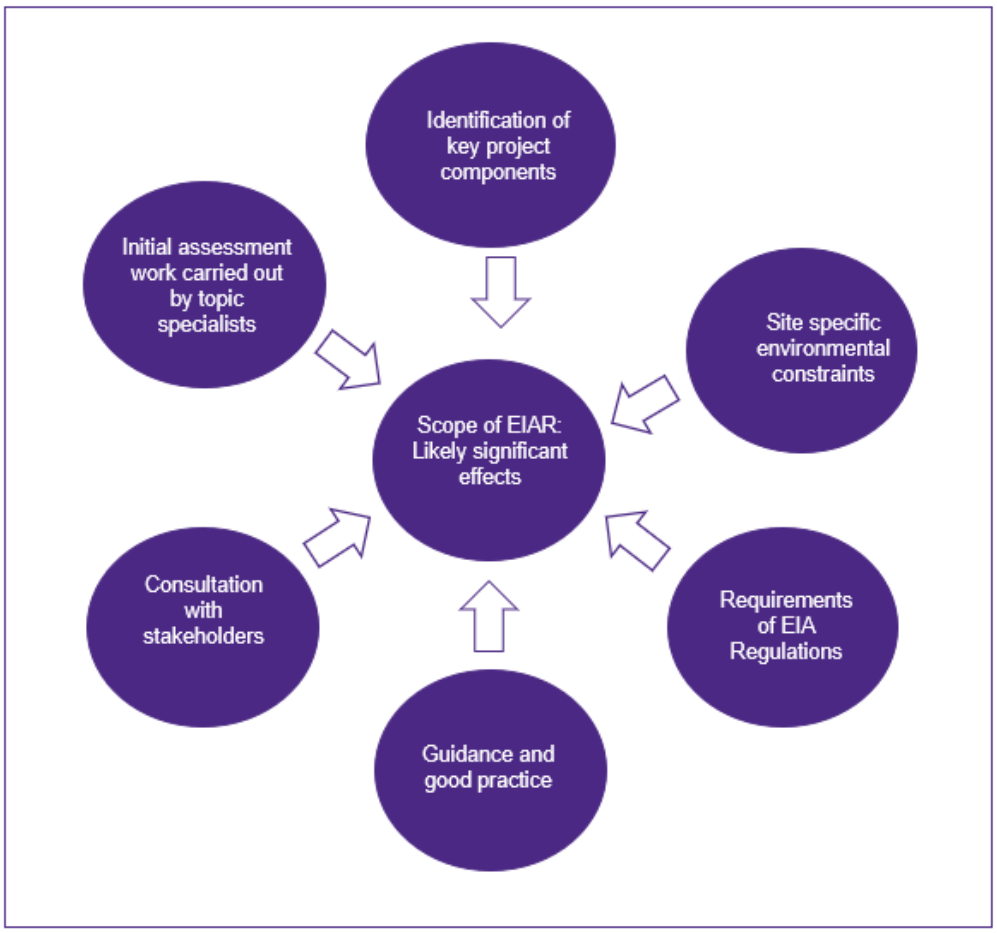


Figure 4-1: Scoping Process.

4.1.1 Technical Scope

In accordance with the requirements of the EIA Regulations 2018 and the information to be contained in an EIAR (Schedule 6), the following list of offshore and onshore environmental topics will be examined through

the EIAR for the Project. Indicative chapter numbers have been provided in **Table 4.1** below, however, these may be subject to change in the EIAR.

Table 4.1: Cross referencing of indicative EIAR Chapters against EIA Directive (Article 3) Factors.

Factors to be considered and assessed from Directive (Article 3)	Chapter factors to be considered and Assessed in EIAR
1(a): Population and human health	▪ Chapter 21: Population ▪ Chapter: 22: Human Health considering both onshore and offshore aspects
1(b): Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC	▪ Chapter 11: Subtidal and Intertidal Ecology ▪ Chapter 12: Fish and Shellfish Ecology ▪ Chapter 13: Marine Mammals and Megafauna ▪ Chapter 14: Offshore Ornithology ▪ Chapter 15: Offshore Bats ▪ Chapter 23: Terrestrial and Aquatic Biodiversity
1(c): land, soil, water, air and climate	▪ Chapter 10: Marine Geology, Sediments and Coastal Processes ▪ Chapter 24: Land and Agriculture ▪ Chapter 25: Soil, Geology and Hydrogeology ▪ Chapter 26: Hydrology and Flood risk ▪ Chapter 27: Air Quality ▪ Chapter 28: Climate ▪ Chapter 29: Noise and Vibration
1(d): material assets, cultural heritage and the landscape	▪ Chapter 16: Commercial Fisheries and Aquaculture ▪ Chapter 17: Shipping and Navigation ▪ Chapter 18: Aviation and Military ▪ Chapter 19: Marine Archaeology and Cultural Heritage ▪ Chapter 20: Offshore Infrastructure, Other Users and Communications ▪ Chapter 30: Cultural Heritage including Architectural and Archaeological Heritage ▪ Chapter 31: Landscape, Seascape and Visual Amenity ▪ Chapter 32: Traffic and Transport ▪ Chapter 33: Material Assets ▪ Chapter 34: Waste
1(e): the interaction between the factors referred to in points (a) to (d).	▪ Chapter 8: Inter-related Effects
2: The effects referred to in paragraph 1 on the factors set out there in shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned	▪ Chapter 9: Risk of Major Accidents and Hazards

Furthermore, **Table 4.2** below shows the information required in the EIAR as per Annex IV of 2011/92/EU, as amended by 2014/52/EU and as transposed into Irish Law and the indicative chapter numbers which may be subject to change, which contain the information required.

Table 4.2: Annex IV Information Referred to in Art. 5.1 of 2011/92/EU, as amended by 2014/52/EU and as transposed into Irish Law.

Information for the EIAR as per Article 5(1)	Relevant Chapter in EIAR
1. Description of the project, including in particular: (a) a description of the location of the project; (b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; In a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases.	▪ Chapter 5: Project Description ▪ Chapter 5: Project Description and Chapter 34: Waste
2. A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	▪ Chapter 4: Alternatives Considered
3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	▪ Chapter 8 and Chapters 10 to 34
4. A description of the factors specified in Article 3(1) likely to be significantly affected by the project: 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.	▪ Chapter 8 and Chapters 10 to 34
5. A description of the likely significant effects of the project on the environment resulting from, *inter alia*: (a) the construction and existence of the project, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resource(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disaster); (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;	▪ Chapter 8 and Chapters 10 to 34

Information for the EIAR as per Article 5(1)	Relevant Chapter in EIAR
(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; (g) the technologies and the substances used. The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.	
6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	▪ Chapter 8 and Chapters 10 to 34
7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	▪ Chapters 10 to 34 and Chapter
8. A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies	▪ Chapter 6 and Chapters 10 to 34
9. A non-technical summary of the information provided under points 1 to 8.	▪ Volume 1: Non-Technical Summary
10. A reference list detailing the sources used for the descriptions and assessments included in the report.	▪ Volume 2A All chapters

Each technical assessment will be carried out by a specialist in the relevant field to the current impact assessment guidance. In addition, it is proposed to include concluding chapters on summary of impacts and commitments register, and overall conclusion.

4.1.2 Geographic Scope

The geographic scope of the EIAR will vary for each environmental topic and will depend on the nature and sensitivity of the receiving environment and the manner in which impacts may be received, *e.g.* via air, water etc.

4.1.3 Temporal Scope

For the EIAR, the potential impacts at all stages of the Project will be considered and assessed, including the construction, operation, and decommissioning stages and reasonable alternatives of same. In all cases the "do nothing" scenario and the "do something" scenario, *i.e.*, the proposed development, will be considered and assessed. During the operational phase the assessment will include assessment of impacts in short, medium, and long term as appropriate. For construction and decommissioning it is assumed that these phases will be completed within 7 years and therefore considered short term (EPA, 2022a).

4.1.4 Environmental Guidelines

The preparation of this Scoping report has had regard to:

- Guidance on EIA Scoping (EC, 2017a);
- Guidelines on the Information to be contained in EIS (EPA, 2022a);
- Guidance on EIA Report (EC, 2017b);
- LA 104, Environmental assessment and monitoring (Design Manual for Roads and Bridges (DMRB), 2020); and
- DCCAE Guidance on EIS and NIS Preparation for ORE Projects gov.ie - Guidance Documents for Offshore Renewable Energy Developers (www.gov.ie) (DCCAE, 2017).

It must be emphasised that scoping for an EIA is ongoing and iterative and continues throughout the EIA process. As such the Scoping Report is never final but an ever-changing document. This allows the flexibility to adapt to any new issues, for example the discovery of additional impacts arising from detailed baseline studies resulting in the investigation of new impacts, alternatives and mitigation measures as necessary.

4.2 EIA Methodology

Information about the Project and the Project's activities for all stages of the Project life cycle (construction, operational and maintenance, and decommissioning) will be combined with information about the environmental baseline to identify the potential interactions between the Project and the environment.

To ensure consistency throughout the EIAR, the terms and definitions used in this Scoping Report are based on the terms used in the Guidelines on the Information to be Contained in EIS (EPA, 2022a).

These potential interactions are known as potential impacts. The potential impacts are then assessed for the level of significance of their effect on the receiving environment/receptors.

The outcome of the assessment is the determination of the significance of the impacts against predetermined criteria, set by the EPA (2022a). The sensitivity of the receptor is defined through consideration of the vulnerability, recoverability and value/importance of that receptor.

The magnitude of the impact is defined through consideration of the spatial extent, duration, frequency and reversibility of that impact.

Significance is assessed by correlating the magnitude of the impact and the sensitivity of the receptor.

The transboundary and potential for cumulative impacts (in conjunction with other applicable projects) will also be assessed. The methodology for these elements is outlined in **Sections 4.2.1** and **4.2.2** below.

Each topic lead will define their own sensitivity and magnitude criteria based on terms and methods appropriate and specific to their topic. These criteria will be presented in table form and an example of these criteria from LA 104, Environmental assessment and monitoring (DMRB, 2020) are shown in **Table 4.3** and **Table 4.4** below.

Table 4.3: Example of Definition of Terms Relating to the Magnitude of Impacts.

Magnitude of impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse) Large scale or major improvement or resource quality; extensive restoration or enhancement, major improvement of attribute quality (Beneficial)
Medium	Loss of resource, but not adversely affecting integrity of resource; partial loss of/damage to key characteristics, features or elements (Adverse) Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial)
Low	Some measurable change in attributes, quality or vulnerability, minor loss or, alteration to, one (maybe more) key characteristics, features or elements (Adverse) Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial)
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse) Very minor benefit to, or positive addition of one or more characteristics, features or elements (Beneficial)

Table 4.4: Definitions Relating to the Sensitivity of the Receptor.

Sensitivity	Definition
High	Very high importance and rarity, national scale and limited potential for substitution
Medium	High or medium importance and rarity, regional scale, limited potential for substitution
Low	Low or medium importance and rarity, local scale
Negligible	Very low importance and rarity, local scale

The significance of the effect is determined by correlating the descriptor (character / magnitude / duration / probability / consequences) of the effect and the sensitivity of the receptor, see **Figure 4-2**. Significant effects (in EIA terms) are considered to be those assessed as being either "moderate", "significant", "very significant" or "profound". Other effects (imperceptible, not significant or slight) are considered to be not significant.

The EPA (2022a) Guidelines on the Information to be Contained in EIAR provides guidance on the significance of effect levels as follows:

- **Profound**: An effect which obliterates sensitive characteristics.
- **Very Significant:** An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
- **Significant:** An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
- **Moderate**: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.

- **Slight**: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- **Not Significant**: An effect which causes noticeable changes in the character of the environment but without significant consequences.
- **Imperceptible:** An effect capable of measurement but without significant consequences.

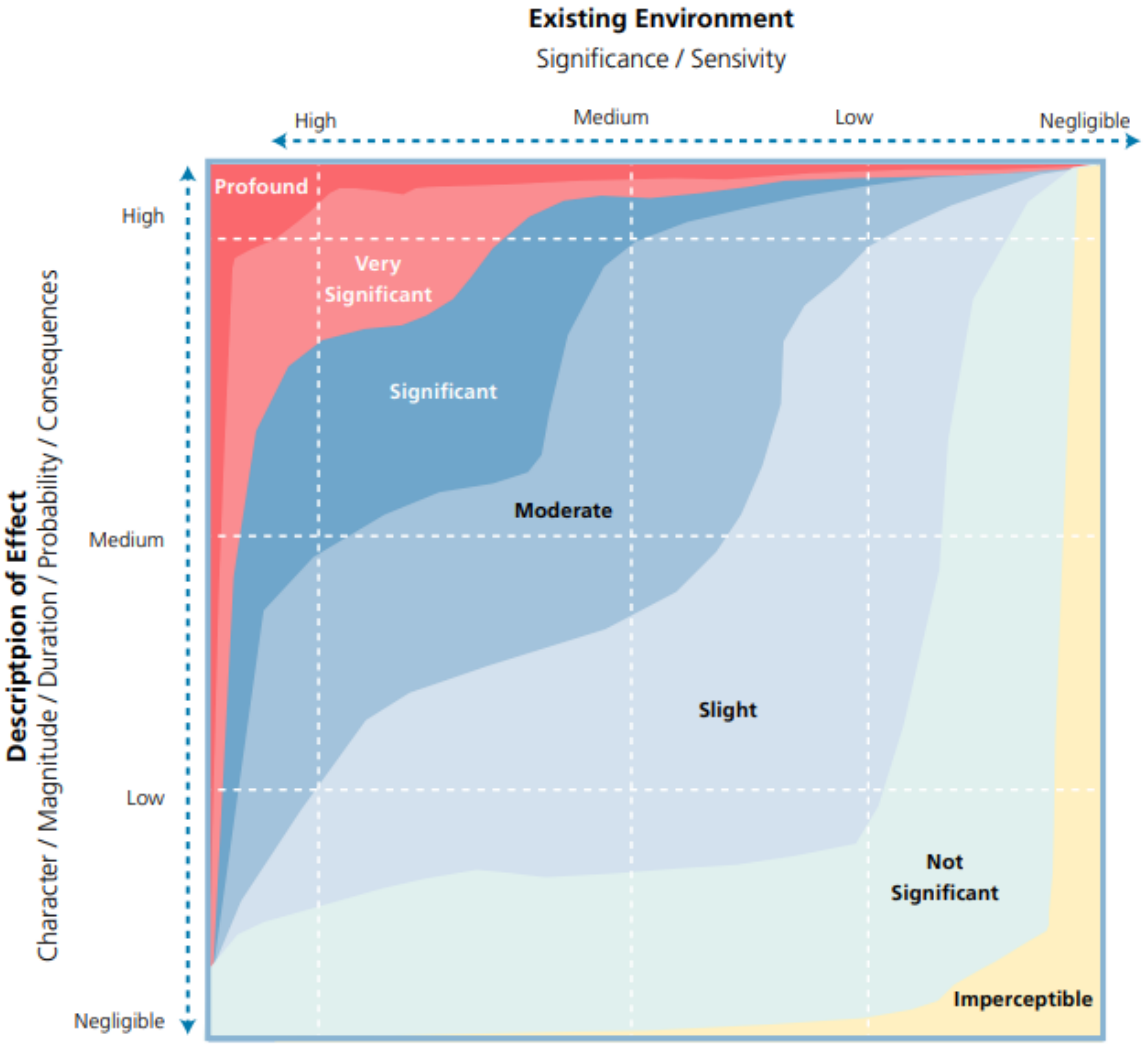


Figure 4-2: Chart showing typical classifications of the significance of effects (EPA, 2022a).

4.2.1 Cumulative Impact Assessment (CIA)

The CIA will consider the likely cumulative impacts with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resource (EIA Directive; EC, 2014). While a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or insignificant), result in a cumulative impact that is collectively significant (EPA, 2022a).

Cumulative effects are defined in the EPA (2022a) Guidelines on the Information to be Contained in EIAR as "The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects". This includes the impact of other relevant developments that were not present at the time of data collection or survey.

4.2.1.1 Approach to Cumulative Impact Assessment (CIA)

A fundamental requirement of undertaking CIA is to identify those projects, plans or activities with which the Project may interact to produce a cumulative impact. These interactions may arise within the construction, O&M or decommissioning phases.

A three-staged process (based on Planning Inspectorate Guidance Note Seventeen, 2019) will be developed in order to methodically and transparently identify the projects, plans and activities that may be considered cumulatively alongside the Project. This will involve a stepwise process that considers the level of detail available for projects, plans and activities, as well as the potential for interactions on a conceptual, physical and temporal basis.

The identification of these other projects will be undertaken using a three-staged approach to gather information on other projects, plans and activities within the defined wider area, including transboundary projects, for each topic considered in the EIAR.

Stage 1 requires the wider area being defined by each topic specialist. A desk study is then undertaken to search planning/foreshore consent applications/Dumping at Sea Permits, relevant development frameworks and any other available sources to identify other plans/projects falling within the largest defined wider area, which may have the potential to give rise to cumulative effects with the Project. This list of projects will include other existing or approved developments, including those which are under construction, permitted but not yet implemented, submitted but not yet determined or identified in a relevant development plan. Projects that do not fall within the largest defined wider area will not be considered further. Stage 1 will also provide the initial identification of projects in accordance with the following key assumptions:

- An indicative construction commencement date of 2027 has been assumed for the Project with construction taking placed in 2027, 2028, 2029 and 2030 It should be noted that these dates may be subject to change. Any licence/lease/consent which expires before the end of 2024 will be excluded on the basis of no temporal overlap (*i.e.,* licence expired) with the Project;

- All “Relevant” projects will be considered in Stage 2. Furthermore, all offshore renewable projects that have sufficient certainty/information on the project’s location and design to allow for assessment will be included in Stage 2. Any EPA licence which is surrendered before 2024 will be excluded on the basis of no temporal overlap with the assumed construction programme for the Project; and

- The following types of projects are not listed owing to their nature and scale (*i.e.* are unlikely to result in cumulative impacts with the Project) include one-off housing, farm sheds/buildings, house/building extensions/renovations.

Stage 2 will provide a reduced list of projects and plans following the application of the above assumptions. Further information on the projects listed in Stage 2 is then gathered to inform the cumulative assessment by topic specialists. This will involve a desk study to source publicly available information on projects using planning databases and internet searches. The relevant project parameters for the projects, plans and activities considered cumulatively will be drawn from EIARs or other similarly detailed planning documents (*i.e.* licence applications). Approximate distances to the Project will also be provided for each project, plan and activity, to better understand any spatial overlap.

Stage 3 will involve tailoring the list of projects from Stage 2 to the cumulative wider area identified for each of the topics. Each of the topic authors will then further consider the list of projects in accordance with the following set of defined screening criteria to identify which projects should be brought forward in the assessment of cumulative effects:

- Included as part of the topic baseline and hence not considered within the cumulative impact assessment: Screened out of assessment;

- Part of the baseline but has an ongoing impact and is therefore considered relevant to the cumulative impact assessment: Screened into assessment;

- Potential cumulative impact exists: Screened into assessment;

- No conceptual or physical effect-receptor pathway: Screened out of assessment;
- Low data confidence (where there is little publicly available information to provide a meaningful assessment): Screened out of assessment;
- No temporal overlap: Screened out of assessment; and
- Project has been withdrawn from development or operation: Screened out of assessment.

4.2.1.2 Assessment Stage

List of projects, plans and activities deemed within scope

Projects, plans and activities deemed within scope will be carried forward into the CIA of the relevant topic chapters of the EIAR. A list of all projects, plans and activities identified for assessment will be tabulated and included in the relevant topic chapters. The list will also include a summary of relevant details for each of the projects, plans and activities relevant to the CIA.

Implementing the CIA

The CIA is presented within each topic chapter in a separate section.

4.2.2 Transboundary Effects

4.2.2.1 Transboundary Effects Legislation and Guidance

The need to consider transboundary effects has been embodied by the United Nations Economic Commission for Europe (UNECE) Convention on EIA in a Transboundary Context, adopted in 1991 in the Finnish city of Espoo and 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 impacts. The Espoo Convention has been ratified by the EU, Ireland and the UK. It is aimed at preventing, mitigating and monitoring environmental damage by ensuring that explicit consideration is given to transboundary environmental factors before a final decision is made as to whether to approve a project. The Espoo Convention requires that the Party of origin notifies affected Parties about projects listed in Appendix I and likely to cause a significant adverse transboundary impact.

Article 7 of the EIA Directive introduces similar requirements concerning projects carried out in one Member State but likely to have significant effects on the environment of another. While the EIA Directive provides a definition of the term 'project' the 1991 Espoo Convention uses the term 'proposed activity'. The principal obligation is in respect of information and consultation and is imposed by Article 7(4) of the amended EIA Directive:

“The Member States concerned shall enter into consultations regarding, *inter alia*, the potential transboundary effects of the project and the measures envisaged to reduce or eliminate such effects and shall agree on a reasonable time-frame for the duration of the consultation period.”

This corresponds to the EPA Guidelines (2022a), which outlines that in the case of an EIAR, for any project that is likely to cause significant transboundary effects, contact with the relevant authorities in other Member States should be made. This will establish a consultation framework to consider and address these effects.

Potential transboundary effects will be identified in each topic chapter of the EIAR.

4.2.2.2 Approach to Assessment of Transboundary Effects

Transboundary assessment

Where likely significant transboundary effects are identified in the EIA process then there is an obligation (Article 7(4) of the amended Directive) for the developer to contact the relevant authorities in the UK (including

Northern Ireland) or/any other potentially affected states. The potential for transboundary effects will be discussed between the developer and the CA during pre-application consultation. Contact between the authorities will establish a consultation framework to consider and address these effects (EPA, 2022a).

The assessment of transboundary effects for each receptor group will be included in the relevant topic chapters of the EIAR, taking into account the inter-relationships between effects.

The consideration of transboundary effects will be undertaken in accordance with the guidance provided in the following document: Guidance on the Application of the EIA Procedure for Large-scale Transboundary Projects (2013) and will follow the seven key steps identified in this guidance document:

- Notification and transmittal of information (Articles 7.1 and 7.2 of the EIAD; Article 3 Espoo);
- Determination of the content and extent of the matters of the EIA information – scoping (Article 5.2 of the EIAD);
- Preparation of the EIA information/report by the developer (Articles 5.1, 5.3 and Annex IV of the EIAD; Article 4 and Appendix II Espoo);
- Public participation, dissemination of information and consultation (Articles 6, 7.3 EIAD, Article 3.8, 2.2, 2.6 and 4.2 Espoo);
- Consultation between concerned Parties (Article 7.4 EIAD, Article 5 Espoo);
- Examination of the information gathered and final decision (Article 8 EIAD, Article 6.1 Espoo); and
- Dissemination of information on the final decision (Article 9 EIAD, Article 6.2 Espoo).

4.2.3 Risk of Major Accidents and Hazards

This EIAR chapter will present the expected effects deriving from the vulnerability of the Project to risks of major accidents and/or natural disasters, based on the information gathered and the analysis and assessments undertaken.

This includes an assessment of the vulnerability of the project to the following potential major risks:

- Risks to the environment, human health and material assets from potential accidents and disasters occurring as a result of Project activities undertaken during the construction, operation or decommissioning of the Project (e.g. risk of vessel collision, risk of pollution of the marine environment from pollution events during the Project's operational phase); and
- Risks to the Project from potential accidents and disasters resulting from natural disasters (in particular extreme weather events) as well as from accidents occurring in nearby infrastructure, such as existing built services and control of major accident hazards (COMAH) establishments (*e.g.* risks from extreme precipitation events, risk of accidents from existing built infrastructure).

The chapter will present the existing environmental baseline established from desk studies, and consultation and will identify any assumptions and limitations encountered in compiling the environmental information. Furthermore, the chapter will highlight any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce, or offset the possible environmental effects of the Project arising from major accidents and/or natural disasters.

The assessment will be focused on all elements of the Project (onshore and offshore) including the onshore cable corridor (including joint bays), landfall location, OnSS site, O&M facility, and the offshore wind farm area consisting of the offshore cable corridor and offshore wind farm area.

The assessment will be informed by the following technical chapters, these chapter numbers are indicative and may be subject to change in the EIAR:

- Chapter 5: Project Description;
- Chapter 10: Marine Geology, Sediments and Coastal Processes;
- Chapter 16: Commercial Fisheries and Aquaculture;
- Chapter 17: Shipping and Navigation;
- Chapter 18: Aviation, and Military;
- Chapter 20: Offshore Infrastructure, Other Users and Communications;
- Chapter 24: Land and Agriculture;
- Chapter 25: Soils, Geology and Hydrology;
- Chapter 26: Hydrology and Flood Risk;
- Chapter 27: Air Quality;
- Chapter 28: Climate;
- Chapter 32 Traffic and Transport; and
- Chapter 33: Material Assets.

4.3 EIAR Structure and Content

From a practical perspective, in order to provide a holistic assessment of the Project, but at the same time differentiate the offshore and onshore assessments, it is proposed that a multi volume EIAR be prepared. This provides a suitable structure:

- To tailor the environmental topics to address the very different receiving environments, assessments and potential impacts;
- To support the different narratives around what level of environmental assessment has been carried out in respect of the onshore and offshore elements; and
- This will allow interested stakeholders to readily identify the assessments of relevance to them (be it locational or sectoral based).

An indicative structure of the multi volume EIAR Project is set out in **Table 4.5** (EPA, 2022a). Indicative chapter numbers have been provided however, these may be subject to change in the EIAR.

Table 4.5: Indicative Structure of the Multi-Volume EIAR.

Item	Detail
Volume 1	The Non-Technical Summary
Volume 2A (and Appendices / Figures)	This will present matters of common interest to the holistic assessment of the Project. It will provide the background to the Project and the requirement for the onshore and offshore assessments (including need and alternatives). Volume 2A will be arranged by the following headings: ▪ Chapter 1: Introduction ▪ Chapter 2: EIA Approach ▪ Chapter 3: Background and Need for the Project ▪ Chapter 4: Alternatives Considered ▪ Chapter 5: Project Description ▪ Chapter 6: Schedule of Environmental Commitments ▪ Chapter 7: Consultation ▪ Chapter 8: Inter-related effects ▪ Chapter 9: Risk of Major Accidents and Hazards
Volume 2B (and Appendices / Figures)	This will present the technical environmental assessment of the offshore elements and will be arranged by the following headings: ▪ Chapter 10: Marine Geology, Sediments and Coastal Processes ▪ Chapter 11: Subtidal and Intertidal Ecology ▪ Chapter 12: Fish and Shellfish Ecology ▪ Chapter 13: Marine Mammals and Megafauna ▪ Chapter 14: Offshore Ornithology ▪ Chapter 15: Offshore Bats ▪ Chapter 16: Commercial Fisheries and Aquaculture ▪ Chapter 17: Shipping and Navigation ▪ Chapter 19: Marine Archaeology and Cultural Heritage ▪ Chapter 18: Aviation and Military ▪ Chapter 20: Offshore Infrastructure, Other Users and Communications
Volume 2C (and Appendices / Figures)	This will present the technical environmental assessment of the onshore elements and will be arranged by the following headings: ▪ Chapter 21: Population ▪ Chapter 22: Human Health considering both onshore and offshore aspects

Item	Detail
	▪ Chapter 23: Terrestrial and Aquatic Biodiversity ▪ Chapter 24: Land and Agriculture ▪ Chapter 25: Soil, Geology and Hydrogeology ▪ Chapter 26: Hydrology and Flood Risk ▪ Chapter 27: Air Quality ▪ Chapter 28: Climate ▪ Chapter 29: Noise and Vibration ▪ Chapter 30: Cultural heritage (including architectural and archaeological heritage) ▪ Chapter 31: Landscape, Seascape and Visual Amenity ▪ Chapter 32: Traffic and Transport ▪ Chapter 33: Material Assets ▪ Chapter 34: Waste

4.4 Habitats Directive Requirements

A report to inform Screening for Appropriate Assessment (AA) will be undertaken to determine likely significant effects to Natura 2000 sites. Given the nature, scale and location of this Project it is likely to screen in. If the Project does screen-in for Stage 2 AA, then a Natura Impact Statement (NIS) will be prepared to inform the AA of the competent authority (CA). If it can be concluded on the basis of the AA that there will be no adverse effects on the integrity of a Natura 2000 site, the Project can proceed to authorisation by the CA. However, if adverse effects are likely, or in cases of doubt, the derogation steps of Article 6(4) will apply, but only in a case in which there are imperative reasons of overriding public interest (IROPI) requiring the Project to proceed, that there are no less damaging alternative solutions, and compensatory measures have been identified that can be put in place (DEHLG, 2010a).

The Natura 2000 sites will be considered in the context of the Project and how each site has the potential to be impacted in view of the conservation objectives of each site. It will be necessary to establish if the Project will trigger the need for an AA under Article 6 of the Habitats Directive. Article 6 (3) of the Habitats Directive states:

6(3) Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.

The focus of the Stage 2 AA will be on the potential for significant adverse effects, the conservation objectives of the site(s) and maintaining the integrity of the Natura 2000 site(s). Field surveys, (including specialist environmental surveys) and consultation with various statutory (and non-statutory) bodies such as NPWS, Department of Housing, Local Government and Heritage (DHLGH) and Inland Fisheries Ireland (IFI) will be completed to reach informed and professional judgements on the issues. In addition, any further information including, but not limited to, any plans, maps or drawings, scientific information or data required to enable the carrying out of an AA will be presented.

The outcome of this stage is an NIS. The findings of which should provide a clear statement of whether, or not, in view of best scientific knowledge and the conservation objectives of the site, if the plan or project, individually or in combination with other plans or projects may adversely affect the integrity of any European site(s).

5 Offshore EIAR Scope

This chapter outlines the key potential issues associated with relevant offshore environmental topics and identifies the specific methods and standards that will be used in the assessment. The most up to date available standards, guidelines and data has been referenced in this Scoping Report, however, it is recognised that amendments and updates will become available from time to time during the EIAR phase of the Project. The EIAR will reflect the most up to date information available at that time.

It should be noted that the various stages of the project will undergo a rigorous assessment process to ensure the identified potential environmental impacts are either avoided or mitigated in so far as is possible in line with best industry practice.

A number of additional stand-alone reports will be submitted in conjunction with the EIAR as part of the overall planning application. These additional reports are as follows:

- Planning Report;
- NIS; and
- WFD Assessment Report.

5.1 Marine Geology, Sediments and Coastal Processes

5.1.1 Baseline Environment

5.1.1.1 Tidal Elevation and Currents

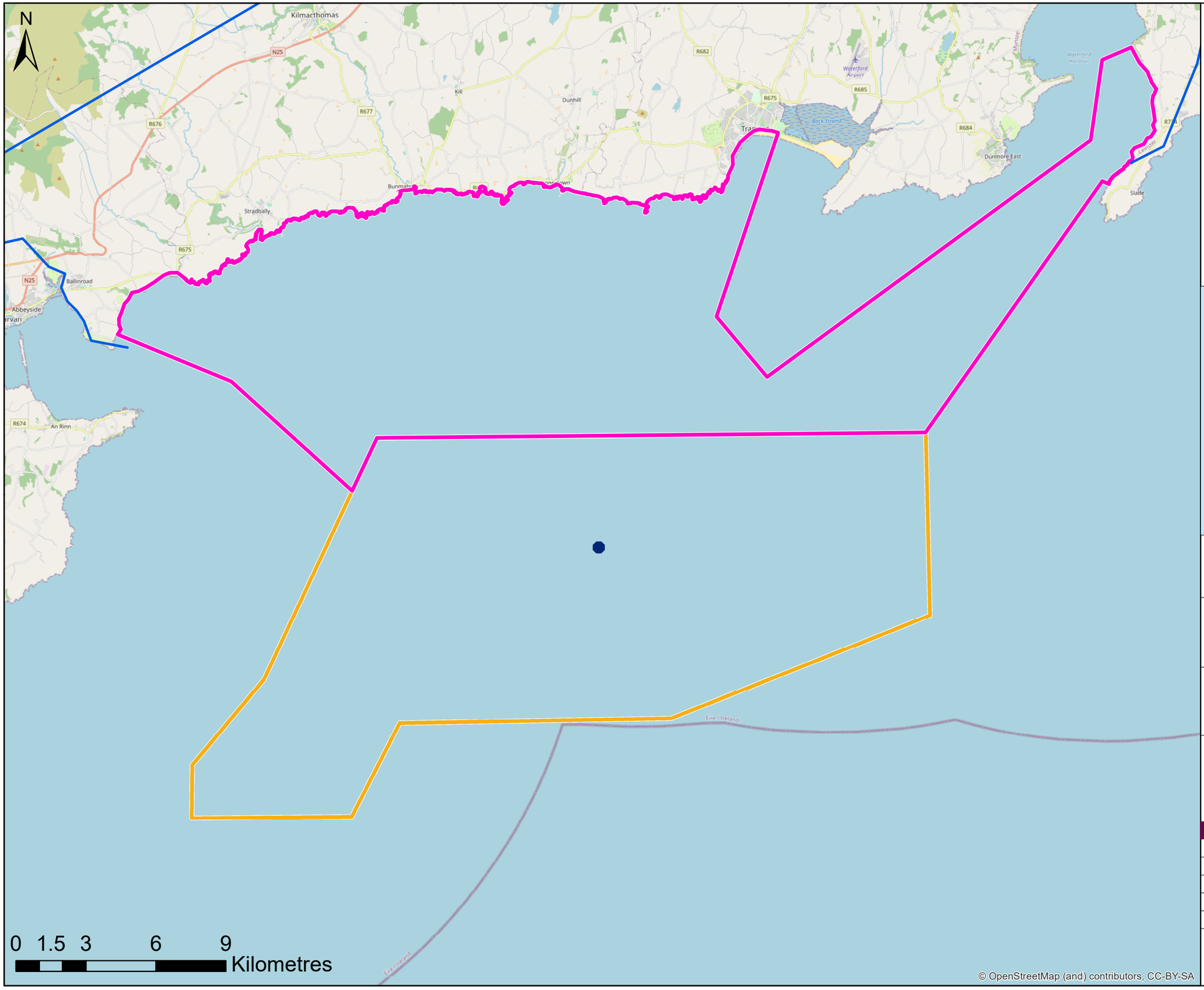
An understanding of tidal currents provides an insight into the patterns and rates of naturally occurring sediment transport. UK Hydrographic Office (UKHO) states that the mean spring tidal range at Dunmore East Port is approximately 2.7 m, however, this may vary significantly due to the location of the UKHO gauging station and the Project. The shallow waters of the north Celtic Sea are dominated by strong semi diurnal tides which are created as a response to the tides generated in the Atlantic via the Atlantic semi diurnal Kelvin wave (Coughlan and Stips, 2015). The MetOceanWorks (MOW) European Hydrodynamic Model, confirms tidally dominated currents with an average speed of 0.11m/s with low seasonal variation.

5.1.1.2 Wind and Waves

To examine site specific conditions, wind parameters between the years of 1979-2022 have been extracted from the climate forecast system reanalysis (CFSR) model via the DHI MetOcean Data Portal at an offshore point within the north Celtic Sea. For the same location, offshore wave data from 1979-2022 from the European Centre for Medium Range Forecasts (ECMWF) model was extracted, giving spectral wave data on significant wave height, wave directions, and wave periods. The mean wind speed was found to measure between c.10 m/s during winter months and *c.*4.5m /s during summer months with an annual average of *c.*7.2 m/s. The greatest wave heights are observed during winter in December and January when the average significant wave heights of *c.*1.75 m are *c.*40% greater than the annual average wave height of *c.*1.25 m.

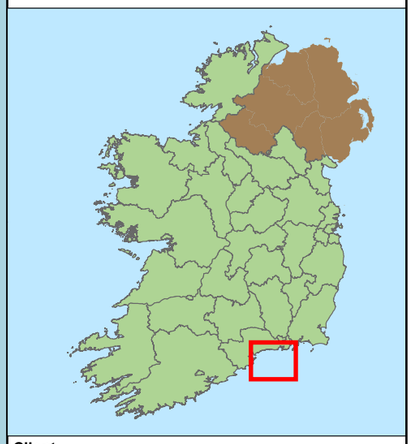
The offshore location from which wind and wave data was extracted from is 51°59'42.64"N, 7°11'40.91"W in the north Celtic Sea and this can be seen in **Figure 5-1.** This location represents potential wave and wind conditions experienced within the Offshore and Cable Route AoIs.

Wave and wind roses shown in **Figure 5-2** and **Figure 5-3** illustrates the wave and wind in the area, whilst summary statistics are shown in **Figure 5-4**. A review of the extracted wave data established that over 85% of the wave energy experienced at this location had peak wave periods in excess of 6 s, indicating that the majority of waves at this location are generated from swells in the Atlantic. This was corroborated by a dominant south-westerly direction as seen in the wave rose of **Figure 5-2**. Likewise, the dominant wind action propagating through the site was found to blow from a south-westerly direction, as shown in **Figure 5-3.** Wave point data showed that during extreme events, the NCS Offshore AoI can be subject to waves of greater than 8 m wave height and peak wave periods of greater than 15 s.



Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- 12 NM Limit
- Wave Point



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 5-1: Location of long-term offshore wave and wind point within the NCS Offshore AoI

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: PK	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0003
Approved By: CB	
Scale: 1:152,928@ A3	**Projection:** ITM (IRENET95)
Date: 22/03/2023	

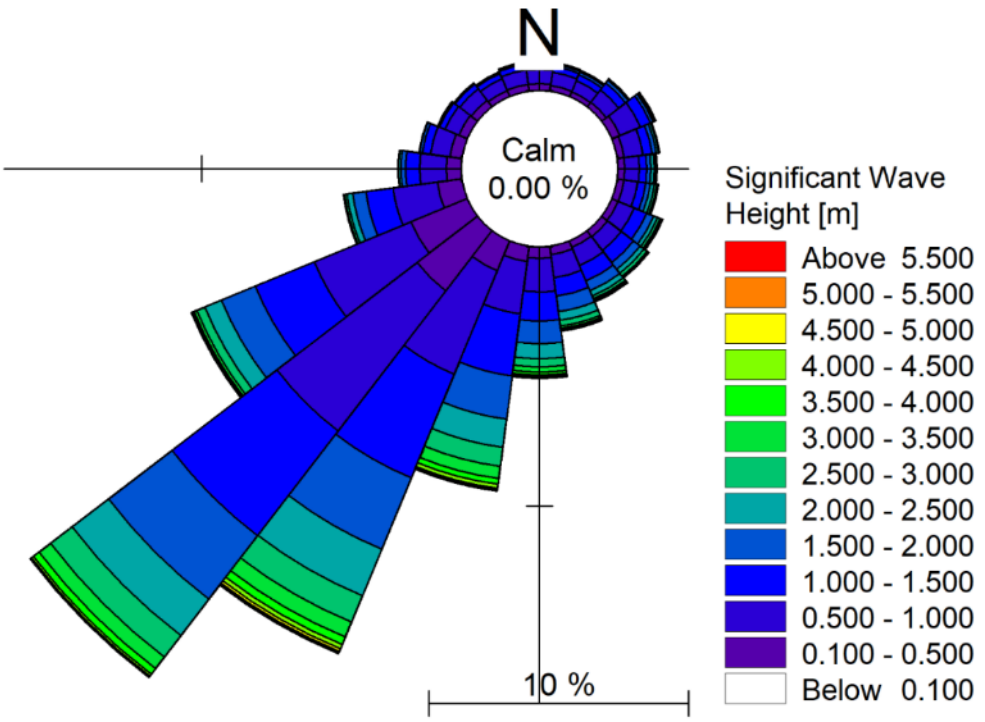


Figure 5-2: Long-Term Offshore Wave Rose for NCS Based on ECMWF Data from 1979-2022.

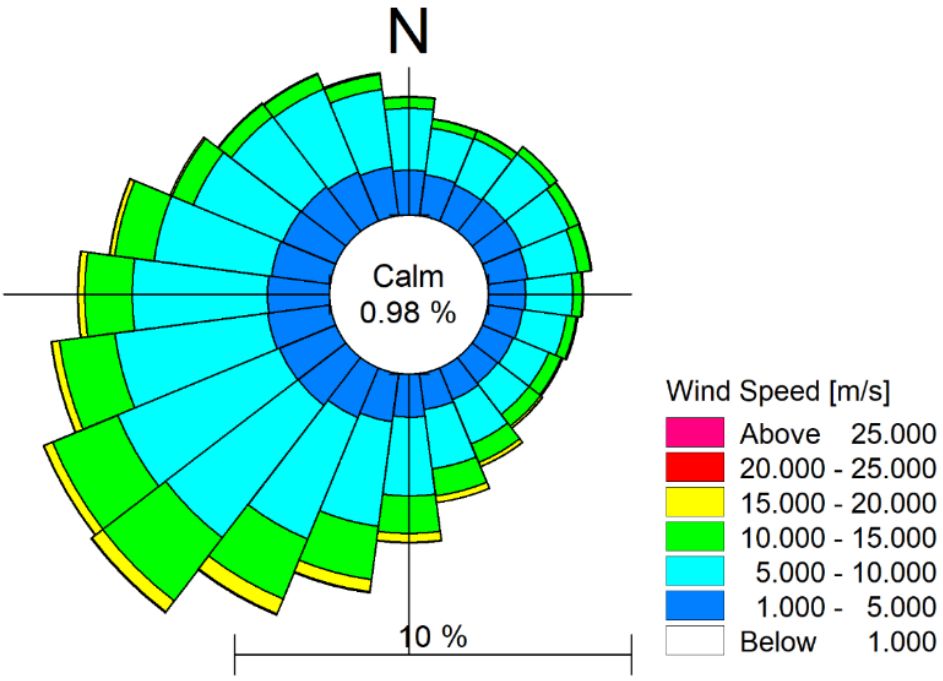


Figure 5-3: Long-Term Offshore Wind Rose for NCS Based on data from the CFSR model via the DHI MetOcean Data Portal Data from 1979-2022.

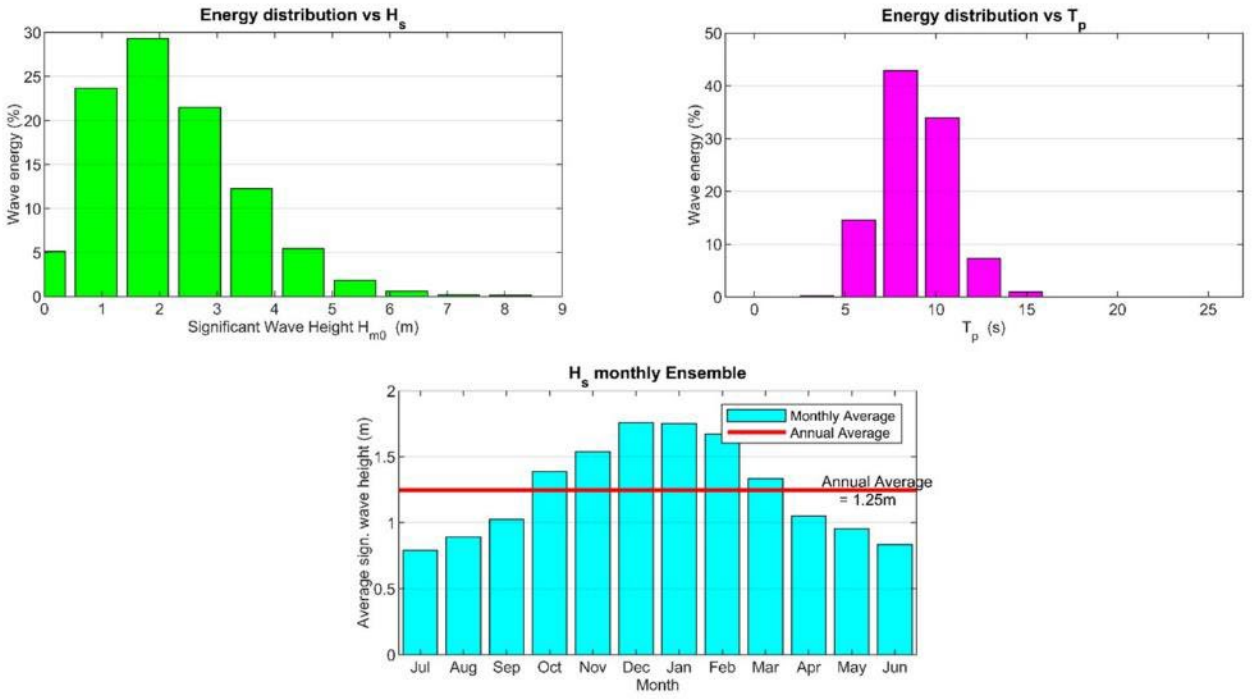


Figure 5-4: Summary Statistics of Long-Term Offshore Wave Climate in the NCS.

5.1.1.3 Bathymetry

The bathymetry (water depth) of the NCS Offshore and Cable Corridor AoI are described as quite regular, with a relatively linear sloping gradient, with shallow water depths of *c*. 46 - 68 m and *c*. 0 - 49 m relative to mean sea level (MSL) in the Offshore and Cable Corridor AoIs, respectively (INFOMAR, 2023). **Figure 5-5** shows the bathymetry of the NCS Offshore and Cable Corridor AoIs.

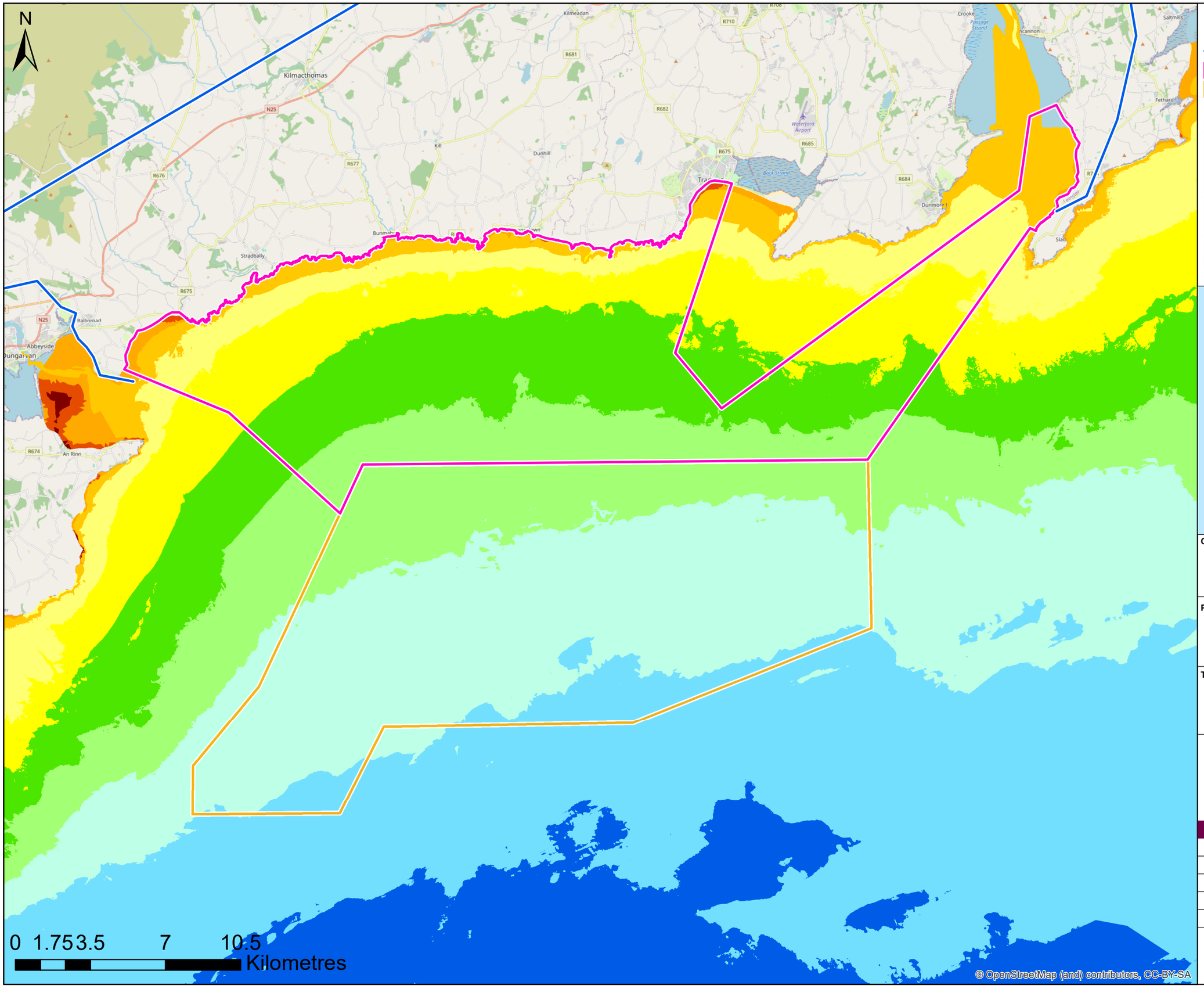
5.1.1.4 Geology

Information regarding the geology of the Offshore and Cable Corridor AoIs allows for an understanding of the origin and stability of the seabed, and the conditions which will be encountered during the installation of offshore foundations, array cables, offshore export cables or any other elements associated with this development.

The Celtic Sea shelf comprises bedrock outcrops and channels of superficial sediments of quaternary age such as mud, sand, and boulders. Deeper waters of the Celtic Sea, as are found south of St. Georges Channel, consist of quaternary sediments up to 375 m thick (Edward *et al*., 2018). Information from the Geological Survey Ireland (GSI) describes pre-Quaternary sediments of Palaeozoic rocks, consisting of Ordovician metamorphic slate, Devonian sandstone and Mississippian carbonate limestone.

5.1.1.5 Seabed Substrate

Seabed sediment data within the NCS Offshore and Cable Corridor AoIs were sourced from the European Marine Observation and Data Network (EMODnet) Geology Data Portal. **Figure 5-6** shows that the Offshore AoI comprises predominantly sand, with coarse sediment and small patches of rocks and boulders along the northern boundary. The southwestern boundary of the Offshore AoI also contains rocks and boulders. In the Cable Corridor AoI seabed sediments appear to be a mosaic of rocks and boulders, coarse sediment and to a lesser extent sand and mud to muddy sand.



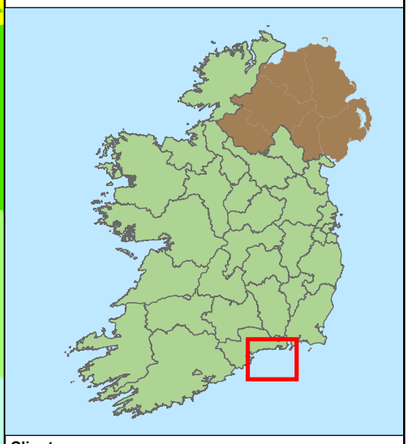
Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI

Bathymetry [m]

- -79 - -70
- -69 - -60
- -59 - -50
- -49 - -40
- -39 - -30
- -29 - -20
- -19 - -10
- -9 - 0
- 1 - 10
- 11 - 20

Data Source: INFOMAR



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

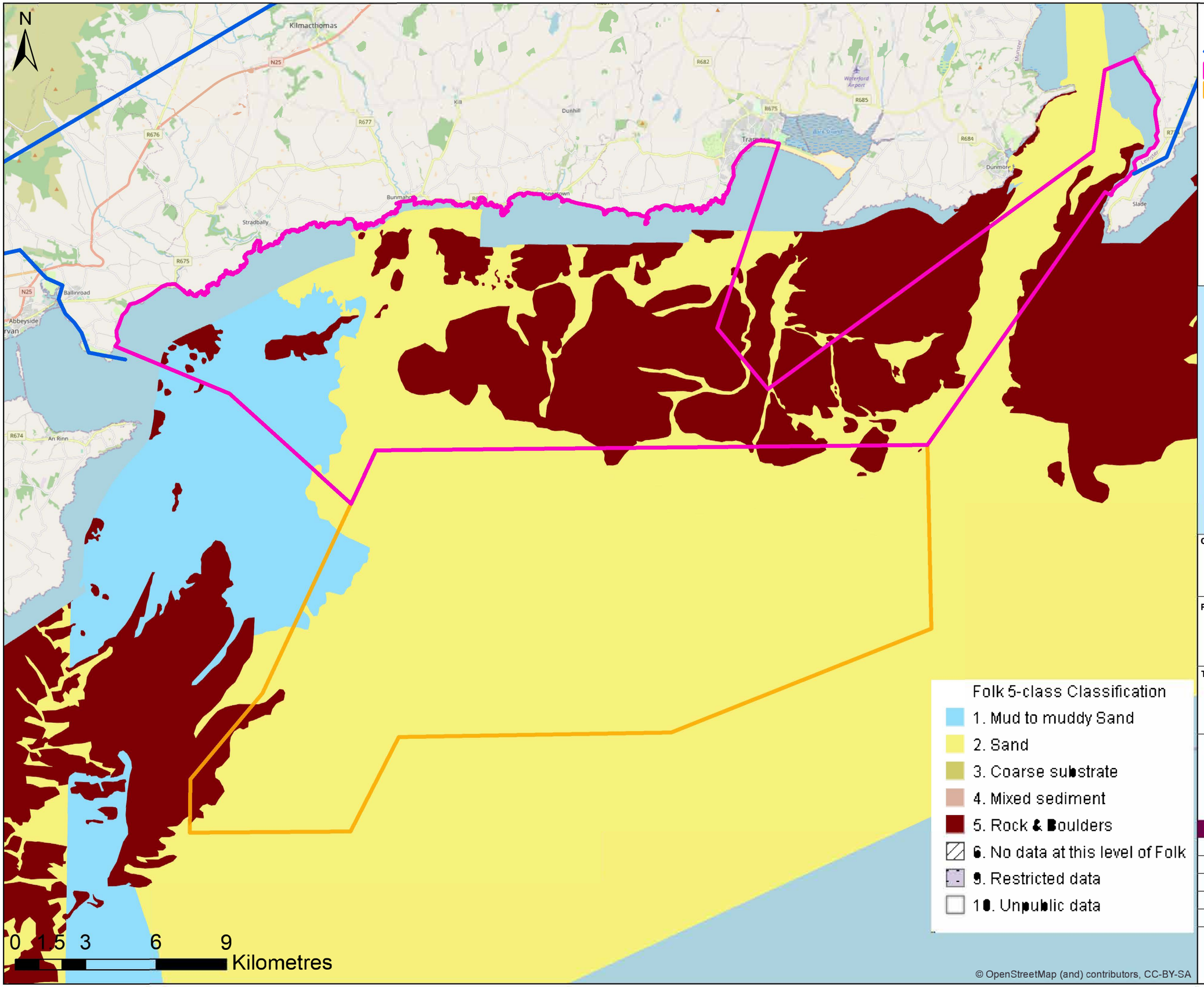
Figure 5-5: Bathymetry in the NCS AoI relative to Mean Sea Level

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

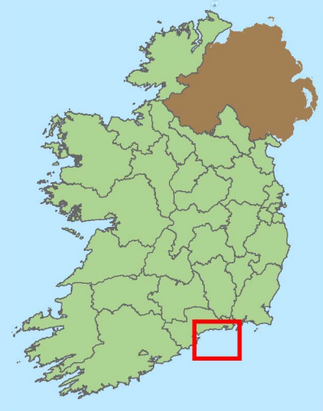
Drawn By: RMcC	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-SIS-DR-Z-AG-0002
Approved By: CB	
Scale: 1:165,890@ A3	**Projection:** ITM (IRENET95)
Date: 14/03/2023	



Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI

Data Source: EMODnet



Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 5-6: EMODnet seabed sediment data for NCS AoI

RPS
West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: PK	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0004
Approved By: CB	
Scale: 1:151,830@ A3	**Projection:** ITM (IRENET95)
Date: 22/12/2022	

5.1.2 Key Issues and Proposed Scope

Table 5.1 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to marine geology, sediment and coastal processes.

Table 5.1: Marine Geology, Sediment and Coastal Processes Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Bathymetry data sourced from the MEDIN and INFOMAR studies ▪ Office of Public Works (OPW) Waterford datasets ▪ Sediment dynamics study funded by the Geological Survey of Ireland (GSI) ▪ ECMWF wave data ▪ DHI Met Ocean Data, from CSFR model ▪ EMODnet geology data.
Proposed Baseline Survey Work and Assessments	▪ Site specific wave and current data will be used to calibrate and validate hydrodynamic models. Where available, publicly available data will be used and where required, Acoustic Doppler Current Profiler (ADCP)s, or similar will be deployed on site for approximately one month. ▪ High-resolution SSS data to determine seabed features and the presence of boulders, seabed sediments and debris. ▪ Grab sampling providing an overview of the seabed sediment composition to support the characterisation of the subtidal environment. ▪ Up-to-date site-specific bathymetry survey data to form the basis of model domains. ▪ Modelled assessment of baseline hydrography and sediment dynamics. ▪ Modelled assessment of post-construction hydrography and sediment dynamics. ▪ Assessment of changes/post-construction minus baseline conditions.
Potential Impacts and Key Issues	The following is a summary of issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Presence of infrastructure may lead to changes to tidal currents, wave climate and sediment transport. Localised changed in tidal and wave climate may be caused by the presence of the wind turbines. The magnitude of these changes will be quantified in terms of the influence of individual structures and also the potential for interaction of effects. Changes in tidal flow and wave climate have the potential to alter sediment transport regimes in the vicinity of the Project and closer inshore. ▪ Presence of infrastructure may lead to changes to littoral currents, suspended sediment concentrations and associated deposition due to seabed preparation activities in advance of installation. The largest potential release would arise from augured (drilled) piles. There is potential for increased suspended sediment concentrations and associated deposition associated with any cable repair and/or reburial activities. ▪ Installation of infrastructure may affect water quality. Construction activities undertaken out to a distance of 1 nm, such as trenching of the offshore export cable and activities at the landfall will be assessed in terms of the WFD. Any impact in terms of the biological elements from the aquatic and terrestrial ecology assessment will be considered in the context of the WFD ecological status and environmental objectives of water bodies. Any potential for hazardous or priority hazardous substances to affect surface and ground waters chemical status would be investigated.
Technical Consultations	▪ Department of Agriculture, Food and the Marine. ▪ Waterford County Council.
Relevant Standards and Guidance	▪ ABPmer Ltd., Met Office and SeaRoc UK Ltd. (2008a). Guidelines in the use of metocean data through the lifecycle of a marine renewable's development CIRIA C666

Scope of EIAR Chapter	Summary
	▪ ABPmer, Met Office and POL (2008b). Atlas of UK Marine Renewable Energy Resources: Atlas Pages. A SEA Report, March 2008. Available online: http://www.renewables-atlas.info/ ▪ Carroll, B., Cooper, B., Dewey, N., Whitehead, P., Dolphin, T., Rees, J., Judd, A., Whitehouse, R., and Harris, J., (2010). A further review of sediment monitoring data commissioned by Collaborative Offshore Wind Research into the Environment (COWRIE) Ltd (project reference ScourSed 09) ▪ Beiboer, F. and Cooper, B. (2002). Potential Effects of Offshore Wind Developments on Coastal Processes. Report by ABP Marine Environmental Research Ltd (ABPmer). pp 127, Crown ▪ Business Enterprise and Regulatory Reform (BERR). (2008). Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry. Technical Report, Department for BERR, in association with Defra, 164 pp ▪ Brooks, A.J., Whitehead, P.A., Lambkin, D.O. (2018). Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects. Natural Resources Wales (NRW) Report No: 243, Natural Resources Wales, Cardiff, pp. 139. ▪ Centre for Environment, Fisheries and Aquaculture Science (CEFAS). (2016). Suspended Sediment Climatologies around the UK ▪ Coughlan, M., Wheeler, A.J., Dorschel, B., Long, M., Doherty, P., Morz, T., (2019) Stratigraphic model of the Quaternary sediments of the Western Irish Sea Mud Belt from core, geotechnical and acoustic data, Geo-Marine Letters. ▪ Department of Energy & Climate Change, (2008) Dynamics of Scour Pits and Scour Protection, Research Advisory Group ▪ GSI (2018) Scour Potential Evaluation of the Western Irish Sea Mud Belt, pp. 79. ▪ NIRAS (2015). Subsea Cable Interactions with the Marine Environment, Renewables Grid Initiative, pp. 58 ▪ Pye, K., Blott, S.J., Brown, J. (2017) Advice to Inform Development of Guidance on Marine, Coastal & Estuarine Physical Processes Numerical Modelling Assessments. NRW Report No 208, Natural Resources Wales, Cardiff, pp. 139.

5.2 Subtidal and Intertidal Ecology

5.2.1 Baseline Environment

5.2.1.1 Subtidal Ecology

The subtidal zone is the area of seabed that extends seaward from the low-water mark (LWM) and is always submerged under water, except for an area known as the subtidal fringe which is only exposed during the lowest spring tides. Subtidal habitats are primarily categorised by sedimentary characteristics followed by light levels and exposure to tidal movements and waves (Fossitt, 2000). The seabed of the northern Celtic Sea is mainly coarse sediment, sand and mud to muddy sands. Areas of rock and hard substratum are present in the inshore areas along the south coast of Ireland and the northern coastline of the Project. Mud to muddy sand sediments dominate the deeper, offshore areas (ICES, 2022). The circalittoral zone is the region of the sublittoral zone which extends from the lower limit of the infralittoral to the maximum depth at which photosynthesis is still possible. Circalittoral rock is present all around the coast of Ireland and is characterised by animal-dominated communities (a departure from the algae dominated communities in the infralittoral zone (the region of shallow water closest to the shore usually excluding the intertidal zone). The character of the fauna varies enormously and is affected by several factors: wave action, tidal stream strength, salinity, turbidity, the degree of scouring and rock topography.

The EMODnet broad-scale seabed habitat map for Europe (EUSeaMap) presents the European Nature Information System (EUNIS) habitat classifications for the Project area. Seabed habitat information acquired through the INFOMAR and the Irish National Seabed Survey (INSS) national seabed mapping programmes is also available. The EUSeaMap data for the NCS Offshore and Cable Corridor AoIs is illustrated in **Figure 5-7**.

The subtidal environment within the NCS Offshore AoI is a mix of various grades of sands, harder substrate sections with a fine sediment veneer in places: circalittoral coarse sediment (A5.14), circalittoral fine sand or circalittoral muddy sand (A5.25 or A5.26), and deep circalittoral sand (A5.27). The deep circalittoral biozone is composed of predominantly A5.15: deep circalittoral coarse sediment, A5.27: deep circalittoral sand and A4: circalittoral rock and other hard substrata. Subtidal reefs are found to the south and east of Hook Head Peninsula, located to the north-east of the Offshore and Cable Corridor AoIs. The reefs around Hook Head have excellent examples of tide-swept communities and species richness is high in both the shallow and deep-water communities (NPWS, 2014).

The shallow circalittoral biozone (closest to the coastline) within the NCS Cable Corridor AoI is composed of a mix of substrates and sediments, with the western Cable Corridor AoI composed of circalittoral sandy mud (A5.35), circalittoral fine sand or circalittoral muddy sand (A5.25 or A5.26), Atlantic and Mediterranean low energy circalittoral rock (A4.3), sponge communities on deep circalittoral rock (A4.12) and low energy infralittoral seabed at the coastline, and the eastern Cable Corridor AoI composed of circalittoral coarse sediment (A5.14), infralittoral fine sand or infralittoral muddy sand (A5.23 or A5.24), and high energy infralittoral seabed at the coastline as defined by EUSeaMap.

5.2.1.2 Intertidal Ecology

Intertidal ecology encompasses all sediments/substrates along with the associated faunal and algal communities between the LWM and the HWM. For the purposes of this EIA Scoping Report, intertidal habitats includes those coastal habitats which are inundated on high tides, *i.e*. saltmarsh. This does not include sand dunes, which are covered by the Terrestrial Biodiversity topic (see **Section 6.3** for more information).

Although the cable landfall location has not yet been selected, a desktop review of the typical intertidal habitats along the landward boundary of the NCS Cable Corridor AoI has been undertaken. County Waterford's coastline is approximately 100 km in length and is known for its cliffs at the sea edge and several streams that flow through the valleys to beaches with rocky headlands. The UNESCO 'Copper Coast Geopark' stretches from Stradbally to Kilfarrasy and was formed by volcanic activity.

While information on intertidal habitats and species will be collected during site specific surveys, a review of broad scale evidence (EUSeaMap and Ireland's Marine Atlas), shows that the coastline largely consists of a mix of hard cliff and rocky shore and sandy shores influenced by the varying levels of exposures along the

coast of the Celtic Sea. EUSeaMap data shows that the intertidal boundary of the Cable Corridor AoI is predominantly composed of Atlantic and Mediterranean high energy circalittoral rock (A4.1).

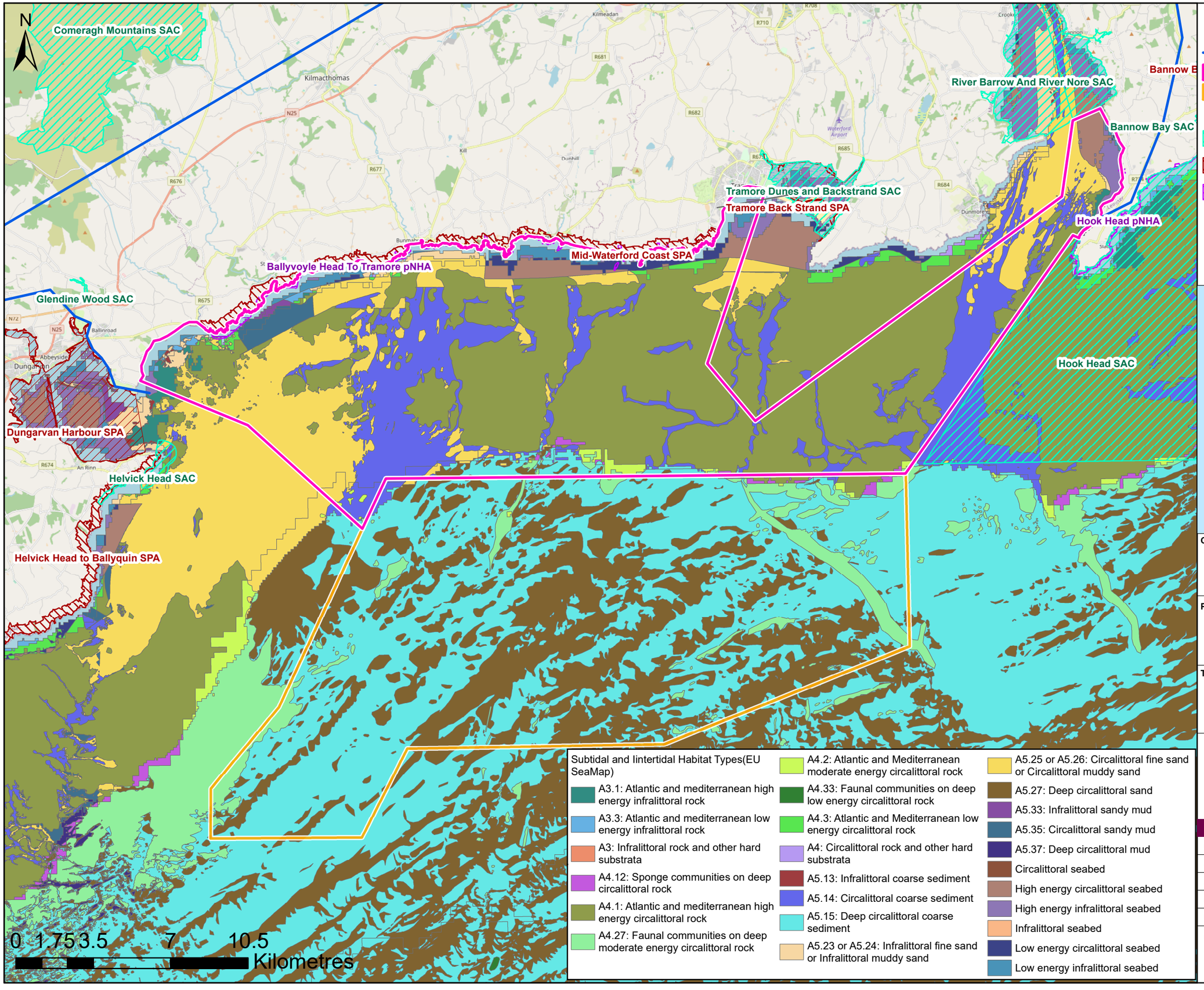
Information can also be obtained from the supporting documents for protected areas in the area, for example the intertidal areas at Tramore Dunes and Backstrand SAC are characterised by mudflats and sandflats with beaches composed of sandy shingle, with species such as common cockle (*Cerastoderma edule*), mussels (*Mytilus edulis*) and periwinkles (*Littorina littorea*) of note (NPWS, 2013). Intertidal reefs have been mapped within Hook Head SAC, adjacent to the eastern boundary of the Cable Corridor AoI, and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)* [1330], and Mediterranean salt meadows (*Juncetalia maritimi* are recorded within the nearby Tramore Dunes and Backstrand SAC.

5.2.1.3 Designated Sites

Hook Head SAC, which is designated for large shallow inlets and bays [1160] and reefs [1170] was identified as an important site of nature conservation for benthic intertidal and subtidal ecology that bounds the proposed NCS Cable Corridor AoI on its eastern boundary and is less than a kilometre north-east of the Offshore AoI. The Tramore Dunes and Backstrand SAC is less than a kilometre north-east of the Cable Corridor AoI and approximately 10 km north-east of the Offshore AoI. This SAC is designated for the following subtidal and intertidal habitats: mudflats and sandflats not covered by seawater at low tide [1140], *Salicornia* and other annuals colonising mud and sand [1310], Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)* [1330], and Mediterranean salt meadows (*Juncetalia maritimi*) [1410] (NPWS, 2013).

There are two proposed Natural Heritage Areas (pNHAs) which bound the intertidal section of the Cable Corridor AoI; Hook Head pNHA to the east and Ballyvoyle Head to Tramore pNHA to the west. Although these sites have not been designated on a statutory basis, they identify areas of significance for wildlife and habitats and their ecological value will be considered in the EIAR.

Designated sites identified as relevant to the NCS Offshore and Cable Corridor AoIs are illustrated in **Figure 5-7**.



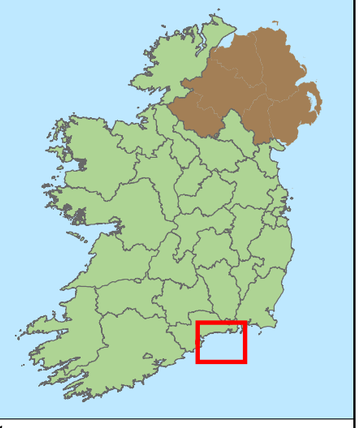
Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI

Relevant Designated Sites

- Special Areas of Conservation (SAC)
- Special Protection Area (SPA)
- Proposed Natural Heritage Area (pNHA)

Data Source: EMODnet/EU Sea Map, NPWS



Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 5-7: Subtidal and Intertidal Habitats and Designated Sites within the Offshore and Cable Corridor AoIs

RPS
West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: PK	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0001
Approved By: CB	
Scale: 1:160,993@ A3	**Projection:** ITM (IRENET95)
Date: 22/03/2023	

5.2.2 Key Issues and Proposed Scope

Table 5.2 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to subtidal and intertidal ecology.

Table 5.2: Subtidal and Intertidal Ecology Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Published historic surveys/data sets. ▪ WFD benthic monitoring survey (Marine Institute (MI)) ▪ Ireland's Marine Atlas at http://atlas.marine.ie/ ▪ INFOMAR (2022), https://www.infomar.ie/maps/interactive-maps/seabed-and-sediment ▪ EMODnet broad-scale seabed habitat map for Europe (EUSeaMap) ▪ NPWS Hook Head SAC site documents (NPWS, 2011) ▪ NPWS Tramore Dunes and Backstrand SAC site documents (NPWS, 2013) ▪ NPWS Mid-Waterford Coast SPA site documents (NPWS, 2022) ▪ Data from the National Biodiversity Data Centre (NBDC)
Proposed Baseline Survey Work and Assessments	Subtidal ecology surveys will be undertaken across the proposed array area and export cable corridor and will include the following: ▪ Visual survey using drop-down video to record the presence of any sensitive benthic habitats using methodology in cognisance of NMBAQC best practise and Joint Nature Conservation Committee (JNCC) Marine Monitoring Handbook (Davies *et al*., 2011). ▪ Grab sampling survey to determine the macrofaunal and sedimentary characteristics of the benthic habitats present – Macrofaunal samples will be sieved over a 1mm mesh sieve and identification to the lowest possible taxonomic level following North East Atlantic Marine Biological Analytical Quality Control (NMBAQC) Scheme guidelines (Worsfold and Hall, 2010). – Particle size analysis and organic content will be carried out in accordance with the NMBAQC Scheme. – Additionally, a subset of samples will be analysed for sediment chemistry including heavy metals and hydrocarbons in accordance with a range of best practise guidelines, e.g. Oslo and Paris Conventions (OSPAR) (2014), Cronin *et al*. (2006) and MI (2019). Bathymetric and seabed feature data collected during the geophysical surveys will be interpreted to inform subtidal ecology surveys and geophysical data will also inform biotope mapping. An intertidal ecology survey will be carried out at the landfall location. This survey will comprise: ▪ Phase 1 walkover in cognisance of Wyn *et al.* (2000) and ▪ Faunal and sediment core sampling survey to identify and map intertidal biotopes.
Potential Impacts and Key Issues	The following issues could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Temporary subtidal habitat loss/disturbance. ▪ Increases in suspended sediment concentrations and associated sediment deposition resulting in smothering. ▪ Long-term subtidal habitat loss. ▪ Colonisation of hard structures. ▪ Removal of hard substrates resulting in loss of colonising species (decommissioning phase only). ▪ Alteration of seabed habitats arising from effects on physical processes. ▪ Accidental pollution events. ▪ Introduction and spread of invasive non-native species.

Scope of EIAR Chapter	Summary
	▪ Electromagnetic field (EMF) and heat emissions from subsea cables –the latest available research on these topics (which will be discussed with stakeholders), may indicate that a significant effect on benthic ecology is unlikely to occur. ▪ Temporary and long-term intertidal habitat loss/disturbance – pending confirmation of Project design which may mean direct impacts can be avoided. ▪ Release/remobilisation of contaminants bound in sediments – depending on the results of site-specific surveys. If contaminants are shown to be absent/minimal in sediments, significant effects on benthic ecology are unlikely.
Technical Consultations	▪ Consultation with the MI and NPWS to agree the baseline data sources, request additional data sources to inform the baseline characterisation and approach to surveys and assessments.
Relevant Standards and Guidance	▪ Guidance on Marine Baseline Ecological Assessments and Monitoring Activities: ORE Projects Parts 1 & 2 (DCCAE, 2018) ▪ Published guidelines on the appropriate approach to impact assessment (*e.g.* Chartered Institute of Ecology and Environmental Management (CIEEM, 2018)

5.3 Fish and Shellfish Ecology

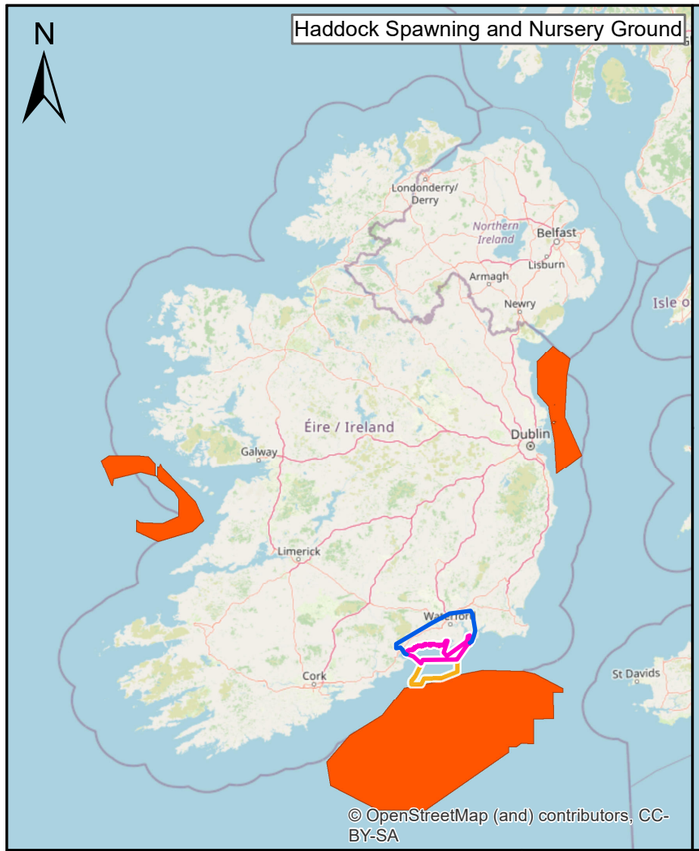
5.3.1 Baseline Environment

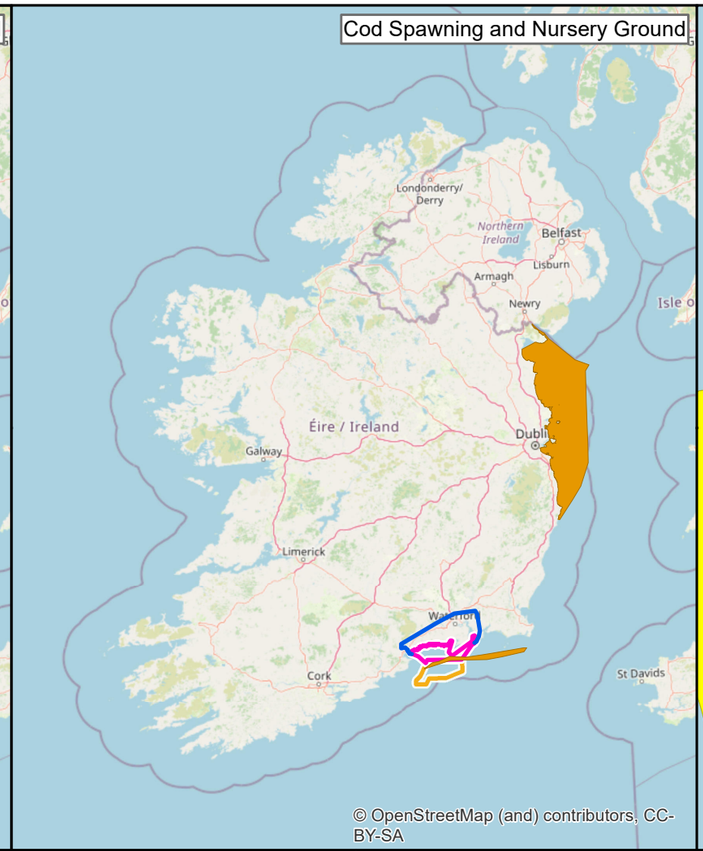
The Celtic Sea is known to host a wide range of pelagic and demersal fish and shellfish populations, with the individual components of these populations reliant upon inshore and offshore environments depending on factors such as the species, season and life history stage. The following sections provide an overview of the key habitats and populations likely to occur within and around the NCS Offshore and Cable Corridor AoIs, with further information to be gathered during the EIA process.

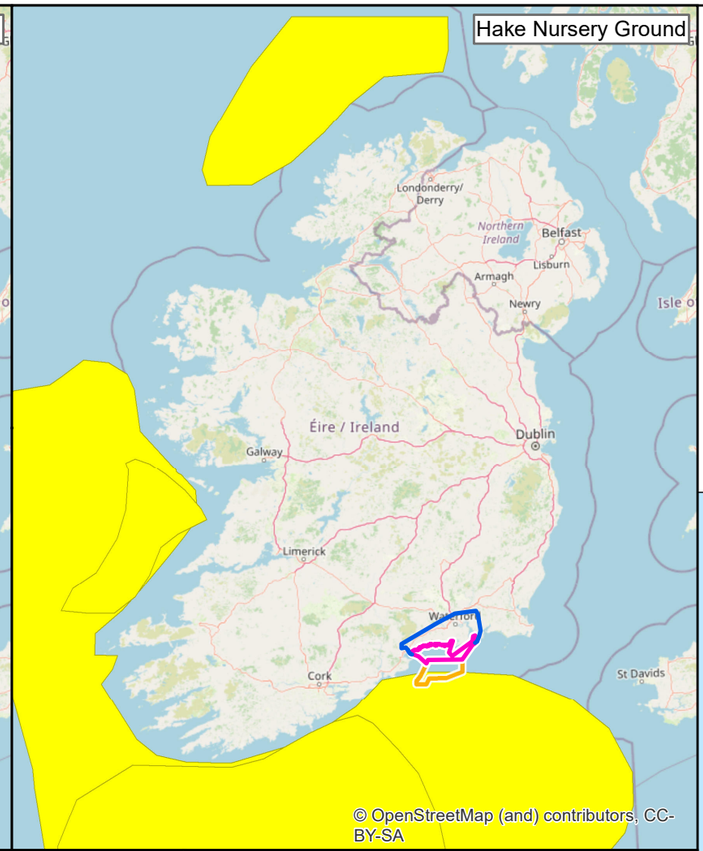
5.3.1.1 Spawning and Nursery Habitats

Information on fish spawning and nursery habitats have been collated from the MI, Gerritsen and Kelly (2019), Ellis *et al*. (2012) and Coull *et al*. (1998). The Offshore AoI and the Cable Corridor AoI overlap with nursery or spawning grounds for the following species (MI, 2022) (see **Figure 5-8**):

- Cod *(Gadus morhua)* nursery and spawning grounds;
- Haddock (*Melanogrammus aeglefinus*) nursery and spawning grounds;
- Hake (*Merluccius merluccius*) nursery ground;
- Herring (*Clupea harengus*) nursery and spawning grounds;
- Whiting (*Merlangius merlangus*) nursery and spawning grounds;
- Mackerel (*Scomber scombrus*) nursery grounds; and
- Horse mackerel (*Trachurus trachurus*) nursery grounds.



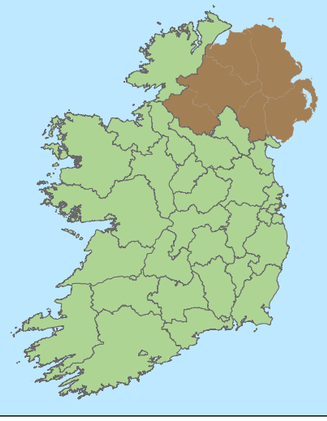


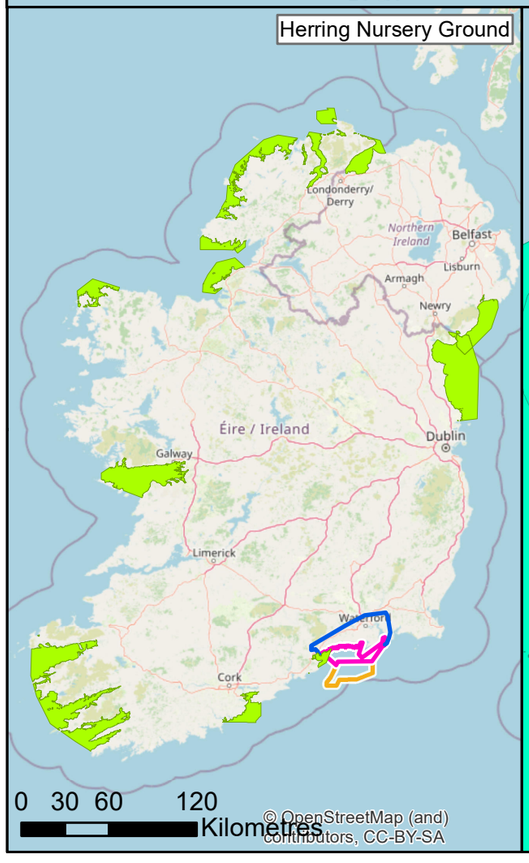


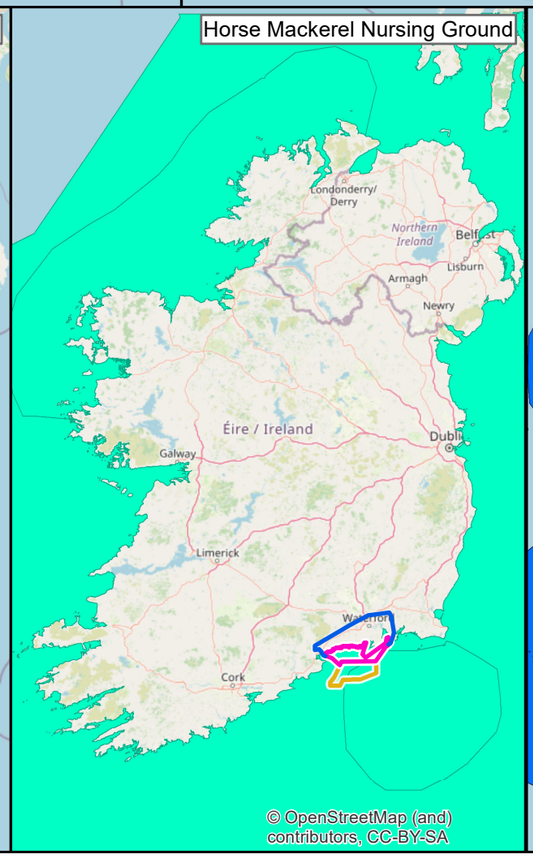
Legend

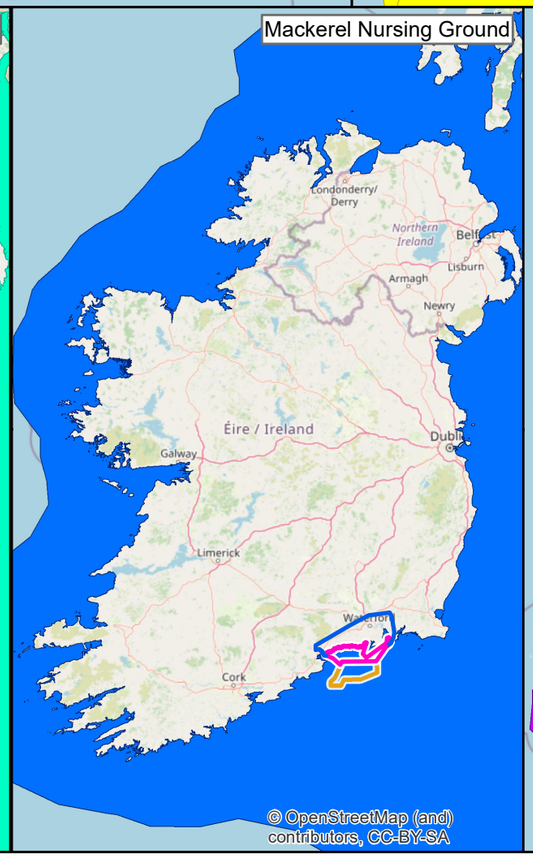
- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- 12 NM Limit
- Haddock Spawning and Nursery Grounds
- Cod Spawning and Nursery Grounds
- Hake Nursery Ground
- Herring Nursery Ground
- Horse Mackerel Nursery Ground
- Mackerel Nursery Ground
- Whiting Spawning Nursery Grounds

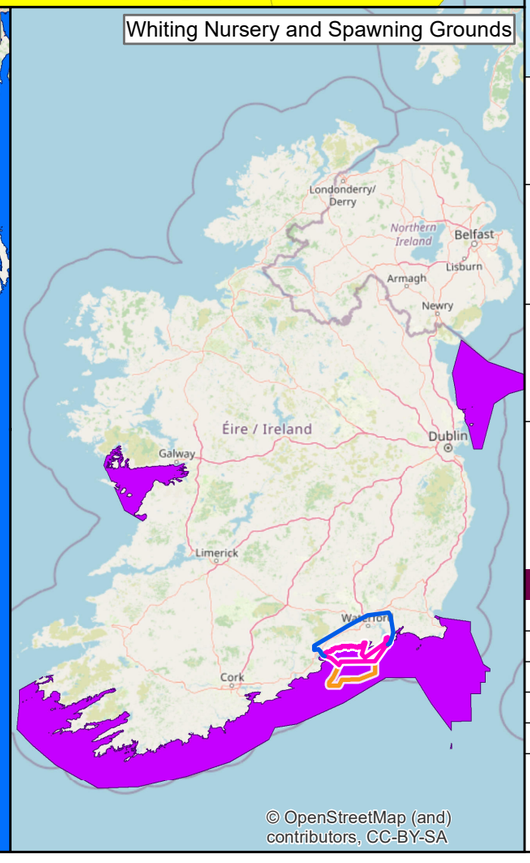
Data Source: Marine Institute











Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 5-8: Fish and Shellfish Nursing and Spawing Areas

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: NR	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0037
Approved By: CB	
Scale: 1:4,200,000@ A3	**Projection:** ITM (IRENET95)
Date: 21/12/2022	

5.3.1.2 Shellfish

Shellfish is a colloquial and fisheries term for exoskeleton-bearing aquatic invertebrates used as food, including various species of molluscs and crustaceans.

The western portion of the Cable Corridor AoI overlaps with *Nephrops* grounds (MI, 2022). The NCS Cable Corridor AoI overlaps with the Waterford Harbour Designated Shellfish Water at its easternmost extent and is approximately 2.8 km from Dungarvan Harbour Designated Shellfish Water at its westernmost extent (MI, 2022).

The demersal shellfish communities associated with the Offshore AoI are brown crab (*Cancer pagurus*), lobster (*Homarus gammarus*) and scallops (*Pectin maximus*). The baseline characterisation of shellfish communities for the EIA will be further developed from desktop data sources and commercial fisheries engagement to ensure a robust and up-to-date characterisation is used to inform the EIA.

5.3.1.3 Elasmobranchs

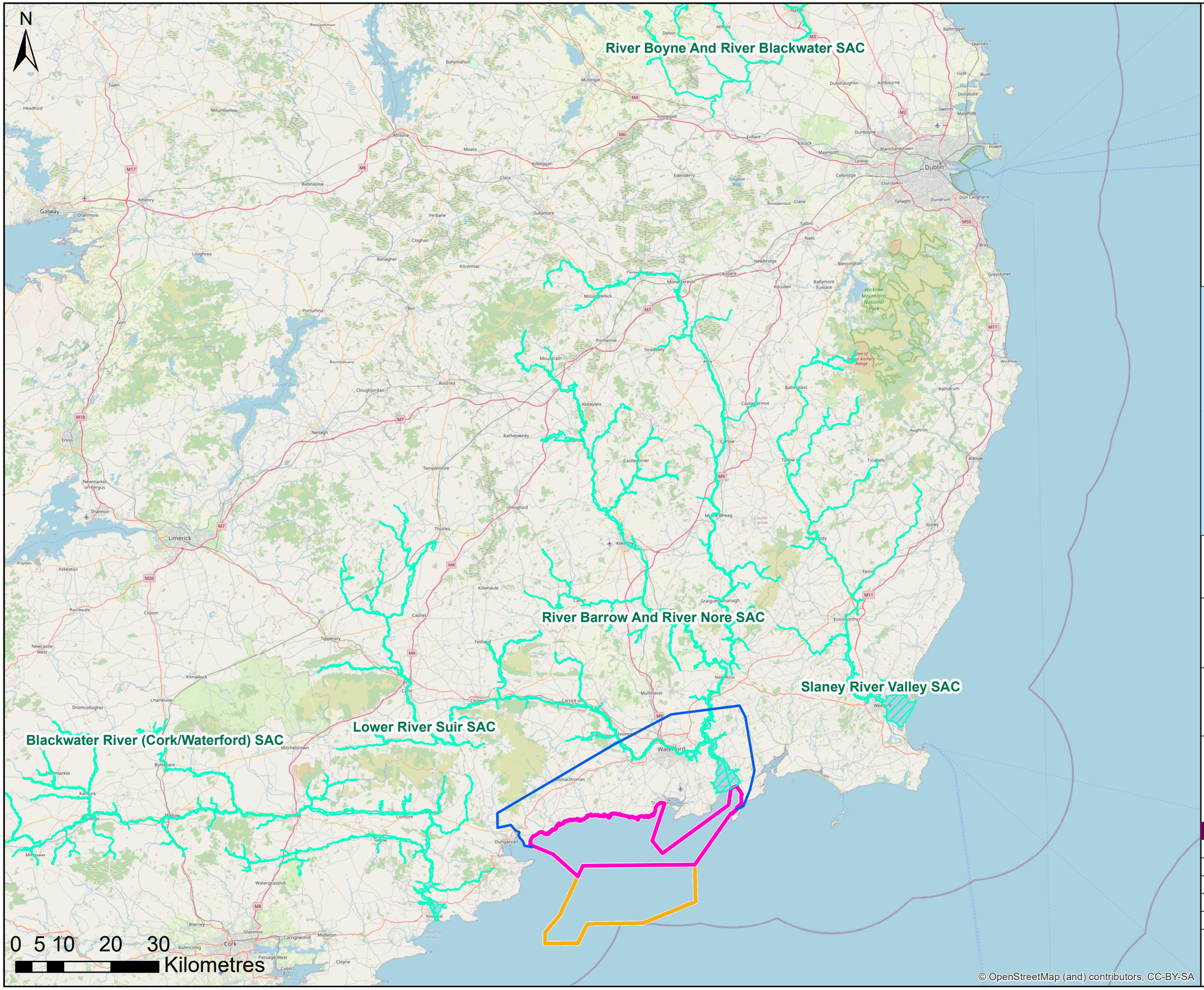
Skates, sharks and rays (*elasmobranchs*) are an important part of the marine ecosystem, however there is relatively limited knowledge about their abundance and distribution which hinders the ability to fully facilitate the protection they require in the marine environment. All sharks and rays are on the OSPAR List of Threatened and/or Declining Species and Habitats (Agreement 2008-06) (OSPAR, 2008). Elasmobranchs typically have a slow growth rate and low fecundity (fertility), leaving them vulnerable to over-fishing pressures and pollution events. This makes the spawning, parturition (birth) and nursery areas highly important with regard to the survival of juveniles and neonates (new-borns) (Ellis *et al*., 2004). In Irish waters there are 28 species of skates and rays (ORCA Ireland, 2019).

Various shark species have been recorded in or in the vicinity of the Project area including basking shark (*Cetorhinus maximus*), tope shark (*Galeorhinus galeus*), blue shark (*Prionace glauca*), spurdog (S*qualus acanthias*), lesser spotted dog fish (*Scyliorhinus canicula*), small-spotted catshark (*Scyliorhinus canicula*), and nurse hound (*Scyliorhinus stellaris*) (MarLIN, 2022).

Skates and rays are a vulnerable component of fish communities and also tend to be data poor in comparison to commercially exploited fish (Dedman *et al*., 2015). Skate and ray species recorded in the vicinity of the Project Area include thornback ray (*Raja clavata)*, cuckoo ray (L*eucoraja naevus*), spotted ray (*Raja montagui*), undulate ray (*Raja undulata*) and blonde skate (*Raja brachyura*) (MarLIN, 2022; NBDC 2022).

5.3.1.4 Diadromous species

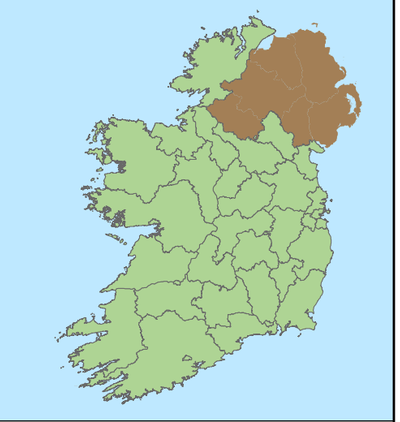
A number of diadromous fish species (which migrate between the sea and fresh water) have the potential to occur within (pass through) the NCS AoIs during certain times in their life cycle, including the European eel (*Anguilla anguilla*), twaite shad (*Alosa fallax*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta*). For most species, this may occur only during upstream or downstream migrations to and from spawning grounds, but some diadromous species may use inshore and offshore areas for feeding (*e.g.* sea trout). Twaite shad, Atlantic salmon, sea and river lamprey are all protected under EU legislation via Annex II of the Habitats Directive. There are a number of SACs on the south coast of Ireland with are designated for these fish species including: Lower River Suir SAC [002137], River Barrow and River Nore SAC [02162], Blackwater River (Cork/Waterford) SAC [00210] and Slaney River Valley SAC [000781] (see **Figure 5-9**).



Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- Special Areas of Conservation (SAC)
- 12 NM Limit

Data Source:



Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 5-9: Special Areas of Conservation for Migratory Fish Species

RPS
West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: NR	**Project No.** MDR1649
Checked By: AE	**File Ref:**
Approved By: CB	MDR1649-RPS-01-NCS-DR-Z-AG-0033
Scale: 1:750,000@ A3	**Projection:**
Date: 22/12/2022	ITM (IRENET95)

5.3.2 Key Issues and Proposed Scope

Table 5.3 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to fish and shellfish ecology.

Table 5.3: Fish and Shellfish Ecology Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Ireland's Marine Atlas at http://atlas.marine.ie/ ▪ MarLIN www.marlin.ac.uk ▪ Lordan, C. and Gerritsen, H. (2009). MI. Working Document on the Assessment of the "Irish Box" in the context of the Western Waters Regime. Working paper prepared for ICES Advisory Committee. ▪ Ellis, J. R., Milligan, S. P., Readdy, L., Taylor, N. and Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., CEFAS, Lowestoft, 147: 56 pp. ▪ Data and information from the Sea Fisheries Protection Authority (SFPA) ▪ Celtic Seas Ecoregion Fisheries Overview (ICES, 2019) ▪ ICES Division technical reports series (ICES areas: 33E2, 32E2, 33E3 and 32E2) ▪ An Inventory of Irish Herring Spawning Grounds (O'Sullivan *et al.,* 2013) ▪ National programme: Habitats Directive and Red Data Book Fish Species (Gallagher *et al.,* 2017) ▪ Coull, K. A., Johnstone, R and Rogers, S. I., (1998). Fishery sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd. Available online from: http://cefas.defra.gov.uk/media/29947/sensi_maps.pdf ▪ Data from the NBDC ▪ Data and information from the MI (*e.g.*, spawning and nursery data, cod tagging data, migratory species data) ▪ Data and information from Bord Iascaigh Mhara (BIM) and consultation with local commercial fisheries in the area (see section on Commercial Fisheries below) ▪ Data and information from Irish Sea-Celtic Sea Groundfish surveys ▪ Data and information from IFI (*e.g.*, migratory species data, if applicable) ▪ Published data sources including information from the Ocean Energy Ireland website, the Celtic Sea Trout project, the UK Offshore Renewables Joint Industry Partnership (ORJIP), Tethys and ORE Catapult Offshore Wind Innovation Hub Network.
Proposed Baseline Survey Work and Assessments	Desktop analysis will be conducted using publicly available data sources as outlined above. These data sources are widespread and considered robust enough, when combined with commercial fisheries and the benthic survey information, to enable a detailed desktop assessment to be undertaken at the EIAR stage.
Potential Impacts and Key Issues	The following issues could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Temporary habitat loss/disturbance. ▪ Increased suspended sediment concentrations and associated deposition. ▪ Underwater noise as a result of vibrations associated with foundation installation (*i.e.* piling) and other construction activities (*e.g.* cable installation, boreholes etc), and operation of the turbines. ▪ Long term habitat loss. ▪ Colonisation of hard structures. ▪ EMF causing behavioural responses in sensitive fish and shellfish receptors. ▪ Accidental pollution events. ▪ Heat emissions from subsea cables – based on the latest available research on these topics to be discussed with stakeholders, which may indicate that a significant effect on fish and shellfish ecology is unlikely to occur.

Scope of EIAR Chapter	Summary
	▪ Temporary and long-term intertidal habitat loss/disturbance – pending confirmation of Project design which may mean direct impacts can be avoided. ▪ Release/remobilisation of contaminants bound in sediments – depending on the results of site-specific surveys. If contaminants are shown to be absent/minimal in sediments, significant effects on fish and shellfish ecology are unlikely.
Technical Consultations	Consultation with the MI, IFI, SFPA, and BIM to discuss fish and shellfish ecology receptors: ▪ Consultation on baseline data sources. ▪ Consultation to confirm the key impacts/risks and scope of impact assessment. ▪ Consultation to discuss the results of the impact assessment, proposed mitigation and monitoring etc.
Relevant Standards and Guidance	▪ Popper *et al.,* 2014, Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI ▪ Published guidelines on the appropriate approach to impact assessment (*e.g.* CIEEM) ▪ Guidance on Marine Baseline Ecological Assessments and Monitoring Activities: ORE Projects Parts 1 & 2 (DCCAE, 2018).

5.4 Marine Mammals and Megafauna

5.4.1 Baseline Environment

Twenty-five species of cetacean and two species of pinniped (seal) have been recorded in Irish waters, as recorded from sightings or strandings data. The high species richness is attributed to the suitability of the physical marine environment (including bathymetry, seabed topography, salinity and temperature) and the availability and distribution of prey species in Irish waters. The waters off the west and south-west of Ireland support the greatest diversity and abundance of marine mammals. In the Celtic Sea, off the south coast, harbour porpoise (*Phocoena phocoena*), short-beaked common dolphin (*Delphinus delphis*), bottlenose dolphin (*Tursiops truncatus*), humpback whale (*Megaptera novaeangliae*), and Risso's dolphin (*Grampus griseus*) are regularly found in the vicinity of the NCS Offshore and Cable Corridor AoIs (Rogan *et al*., 2018; Wall *et al.,* 2013; NBDC, 2022). Minke whale (*Balaenoptera acutorostrata*) and fin whale (*Balaenoptera physalus*) are both considered to be seasonal visitors during summer months (Wall *et al.,* 2013). The pinnipeds, harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*), commonly occur in the Celtic Sea. A summary of each of the key marine mammal species likely to occur within the vicinity of the Project is provided below (see **Figure 5-10**).

Marine mammals are protected under Irish and international legislation. National legislation includes the Wildlife Act (1976) and Wildlife (Amendment) Act (2000), which protects marine mammals and their habitats from disturbance and wilful interference up to 12 nm from the coast. The Habitats Directive (Council Directive 92/43/EEC) protects marine mammals through the designation of SACs within Member States and through the protection of species listed in Annex IV of the Habitats Directive.

Turtles are also protected in Irish waters under Annex IV of the Habitats Directive. Three species of marine turtles may occur in Irish waters, namely leatherback (or 'leathery') turtle (*Dermochelys coriacea*), loggerhead turtle (*Caretta caretta*) and Kemp's Ridley turtle (*Lepidochelys kempii*) (King and Berrow, 2009). Of these, leatherback turtle is the most regularly reported around the coast of Ireland, accounting for just over 80% of all records (King and Berrow, 2009)

Leatherbacks are assessed as a non-breeding visitor, that are known to migrate to Irish waters each summer (IUCN, 2003; King *et al.,* 2011). There has been an estimated population of 2,500 migrants per year, which accounts for 2-5% of the North Atlantic population (King *et al*., 2011). They have been sighted throughout the Irish coast, with 90% of sightings occurring from June to September (King and Berrow, 2009). There has been recorded sightings in the north Celtic Sea off the coast of Co. Waterford as they migrate towards the western Irish Coast (King and Berrow, 2009).

Leatherbacks and Kemp Ridleys have a smaller distribution, with these species mainly recorded off the south and west Irish coast, in spring and winter, respectively (King and Berrow, 2009). However, there has been recorded sightings of the Leatherback off Dungarvan, Co. Waterford, which suggests that this species may occur in the north Celtic Sea (NBDC, 2022). Loggerhead and Kemp Ridleys are recorded in highest numbers along the Irish coast in spring and winter, respectively (King and Berrow, 2009).

5.4.1.1 Harbour porpoise

Data from published sources support the findings that harbour porpoise is a regular feature of the NCS Cable Corridor and Offshore AoIs and the surrounding area. Recent data from the OBSERVE aerial surveys suggest that the highest densities of harbour porpoise are found in the Irish Sea and to the south-west of Ireland, however, the south coast of Ireland also supports a high number of harbour porpoises during the summer calving months (Rogan *et al.,* 2018). Harbour porpoise is selected as a Qualifying Interest (QI) of the Roaringwater Bay SAC, which is located approximately 135 km to the west of the NCS Offshore AoI. The West Wales Marine SAC/Gorllewin Cymru Forol SAC, located approximately 100 km east of the NCS Offshore AoI, is designated for harbour porpoise (see **Figure 5-10**).

5.4.1.2 Bottlenose dolphin

Bottlenose dolphin is the third most frequently recorded cetacean in Irish waters and has also been recorded in the Celtic Sea, mainly in coastal inshore waters (Berrow *et al*., 2010a). Data from the ObSERVE surveys

suggest that the west and south-west of Ireland are likely to be more important in terms of the distribution of this species compared to the rest of Irish waters. Some communities of bottlenose dolphin show a level of residency in (quite) discrete coastal areas (DEHLG, 2009b) and subsequently there are two SACs designated for bottlenose dolphin in the eastern Irish Sea. Llyn Peninsula and the Sarnau SAC and Cardigan Bay SAC are located approximately 115 km and 140 km respectively to the north-east of the Project (see **Figure 5-10**).

5.4.1.3 Risso's dolphin

Risso's dolphin is frequently recorded in Irish waters, in all seasons, and in a variety of habitats. Around the coast of Ireland, sightings of this species are recorded in inshore waters but most are recorded in deeper waters over the continental shelf and slope (Rogan *et al.,* 2018). Risso's dolphins occur in highest abundance off the south-east and south-west coasts and are most frequently sighted during the summer months when their abundance reaches a peak (Reid *et al.,* 2003). High densities of Risso's dolphins have been recorded along the south-east coast off Carnsore point in County Wexford and off the Saltee Islands (NBDC, 2022; Rogan *et al.,* 2018).

5.4.1.4 Short-beaked common dolphin

Short-beaked common dolphin is found throughout the Atlantic seaboard of Europe, in the Western Channel and Irish Sea. This species commonly inhabits continental shelf waters and occurs along the shelf edge and in deep water, and is the second most frequently reported cetacean, after harbour porpoise, within Irish waters (Berrow *et al*., 2010b). Most sightings of short-beaked common dolphin in Irish waters are primarily to the west and south of Ireland in the Celtic Sea. The common dolphin is most frequently sighted off the south and south-west coasts in summer and autumn when there is the highest presence of pelagic fish (Wall *et al.,* 2013).

5.4.1.5 Minke whale

Minke whale is the smallest and most frequently recorded baleen whale in Irish waters and has been observed all around Ireland's coast with highest abundances recorded off the south-west coast of Ireland and localised patches within the Irish Sea (Berrow *et al*., 2010a). Mostly inhabiting continental shelf waters, this species occurs in depths of less than 200 m and can often be seen close to land. Minke whales appear to be present at low relative abundances within the Celtic Sea from early spring through to late autumn (IWDG, 2022; Wall *et al*., 2013).

5.4.1.6 Humpback whale

Humpback whale is a migratory species and is almost exclusively found in waters deeper than 200 m between May and October (Reid *et al*., 2003). Most of the inshore and offshore sightings have been recorded off the south and south-west coast, where they have been known to forage on herring and sprat (Wall *et al*., 2013). Humpback whales have been sighted in lower densities along the south coast compared to the south-west coast, however, there have been sightings of humpback whales outside Waterford harbour (NBDC, 2022).

5.4.1.7 Fin whale

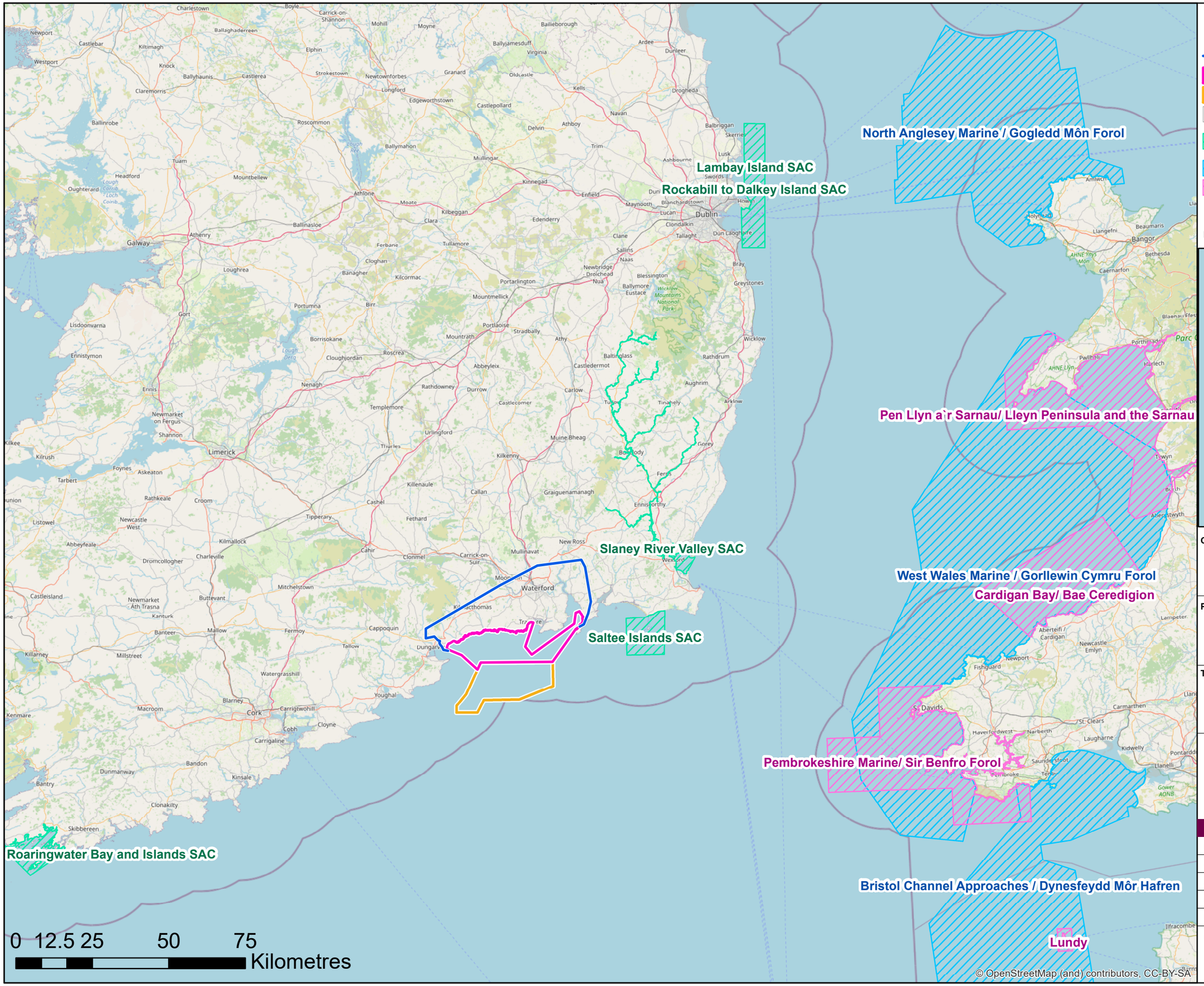
Fin whale has been sighted all along the Irish coast. They typically occur offshore in deep waters between 1,000 and 1,300 m during the summer months (Wall *et al.,* 2013). Although they are largely absent from Irish shelf waters during the winter and early spring, they have been known to inhabit inshore foraging sites along the south-east coast during the early winter (Wall *et al*., 2013). There have been high records of fin whale sightings within the Project area, off the coast of Waterford (NBDC, 2022).

5.4.1.8 Grey seal

Grey seal is the larger of the two pinniped species occurring in Irish waters and it occurs all around the Irish coast including in the vicinity of the Project (Russel *et al*., 2017). Grey seals gather in colonies on land (known as haul-outs) where they breed, rest, moult and engage in social activity (Bonner, 1990). Breeding occurs in late August to December and the annual moult between November to April (Kiely *et al.,* 2000). Preferred haul-out locations around the coast of Ireland include uninhabited islands, isolated main beaches, rocky skerries and sea caves (O'Cadhla *et al*., 2007). Important haul out sites for grey seal occur on the Saltee Islands, and at Bannow Bay (Morris and Duck, 2019). The closest SAC with grey seal selected as a QI is the Saltee Islands SAC, approximately 10 km east of the NCS Offshore AoI (see **Figure 5-10**).

5.4.1.9 Harbour seal

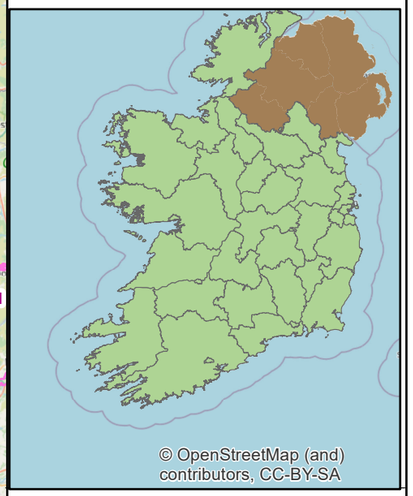
Harbour seal occurs in relatively low numbers in the Celtic Sea compared to elsewhere in Ireland (*i.e*., in the west and north-west of Ireland) (Cronin *et al*., 2004). Harbour seal breeds in small groups during spring/summer scattered along the coastline with the annual moult occurring from late July to August (SCOS, 2021). Scottish Marine Research Unit (SMRU) at-sea usage maps indicate relatively low numbers of harbour seal in the vicinity of the NCS Area. Low densities occur in association with the Slaney River Valley SAC which lists harbour seal as one of the QIs and is approximately 75 km by sea to the north-east of the NCS Cable Corridor AoI (see **Figure 5-10**).



Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- 12 NM Limit
- ROI Special Area of Conservation (SAC)
- GB Offshore SAC
- GB SAC

Data Source: NPWS, JNCC



Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 5-10: Special Areas of Conservation for Marine Mammals

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details	
Drawn By: PK	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0035
Approved By: CB	
Scale: 1:1,163,530 @ A3	**Projection:** ITM (IRENET95)
Date: 23/03/2023	

NOTE:
1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence CYAL50252391
© Ordnance Survey Ireland/Government of Ireland.

5.4.2 Key Issues and Proposed Scope

Table 5.4 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to marine mammals and megafauna.

Table 5.4: Marine Mammals and Megafauna Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Ireland's Marine Atlas at http://atlas.marine.ie/. ▪ NPWS (2019) "The Status of EU Protected Habitats and Species in Ireland." Volume 1: Summary Overview. Unpublished NPWS report. ▪ Rogan *et al.* (2018) "ObSERVE aerial survey data showing occurrence, abundance and distribution of marine mammals in Irish waters based on aerial survey data (2015 – 2017)" ▪ NPWS protected sites data: European designated sites for the conservation of marine mammals in Irish waters (NPWS various conservation objectives documents) ▪ Data from various surveys carried out by the IWDG using boat-based visual and aerial sampling techniques (*e.g.* Berrow *et al.,* 2010a, 2010b, 2011); ▪ Biodiversity maps the NBDC online mapping tool based on marine mammal sightings and stranding records from dedicated surveys and from incidental observations (Available at: Maps - Biodiversity Maps (biodiversityireland.ie) ▪ Small cetacean abundance in the North Sea (SCANS) surveys which included the Irish Sea in survey years 2005 (SCANS-II), in 2016 (SCANS-III), and in 2022 (SCANS-IV) (currently underway). ▪ SCOS reports. "Scientific advice in relation to management of grey seal and harbour seal populations in the UK. Pup production and population trends are described which provide a picture of the health of seal populations around the UK and can be extrapolated to Ireland." ▪ "At-sea distribution maps for seals" (Marine Scotland online; Russell *et al*., 2017) ▪ "Previous seal distribution maps for the Irish Sea" (Jones *et al*., 2015); ▪ "Inshore boat-based surveys for cetaceans: Irish Sea" (Berrow *et al*., 2011) ▪ "Atlas of the Distribution and Relative Abundance of Marine Mammals in Irish Offshore Waters 2005 – 2011" (Wall *et al*., 2013) ▪ NPWS – seal data around the coast of Ireland.
Proposed Baseline Survey Work and Assessments	▪ Monthly site-specific aerial digital surveys for marine mammals (and seabirds) are currently being undertaken by HiDef Aerial Surveying Ltd. The survey consists of 2 km-spaced transects across the Project area plus a 4 km buffer (the Marine Mammal Study Area). A minimum of twenty-four months of aerial survey data will be used to inform the baseline for the EIAR. ▪ Acoustic monitoring for marine mammals will be carried out within the Marine Mammal Study Area. Detectors called F-PODs will be deployed within the Marine Mammal Study Area for a period of up to 12 months. ▪ Monthly vantage point surveys at coastal locations. ▪ Desktop study of the ecology, distribution and abundance of marine mammals within the wider Celtic Sea and Irish Sea (the Regional Marine Mammal Study Area) will inform the assessment where the zone of influence for any of the identified impacts extends beyond the Marine Mammal Study Area (*e.g.* due to underwater noise from piling). ▪ The assessment methodology will consider the guidance outlined below in this table. ▪ For the purposes of undertaking the EIAR, all marine mammal species that have the potential to occur in the vicinity of the Proposed Development will be identified as important ecological features. This identification will be based on their legislative status together with the relative importance of the populations present within the Marine Mammal Study Area compared to the wider regional marine mammal populations in the Irish and Celtic Seas. ▪ Seal count information will be sought from the NPWS annual seal count database.

Scope of EIAR Chapter	Summary
Potential Impacts and Key Issues	The following issues could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Injury and/or disturbance from underwater noise during pile-driving (if required). ▪ Injury and/or disturbance due to other sources of construction/decommissioning noise (*e.g.*, drilling, trenching, dredging, cutting). ▪ Injury and/or disturbance from vessel noise (all phases). ▪ Injury and/or disturbance from underwater noise during pre-construction surveys and enabling works. ▪ Injury and/or disturbance from underwater noise due to UXO clearance ▪ Increased collision risk with vessels. ▪ Changes to fish and shellfish prey resources ▪ Injury and/or disturbance due to underwater noise from operational turbines ▪ Increased suspended sediment and associated deposition. ▪ Accidental pollution. ▪ Remobilisation of contaminated sediment. ▪ Changes in EMF from sub-sea electrical cabling.
Technical Consultations	Consultation with NPWS and IWDG to agree the baseline data sources and approach to surveys and assessments.
Relevant Standards and Guidance	▪ Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (DAHG, 2014) ▪ "Ecology and Environmental Management Guidelines for Ecological Impact Assessment in the UK and Ireland" (CIEEM, 2019) and ▪ Guidance on Marine Baseline Ecological Assessments and Monitoring Activities: ORE Projects Parts 1 & 2 (DCCAE, 2018).

5.5 Subsea Noise

5.5.1 Baseline Environment

Carnsore Point is the south-eastern corner of Ireland and is located one side of the southern entrance to the Irish Sea. The distance from Carnsore Point to the Pembrokeshire coast is about 75 km. The southern Irish Sea and Celtic Sea includes major ports at Rosslare, Fishguard, Holyhead, Liverpool, Dublin, Belview and Cork. The majority of marine traffic to these ports enters through this channel, some heading south towards Lands' End and some along the southern Irish coast. While the majority of this traffic is offshore, some shipping noise will be measurable on the sites from this traffic.

Major fishing ports along the south coast of Co. Waterford/Wexford are Dunmore East and Kilmore Quay. Other ports supporting fishing and leisure activities include Waterford, Helvick, Dungarvan, Duncannon and Passage East. Smaller vessels from these ports will have locally elevated noise levels when the vessels are operating.

Wave action at the M5 weather buoy is relatively vigorous and there are known to be a strong tidal current leading to alterations in seabed profile in the area. This combination results in both sea surface (wave) noise and seabed sediment movement noise. There are no known published datasets of underwater noise levels in the area.

Underwater noise receptors include baleen whales, dolphins, porpoises and seals. The area includes significant commercial pelagic and benthic fisheries. The Slaney, Barrow, Nore and Suir Rivers are important Atlantic salmon and seatrout fisheries with both commercial and ecological interests in underwater noise levels. Species such as lamprey and eel are of interest in the Barrow system.

5.5.2 Key Issues and Proposed Scope

Table 5.5 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to subsea noise.

Table 5.5: Subsea Noise Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Available source data for the range of pile sizes, hammer energies and drilling noise likely to be used ▪ RPS internal database of underwater noise data ▪ Published data.
Proposed Baseline Survey Work and Assessments	▪ Specific underwater noise data will be determined by short period sampling using underwater noise recorders. Underwater noise recorders will be deployed within the Offshore AoI across two survey periods to collect data on baseline underwater noise. The noise recorders are likely to be deployed for two-week periods, resulting in two datasets. The baseline data collected will be used to inform the subsea noise technical assessment, which will be used to assess operational impacts on ecological receptors, namely marine mammals and fish. ▪ An underwater noise model will be developed for construction and operational phases of the Project. The underwater noise levels will be assessed using best international practice (Popper *et al*., 2014 and Southall *et al*., 2019).
Potential Impacts and Key Issues	The following is a summary of issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Subsea noise impacts from construction activities on marine mammal and fish receptors.

Scope of EIAR Chapter	Summary
	▪ Subsea noise during operations is of lower concern but will require assessment.
Technical Consultations	▪ NPWS ▪ IFI
Relevant Standards and Guidance	▪ National Marine Fisheries Service (NMFS) (2018) guidelines for noise assessment for marine mammals. ▪ Southall, B., Finneran, J., Reichmuth, C., Nachtigall, P., Ketten, D., Bowles, A., Ellison, W., Nowacek, D., Tyack, P., (2019), Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for residual hearing effects, Aquatic Mammals, 45(2), 125-232. ▪ Popper *et al*. (2014) Guidelines for Noise Assessment for Fish and Sea Turtles.

5.6 Offshore Ornithology

5.6.1 Baseline Environment

Aerial surveys undertaken in 2015 – 2017 under the ObSERVE Programme highlight the importance of the Atlantic Margin for seabirds (Rogan *et al*., 2018). Seabirds such as puffin (*Fratercula arctica*), guillemot (*Uria aalge*), petrel species (*Hydrobates* spp.), gannet (*Morus bassanus*) and Manx shearwater (*Puffinus puffinus*) were regularly recorded during the summer, while kittiwake (*Rissa tridactyla*), gull species and fulmar (*Fulmarus glacialis*) were more commonly recorded in winter. Species such as kittiwake, guillemot and gannet, known to be sensitive to adverse effects associated with offshore windfarms, like displacement and collision effects, were recorded within the Celtic Sea.

In the ObSERVE aerial surveys, summer surveys were dominated by auk species, petrel species, gannets, fulmar and Manx shearwater. The importance of offshore waters for seabirds becomes increasingly apparent during the winter months, with winter surveys dominated by kittiwakes and gull species, as well as increased abundances of fulmar. Highest seabird densities were recorded over the waters closest to the coast during the summer, as well as the continental shelf waters in the Celtic Sea and the Atlantic (Rogan *et al*., 2018).

5.6.1.1 Kittiwake

Kittiwake was one of the more commonly sighted species in the ObSERVE aerial surveys (Rogan *et al*., 2018). There were comparatively more sightings of this gull species in winter surveys than during the summer. Kittiwake breeds in colonies along the coast, between approximately April and August. Birds then disperse offshore to spend the winter at sea. The peak in sightings during winter indicates that this species may either be primarily wintering in Irish offshore waters, or simply passing through at this time.

5.6.1.2 Manx shearwater

Manx shearwater was one of the more commonly sighted species in the ObSERVE aerial surveys (Rogan *et al*., 2018). Most observations of Manx shearwater were in offshore waters during the summer, with large numbers of sightings (and large group sizes), occurring in the Irish Sea and eastern Celtic Sea. There were also a number of records of birds occurring large distances from the coast, and over deeper waters. Manx shearwaters have large foraging ranges (Woodward *et al*., 2019), with birds likely to be using the site from a range of Irish Sea colonies, including the nearby Skomer and Skokholm SPA. Birds from Skomer and Skokholm have been tracked/recorded passing through this area on the return from extended foraging trips (Padget *et al*., 2019).

5.6.1.3 Fulmar

Fulmar was one of the most commonly sighted species, irrespective of season with some large flocks of over 100 birds observed in all seasonal surveys (Rogan *et al*., 2018). Sightings were distributed over both continental shelf and deeper waters. Fulmar has one of the largest reported foraging ranges during the breeding season of all breeding seabirds in the UK and Ireland (Woodward *et al*., 2019).

5.6.1.4 Gannet

Gannet was recorded predominantly over continental shelf waters in the ObSERVE aerial surveys (Rogan *et al*., 2018). Most sightings were of single individuals or small groups, however, some observations of flocks of over 20 individuals were noted. During winter, sightings were exclusively of adult birds. Gannets are wide-ranging and the Offshore AoI lies well within the foraging range of birds from the Saltee Islands SPA (Woodward *et al.,* 2019). Birds from these colonies have been recorded foraging in this area previously (Hamer *et al*., 2001; Stauss *et al.*, 2012).

5.6.1.5 Guillemot

The Saltee Island SPA has a large population of breeding guillemot. Birds are also likely to originate from a range of colonies along the south Irish coast and in the Irish Sea once they leave their colonies. Displacement

by wind farms may be an issue for this species (Furness and Wade, 2013). However, these species were infrequently recorded in the ObSERVE aerial surveys, and little is known of the Irish colonies overwintering distribution (Rogan *et al.*, 2018).

5.6.1.6 Razorbill

As with guillemot, razorbill (*Alca torda*) spends the winter offshore, returning to coastal colonies to breed between March and July. The nearest colony is likely to be at Helvick Head to Ballyquin SPA, with birds coming from a range of other colonies along the south Irish coast like the Great Saltee, and from within the Irish Sea. This species may be at risk of displacement (Furness and Wade, 2013).

For the purposes of the EIAR, reference populations for each species and population sizes will be based on the best available information at the time of undertaking the assessment using the resources outlined in **Table 5.6**. Consultation with key stakeholders will also help to inform the scope of the analysis and assessment of the Project in the EIAR including site-specific surveys and desktop reports. The conservation status of each species will also be taken into consideration.

These species accounts are preliminary and further analysis of the complete suite of aerial survey data will be presented in the EIAR. Baseline characterisation will be presented using design-based or model-based (*e.g.* MRSea package) methods to produce density and abundance estimates for each species in the survey area and appropriate impact areas, with associated confidence intervals. Estimates will take account of availability bias for diving species, such as auks, and species apportioning of individuals not identified to species level. The baseline characterisation will also draw on desk-study data sources.

5.6.1.7 Designated Sites

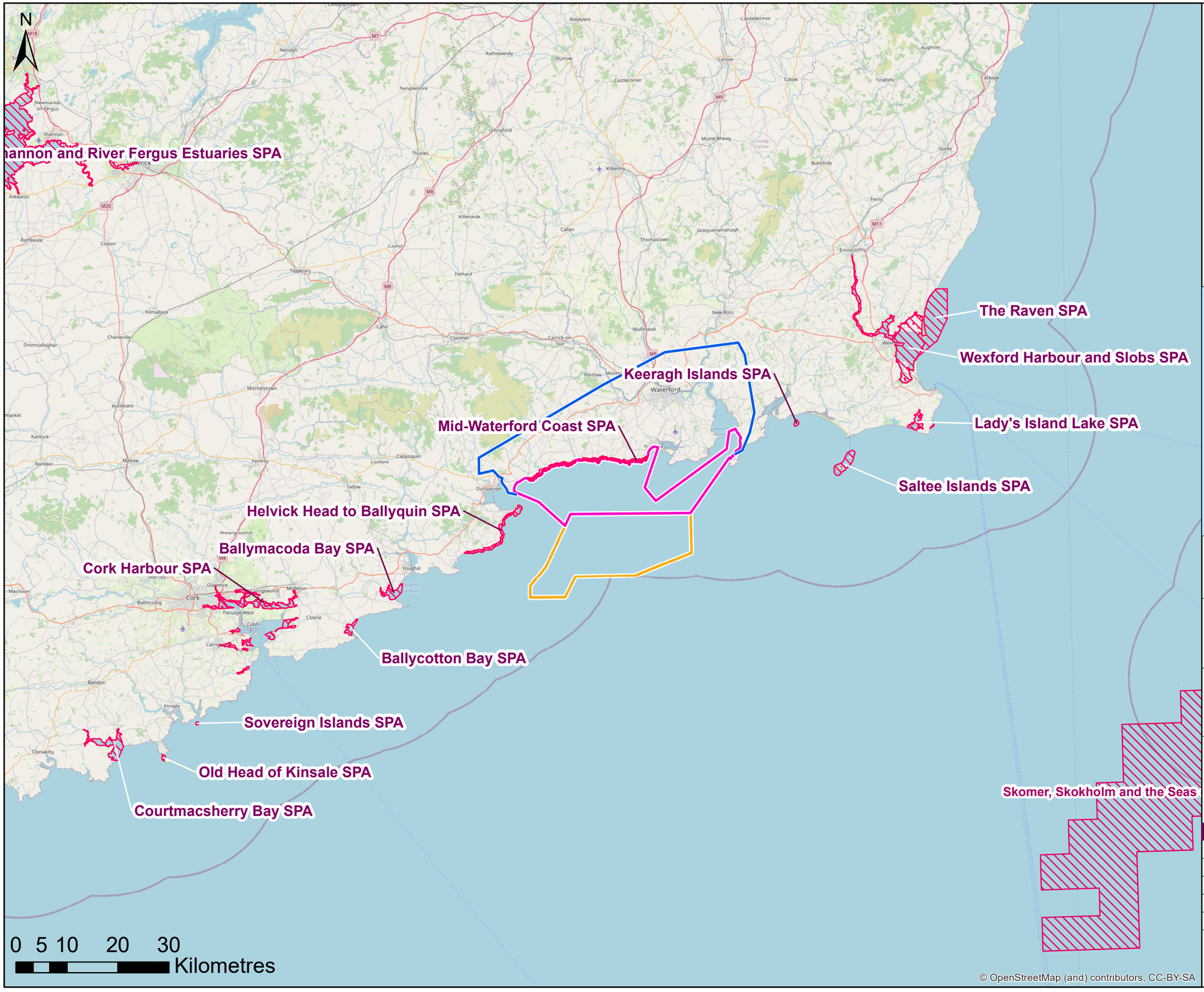
SPAs with seabird QI within 100 km of the Project are displayed in **Figure 5-11**, with the seabird species and foraging ranges listed in **Table 5.6**. For the purposes of this scoping report, a search radius of 100 km is considered appropriate in order to identify the key seabird species to be considered for assessment in the EIAR. Please note that this list is not exhaustive and additional relevant seabird colonies and SPAs may be identified during the detailed baseline assessment within the EIAR.

Those SPAs which are closest to the site are discussed here, as these are the sites most likely to have the highest connectivity with the Project. The closest designated site to the Project is the Mid-Waterford Coast SPA, which bounds part of the Cable Corridor AoI. It encompasses the areas of high coast and sea cliffs in County Waterford between Newtown Cove to the east and Ballyvoyle to the west (see **Figure 5-11**). The site is designated for the following QI seabird species: herring gull and cormorant, in addition to peregrine (*Falco peregrinus*) and chough (*Pyrrhocorax pyrrhocorax*).

The most abundant species recorded during the ObSERVE aerial surveys was kittiwake, which is designated as a QI species for the nearby sites: Helvick Head to Ballyquin SPA (approximately 2 km south-west of the Offshore AoI) and Saltee Islands SPA (approximately 19 km south-east of the Offshore AoI) (see **Figure 5-11**).

Helvick Head to Ballyquin SPA is a linear site situated on the south-west coast of Co. Waterford. It includes the sea cliffs and land adjacent to the cliff edge between Helvick Head in the east and Ballyquin townland in the south-west. The site is designated for the following QI seabird species: cormorant, herring gull and kittiwake. This site supports nationally important breeding populations of cormorant (65 pairs), herring gull (117 pairs) and kittiwake (1,037 pairs), as well as smaller populations of the seabird species: razorbill, fulmar, shag (*Phalacrocorax aristotelis*), guillemot, great black-backed gull (*Larus marinus*) and black guillemot (*Cepphus grylle*) (NPWS, 2015b) (see **Figure 5-11**).

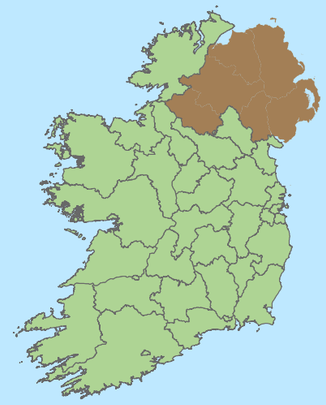
The Saltee Islands SPA comprises the two islands, Great Saltee and Little Saltee, and the surrounding seas both between them and to a distance of 500 m from them (see **Figure 5-11**). The site is designated for the following QI seabird species: fulmar, gannet, cormorant, shag, lesser black-backed gull (*Larus fuscus*), herring gull, kittiwake, guillemot, razorbill and puffin. The site is also of special conservation interest for holding an assemblage of over 20,000 breeding seabirds. The nationally important gannet colony on Great Saltee has been well documented since its establishment in the 1920s and 2,446 pairs were present in 2004, increasing considerably to 4,722 pairs in 2013-14 (Newton *et al.*, 2015). There are several other seabird colonies within foraging range of the Project, which have been designated as SPAs. The potential for connectivity with the sites is outlined in **Table 5.6**.



Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- 12 NM Limit
- Special Protection Area (SPA)

Data Source: NPWS, JNCC



Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 5-11: Offshore Ornithology Special Protection Areas

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: NR	**Project No.** MDR1649
Checked By: AE	**File Ref:**
Approved By: CB	MDR1649-RPS-01-NCS-DR-Z-AG-0034
Scale: 1:700,312@ A3	**Projection:**
Date: 22/12/2022	ITM (IRENET95)

NOTE:
1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence CYAL50252391

Table 5.6: SPAs Designated for seabird species and within 100 km of the Project.

Designated site	Approximate Distance to Offshore AoI	QI seabird species	Mean Max foraging range + SD (sample size) (Woodward *et al*, 2019)
Mid-Waterford Coast SPA	0 km	Cormorant (*Phalacrocorax carbo*) [A017] Herring Gull (*Larus argentatus*) [A184]	25.6±8.3 (4) 58.8±26.8 (10)
Helvick Head to Ballyquin SPA	2 km	Cormorant *(Phalacrocorax carbo*) [A017] Herring Gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188]	25.6±8.3 (4) 58.8±26.8 (10) 156.1±144.5 (37)
Keeragh Islands SPA	11 km	Cormorant *(Phalacrocorax carbo*) [A017]	25.6±8.3 (4)
Saltee Islands SPA	19 km	Fulmar *(Fulmarus glacialis*) [A009] Gannet (*Morus bassanus*) [A016] Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Gulosus aristotelis*) [A018] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Guillemot *(Uria aalge*) [A199] Razorbill (*Alca torda*) [A200] Puffin (*Fratercula arctica*) [A204]	542.3±657.9 (16) 315.2±194.2 (21) 25.6±8.3 (4) 13.2±10.5 (17) 127±109 (18) 58.8±26.8 (10) 156.1±144.5 (37) 73.2±80.5 (16) 88.7±75.9 (16) 137.1±128.3 (7)
Ballymacoda Bay SPA	25 km	Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull *(Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183]	18.5 (1) 50 (1) 127±109 (18)
Wexford Harbour and Slobs SPA	31 km	Cormorant (*Phalacrocorax carbo*) [A017]	25.6±8.3 (4)

Designated site	Approximate Distance to Offshore AoI	QI seabird species	Mean Max foraging range + SD (sample size) (Woodward *et al*, 2019)
		Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Lesser Black-backed Gull (*Larus fuscus*) [A183] Little Tern (*Sterna albifrons*) [A195]	18.5 (1) 127±109 (18) 5 (1)
Lady's Island Lake SPA	33 km	Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Sandwich Tern (*Sterna sandvicensis*) [A191] Roseate Tern *(Sterna dougallii*) [A192] Common Tern *(Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194]	18.5 (1) 34.3±23.2 (9) 12.6±10.6 (3) 18.0±8.9 (16) 25.7±14.8 (9)
Ballycotton Bay SPA	34 km	Common Gull *(Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183]	50 (1) 127±109 (18)
The Raven SPA	38 km	Red-throated Diver (*Gavia stellata*) [A001] Cormorant (*Phalacrocorax carbo*) [A017]	N/A 25.6±8.3 (4)
Cork Harbour SPA	46 km	Cormorant (*Phalacrocorax carbo*) [A017] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183] Common Tern (*Sterna hirundo*) [A193]	25.6±8.3 (4) 18.5 (1) 50 (1) 127±109 (18) 18.0±8.9 (16)
Sovereign Islands SPA	693 km	Cormorant (*Phalacrocorax carbo*) [A017]	25.6±8.3 (4)
Old Head of Kinsale SPA	78 km	Kittiwake (*Rissa tridactyla*) [A188]	156.1±144.5 (37)

Designated site	Approximate Distance to Offshore AoI	QI seabird species	Mean Max foraging range + SD (sample size) (Woodward *et al*, 2019)
		Guillemot *(Uria aalge*) [A199]	73.2±80.5 (16)
Courtmacsherry Bay SPA	84 km	Great Northern Diver (*Gavia immer*) [A003] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull *(Larus canus*) [A182]	N/A 18.5 (1) 50 (1)
Skomer, Skokholm and the Seas off Pembrokeshire	90 km	Puffin *(Fratercula arctica*) [A204] Storm Petrel (*Hydrobates pelagicus*) [A014] Lesser Black-backed Gull (*Larus fuscus*) [A183] Manx shearwater (*Puffinus puffinus*)	137.1±128.3 (7) 336 (1) 127±109 (18) 1346.8±1018.7 (6)
River Shannon and River Fergus Estuaries SPA	97 km	Cormorant (*Phalacrocorax carbo*) [A017] Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	25.6±8.3 (4) 18.5 (1)

5.6.2 Key Issues and Proposed Scope

Table 5.7 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to offshore ornithology.

Table 5.7: Offshore Ornithology Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Ireland's Marine Atlas (MI, 2022). ▪ Seabird distribution and model outputs from the OBSERVE project (Rogan *et al.,* 2018). ▪ Birdlife International data *e.g.*, Important Bird Areas (IBAs). ▪ Seabird count data around the coast of Ireland (held by the NPWS, BirdWatch Ireland and the NBDC. ▪ Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt *et al*., 2019). ▪ SSOSSMAT – Strategic Ornithological Support Services Migration Assessment Tool, British Trust for ornithology. ▪ SEATRACK Seabird tracking data (http://seapop.no/en/seatrack/) ▪ Irish Wetland Bird Survey (I-WeBS) (BWI, 2022).
Proposed Baseline Survey Work and Assessments	▪ Monthly site-specific aerial digital survey for seabirds (and marine mammals) are currently being undertaken by HiDef Aerial Surveying Ltd. The survey consists of 2 km-spaced transects across the Project area plus a 4 km buffer. A minimum of 24 months of aerial survey data will be used to inform the baseline for the EIAR. ▪ Boat-based visual surveys during breeding season along the Waterford Coast to inform the breeding seabird baseline around the Mid Waterford Coast SPA and Helvick Head to Ballyquin SPA. ▪ Desktop study of the ecology, foraging ranges, distribution and abundance of seabirds within the wider Celtic Sea and waters surrounding the west coast of the UK will be carried out to determine potential connectivity. ▪ Disturbance and displacement impacts will be assessed following the recommended matrix approach (SNCB, 2017) based on the abundance estimates within the appropriate species-specific site plus buffer areas. This will be completed using the mean peak population estimates including lower and upper confidence intervals, although alternative metrics may be used if the use of peak numbers artificially overestimates the typical presence of each species. The additional estimated mortality will be apportioned to breeding colonies within species-specific foraging ranges. ▪ Collision risk modelling (CRM) will be undertaken using the prevailing industry-standard approaches at the time of application (*e.g.* deterministic (Band, 2012); or stochastic (McGregor *et al*., 2018) to predict potential mortality levels from this impact and the consequences of this for relevant populations. The parameter values used, such as for avoidance rates, flight heights and nocturnal activity levels, will be based upon the best available evidence and will be consulted on and discussed with relevant stakeholders (*e.g.* NPWS). ▪ The potential impacts arising from collision risk and displacement will be summed to estimate overall additional mortality in seabird populations. In line with standard industry practise, where there is an increase of more than 1% in the baseline mortality rate in the population, this will trigger more detailed investigation of population effects. Below this 1% threshold, there is not likely to be a significant effect; however, the impact will still be quantified and considered in the cumulative or in-combination assessment. The population under consideration will be defined by estimates of regional population scales. Non-breeding season populations will be estimated using similar methods as the biologically defined minimum population scales (BDMPS) described in Furness (2015), but with consideration of populations in Irish waters, while breeding season populations will be derived from estimates of abundance at colonies within foraging range of the Project. Where given further consideration, the impact will be apportioned appropriately to breeding colonies following the latest available guidance (SNH, 2018). Where an impact to an individual (*e.g*. through CRM or displacement, or a combination of the two) has potential to affect a given population, population viability analysis (PVA) (Searle *et*

Scope of EIAR Chapter	Summary
	al., 2019) may be required to further investigate the potential consequences of the impact at the population level.
Potential Impacts and Key Issues	The following key issues could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Disturbance and displacement; ▪ Indirect effects upon prey species and habitats; ▪ Collision risk; ▪ Accidental pollution; and, ▪ Barrier effects.
Technical Consultations	Consultation with key stakeholders (NPWS, Birdwatch Ireland) as identified during preparation of the baseline.
Relevant Standards and Guidance	▪ Planning policy, specifically in relation to offshore ornithology, as contained in the NMPF (DHLGH, 2021); ▪ Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester. (CIEEM, 2018); ▪ Guidance on Marine Baseline Ecological Assessments and Monitoring Activities: ORE Projects Parts 1 & 2 (DCCAE, 2018); ▪ Various specific guidance documents from UK Statutory Nature Conservation Bodies (SNCBs) regarding approaches to the assessment of collision and displacement impacts including Joint SNCB Interim Advice on The Treatment Of Displacement For Red-Throated Diver (2022).

5.7 Offshore Bats

5.7.1 Baseline Environment

There are nine bat species confirmed as resident in Ireland with two vagrant/migratory species. Certain species, such as Nathusius' pipistrelle (*Pipistrellus nathusii*) and Leislers bat (*Nyctalus Leisleri*) are known to be migratory outside of Ireland, with migrations of 800 – 1600 km between summer and hibernation sites recorded, particularly in continental Europe. While it is understood that some bat species undertake seasonal migrations within Ireland, due to a lack of scientific studies, bat migration patterns within and to/from Ireland are not understood or significantly researched.

5.7.2 Key Issues and Proposed Scope

Table 5.8 outlines the desktop data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to offshore bats.

Table 5.8: Offshore Bats Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Guidelines for the Considerations of Bats in Wind Farm Projects Revision 2014 (Eurobats, 2014) ▪ Survey Guidelines for Assessing Bat Activity at Proposed Onshore Wind Farms (Cook *et al*., 2008) ▪ Temporal Variation in Activity of Bats and the Design of Echolocation – monitoring studies (Hayes, 1997) ▪ North Sea Ferries Bat Migration Research Reports (BSG, 2014)
Proposed Baseline Survey Work and Assessments	▪ Two Anabat Swift Detectors were deployed onboard the survey vessels while geotechnical and geophysical surveys were being undertaken within the Offshore AoI. Survey data collected from dusk to dawn for the duration of the geophysical /geotechnical survey period during the March to October "window" for bat activity. Survey aim is to identify any offshore bat activity within the Offshore AoI. ▪ Eurobats (2014) Guidelines for Consideration of Bats in Windfarm Projects provides some high-level guidance. ▪ Draw from the various North Sea and Scandinavian offshore studies which have been completed for survey methodologies while creating a bespoke suite of surveys for this Project.
Potential Impacts and Key Issues	Possible interaction with offshore infrastructure during the construction and operation phases, if migration is confirmed.
Technical Consultations	Consultation with NPWS to discuss: ▪ Bat activity if any is recorded: ▪ Baseline data sources ▪ Results of the impact assessment, proposed mitigation and monitoring etc.
Relevant Standards and Guidance	▪ Published guidelines on the appropriate approach to impact assessment (*e.g.* CIEEM, 2018) ▪ Bat Surveys for Professional Ecologists, Good Practice Guidelines (Collins, 2016) ▪ Bat Mitigation Guidelines for Ireland- V2 (Marnell *et. al*., 2022) ▪ Guidelines for consideration of bats in wind farm projects Revision 2014 (Rodrigues *et al.,* 2015).

5.8 Commercial Fisheries and Aquaculture

5.8.1 Baseline Environment

The NCS AoIs traverse International Council for the Exploration of the Sea (ICES) Areas VIIa and VIIg and three ICES statistical rectangles 32E2, 33E2 and 33E3. The NCS Cable Corridor AoI is mainly located in ICES rectangle 33E2 within the 6 nm inshore delineation whereas the NCS Offshore AoI spans ICES rectangles 33E2 and 32E2 out towards the 12 nm territorial water boundary.

There are several aquaculture sites in the coastal waters surrounding the NCS Offshore and Cable Corridor AoIs, however, none overlap with the Project. Approximately 2 km west of the Cable Corridor AoI and approximately 13 km north-west of the Offshore AoI in Dungarvan Harbour there are licensed aquaculture sites for the production of Pacific oysters. At the entrance to Waterford Harbour approximately 2 km north of the Cable Corridor AoI, there are a number of aquaculture licences for blue mussels. Further inside Waterford Harbour, at Woodstown Strand there are several licences for Pacific oysters, while further north opposite Passage Strand between Duncannon and Ballyhack aquaculture licences have been granted for blue mussels (Ireland's Marine Atlas, 2022). It is unknown how many of these licences and sites are currently active. Further information may be obtained through consultation with the Aquaculture & Foreshore Management Division, Department of Agriculture, Food and Marine (DAFM) and BIM, including where possible, volumes per species, per site.

An initial investigation of fishing activity in the Project area and adjacent waters has been informed by vessel monitoring system (VMS) data published by the MI[3], as well as effort and landings data from the EC Scientific, Technical And Economic Committee For Fisheries (STECF) collated by ICES rectangle (STECF, 2023). It is important to note that UK effort and landings data from 2021 were not included in the dataset collated by STECF. STECF data were supplemented with available landings data for UK vessels in 2021 from the Marine Management Organisation (MMO) (see **Section 5.8.1.2**).

An ICES rectangle is a defined area, 1 degree longitude x 0.5-degree latitude, equalling approximately 30 x 30 nm used for fisheries statistics. As such these initial findings reflect the extent of fishing activity in the respective ICES rectangle and a proxy for the scope of commercial fishing in the Project area. The most recently available commercial fisheries data has been used to inform this baseline summary. The commercial fisheries baseline description in the EIAR will utilise the most recent data available at the time of writing.

Commercial fishing effort and landings data of EU (including Irish) and UK flagged vessels were selected as the most informative parameters:

- Fishing effort distributions based on VMS data and STECF data; and
- Landing's volumes and values by species and gear, for:
  - All vessels
  - Vessels under 12 m length

5.8.1.1 Fishing Effort

Effort data collated by STECF indicate that the principal gear types in the Project area and adjacent waters (i.e. ICES statistical rectangles 32 E2, 33 E2 and 33 E3) from 2017 to 2021 included pots and traps, dredges, beam trawls, demersal otter trawls, set gillnets and pelagic trawls. Approximately 50% of total fishing days in the project area and adjacent waters were accounted for by vessels under 12 m in length over this time period. Effort from vessels larger than 12 m length was predominantly from active gears, including beam trawls, demersal otter trawls and dredges. Vessels under 12 m in length accounted for the majority of effort in the

[3] Offshore Fishery Effort by Gear Type, Marine Institute resource identifier: ie.marine.data:dataset.3994. Accessed 20/09/2022 from: https://www.isde.ie/geonetwork/srv/eng/catalog.search#/metadata/ie.marine.data:dataset.3994.

Project area and adjacent waters from pots and traps (94%) and set gillnets (74%). The other main gear type deployed by the under 12 m fleet was dredging, accounting for 13% of total fishing days from vessels under 12 m length, and approximately half of the total fishing days from dredging in the Project area and adjacent waters. This figure of 13% has been reducing in recent years for the under 12 m segment of the fleet, this will be kept under review.

Fishing effort from UK vessels in 2021 was not included in the dataset collated by STECF. UK vessels accounted for a low proportion of total fishing effort in the Project Area and adjacent waters from 2017 to 2020, averaging 0.5% of total fishing days and 0.2% of fishing days by vessels under 12 m length. A preliminary investigation of available landings data from the MMO suggests fishing activity by UK vessels within the Irish EEZ in the Project Area and adjacent waters was also limited in 2021 (see **Section 5.8.1.2**).

Generally, this smaller vessel length category has been exempted from using a VMS. However, fishing activity by the under 12 m fleet is expected to occur at relatively high levels in inshore (0-6 nm) waters and out to the 12 nm territorial water boundary.

In contrast, vessels over 12 m in length are equipped with VMS as a regulatory requirement since 2012 (Council Regulation (EC) No 1224/2009 and Commission Implementing Regulation (EU) No 404/2011). VMS data provide a reliable indication of spatial distribution and intensity of fishing activity, for vessels above this length category.

The distribution of fishing effort from EU (including Irish) and UK vessels greater than 12 m length in recent years has overlapped with the NCS Offshore AoI, and to a more limited extent the NCS Cable Corridor AoI (**Figure 5-12**). The distribution of fishing effort within the Project area varied between gear types, with beam trawls, dredges and seines more prevalent in the NCS Offshore AoI and a more limited overlap with the NCS Cable Corridor AoI, and vice versa for pelagic trawls. Demersal otter trawls had appreciable overlap with the NCS Offshore AoI, as well as the eastern sector of the NCS Cable Corridor AoI.

As described above, contemporary data are relatively limited for the fine scale spatial distribution of effort by vessels under 12 m length, given the limited coverage of VMS in this sector. However, the introduction of inshore VMS (I-VMS) for smaller vessel length categories has developed in recent years *e.g.* 2018 pilot study by the Marine Institute (MI). As such, higher resolution data of fishing activity for the smaller vessel length categories is expected to become available during the life span of the Project development.

N

33E2

33E3

32E2

Blackwater

Youghal Bay

Dungarvan Harbour

Waterford Harbour

Wexford Harbour

0 5 10 20 30

Kilometres

Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

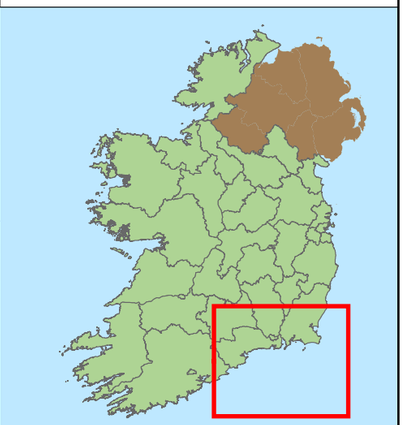
Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- ICES Rectangles

Fishing Effort Hours km-2 year -1

- 0
- E <= 1.2
- 1.2 < E <= 3.2
- E > 3.2

Data Source: ICES



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 5-12: Distribution of Fishing Effort by Pots, Dredges, Beam Trawls and Bottom Otter TrawlsBased on VMS Data within the Irish EEZ

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: RS	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0042
Approved By: CB	
Scale: 1:455,578@ A3	**Projection:** ITM (IRENET95)
Date: 22/03/2023	

5.8.1.2 Landings

The annual weight landed of the top five species between 2017 and 2021 for all EU and UK vessels are presented in **Table 5.9**. Pelagic species such as sprat and herring are caught in large volumes in seasonal fisheries deploying active gears such as otter and pelagic trawls, whereas crab and whelk appear to be important fisheries for Ireland's inshore fleet and caught all year-round using pots and traps. Haddock and other whitefish species are caught using otter trawls and beam trawls typically deployed by vessels over 12 m.

Landings data collated by STECF do not cover UK vessels in 2021. A preliminary investigation of available landings data from the MMO[4] suggests fishing activity by UK vessels within the Irish EEZ in the Project Area and adjacent waters was limited in 2021, with 2 tonnes of whelks landed by vessels using pots and traps in ICES rectangle 32 E2.

Table 5.9: Annual Landings (tonnes) for all EU and UK Vessels in the Project Area and Adjacent Waters (ICES rectangles 32E2, 33E2 and 33E3).

English name	Scientific name	2017	2018	2019	2020	2021*
European sprat	*Sprattus sprattus*	527.3	938.9	3,260.9	6,507.3	6,604.3
Whelk	*Buccinum undatum*	1,043.6	772.6	1,226.0	1,072.5	1,310.6
Edible crab	*Cancer pagurus*	1,216.2	1,199.9	1,069.3	839.1	813.9
Atlantic herring	*Clupea harengus*	1,503.4	2,167.4	522.4	49.0	71.5
Haddock	*Melanogrammus aeglefinus*	802.2	600.6	687.2	664.4	784.0
Others		3,574.2	2,296.8	3,434.8	2,803.0	2,154.0
Total		**8,666.9**	**7,976.2**	**10,200.6**	**11,935.4**	**11,738.3**

** Note: Data for 2021 do not include landings from UK vessels.*

Analysis of landings by volume (tonnes) of vessels under 12 m shows species caught by static gear predominate: whelk and edible crab along with lower volumes of spinous spider crabs and pelagic species sprat and Atlantic herring (**Table 5.10**).

The general trend shows large increases in the volume of catches of sprat from 2019 to 2020, whereas catches of crab and herring have declined for the same period (2016-2020, see **Table 5.9**). Catches of whelk and haddock appear to be relatively stable. The same trend in landed volume per species is also evident for the vessels under 12 m (see **Table 5.10**).

[4] UK fleet landings by ICES rectangle, stock, port and EEZ 2021, accessed on 13th March 2023 from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133980/UK_landings_into_all_ports_and_foreign_landings_into_UK_ports_by_rectangle_stock_port_and_reported_EEZ_2021__updated_.ods

Table 5.10: Annual Landings (tonnes) for Vessels <12 m LoA in the Project Area and Adjacent Waters (ICES rectangles 32 E2, 33 E2 and 33 E3).

English name	Scientific name	2017	2018	2019	2020	2021*
Whelk	*Buccinum undatum*	1,043.5	769.2	1,225.9	1,047.2	1,214.7
Edible crab	*Cancer pagurus*	1,212.2	1,187.1	1,063.9	780.6	756.2
European sprat	*Sprattus sprattus*	118.5	374.0	484.6	1,488.2	1,364.3
Spinous spider crab	*Maja squinado*	15.8	26.8	263.8	346.5	327.5
Atlantic herring	*Clupea harengus*	510.3	207.6	162.3	8.0	13.3
Others		858.1	626.9	835.6	805.7	744.9
Total		**3,758.5**	**3,191.7**	**4,036.2**	**4,476.2**	**4,421.0**

** Note: Data for 2021 do not include landings from UK vessels.*

The respective value of landings during the same period (2017-2021) shows the importance of pot and trap fisheries for crab, lobster and whelk (**Table 5.11**). The scallop fishery appears to be most valuable at an average catch of just over €3,000,000 between 2017 and 2021, though this was largely driven by the high value of landings in 2019. The overall trend appears to be a decline in value reflecting lower catches *e.g.* whelk and crab, though with a high value of overall landings in 2019 driven by the scallop fishery.

Table 5.11: Annual Landings (value – M €) for all EU and UK Vessels (ICES rectangles 32 E2, 33 E2 and 33 E3).

English name	Scientific name	2017	2018	2019	2020	2021*
Great Atlantic scallop	*Pecten maximus*	1.96	2.76	6.39	3.13	0.26
Edible crab	*Cancer pagurus*	2.07	2.94	2.28	1.45	1.74
Whelk	*Buccinum undatum*	1.63	1.57	2.62	1.74	1.94
European lobster	*Homarus gammarus*	1.57	1.14	1.67	1.11	1.54
Haddock	*Melanogrammus aeglefinus*	1.36	1.15	0.91	0.89	1.09
Others		7.83	5.85	7.11	6.60	6.46
Total		**16.43**	**15.40**	**20.98**	**14.94**	**13.04**

** Note: Data for 2021 do not include landings from UK vessels.*

Similar trends in value of landings are reflected in the under 12 m fleet with the predominance of the crab, lobster and whelk fisheries and dredging for Atlantic scallop and razor clams (**Table 5.12**).

Table 5.12: Annual Landings (Value - M €) for Vessels <12 m LoA in the Project Areas and Adjacent Waters (ICES rectangles 32 E2, 33 E2 and 33 E3).

English name	Scientific name	2017	2018	2019	2020	2021*
Edible crab	*Cancer pagurus*	2.07	2.91	2.27	1.35	1.62
Whelk	*Buccinum undatum*	1.63	1.57	2.62	1.71	1.80
European lobster	*Homarus gammarus*	1.55	1.12	1.66	1.08	1.53
Common shrimp	*Crangon crangon*	0.14	0.40	0.61	0.53	0.64
Great Atlantic scallop	*Pecten maximus*	0.62	0.62	0.69	0.00	0.00
Others		1.91	1.68	1.59	2.09	2.03
Total		**7.92**	**8.31**	**9.44**	**6.76**	**7.62**

** Note: Data for 2021 do not include landings from UK vessels.*

A presentation of the spatial distribution of value of commercial fisheries in the Project area is provided in **Figure 5-13**. This simple schematic provides a proxy for the values of landings in the NCS Cable Corridor and Offshore AoI, respectively. Landings in the southern area of the NCS Offshore AoI (south of 52°S) appear to be more valuable than the northern area.

Annual commercial fisheries data between 2017-2021 also collates landings values (volume and value) by gear type. The data indicate the dominance of static gear for vessels under 12 m length operating in the Project area, mainly pots and traps and set gillnets, along with dredges, pelagic trawls and bottom otter trawls, presumably operating within territorial waters (0-12 nm). For vessels larger than 12 m length, active gears dominated, including dredges, bottom otter trawls, beam trawls and seine nets. The commercial fisheries baseline description in the EIAR will utilise the most recent data available at the time of writing.

Key ports used by the commercial fleet in the geographical vicinity of the Project area are Cheek Point, Dunmore East, Duncannon/St Helens, Kilmore Quay to the east of the Project area and Helvick, Ballycotton and Youghal to the west. The ports along the south coast receive a mix of pelagic, demersal and shellfish species (Gerritsen and Kelly, 2019).

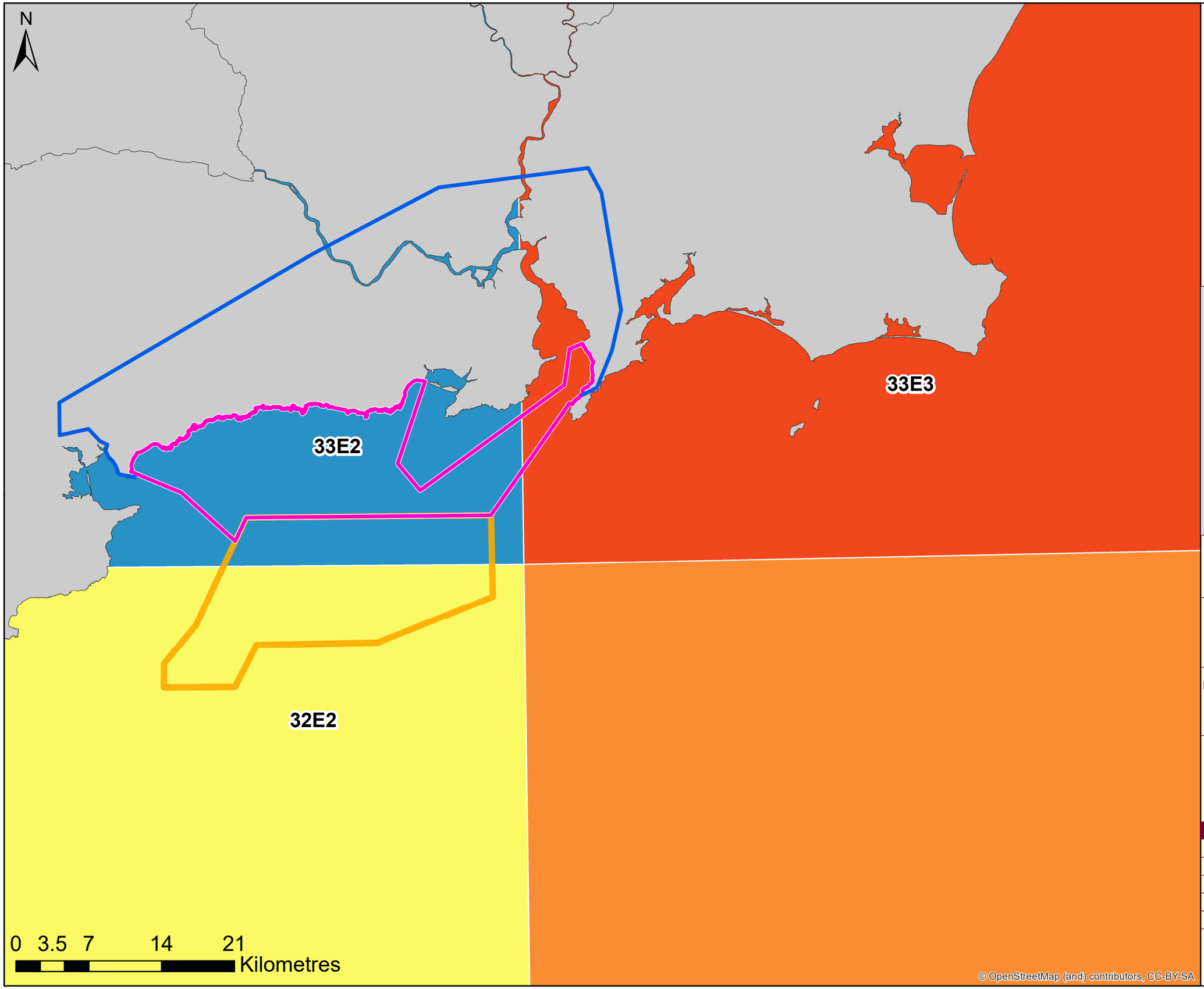
The Atlas of Commercial Fisheries around Ireland (Gerritsen and Kelly, 2019) provides a robust account of fishing activity around Ireland based on commercial fisheries data collated between 2014 and 2018. The findings of the initial investigation of commercial fisheries data are consistent with the descriptions set out in the Atlas. To summarise:

- Irish flagged vessel account for 58% of the total dredge effort inside the Irish EEZ. The majority of Irish dredge effort is located in Celtic Sea fishing grounds by vessels under 12 m (without VMS), with scallops dominating landings into Ireland.
- Smaller vessels <12 m (without VMS) account for a significant proportion of the Irish potting effort. Potting effort is mostly confined to inshore areas of which Irish flagged vessels accounts for 88% of the total potting effort. Crabs dominate landings followed by whelks.
- VMS data for vessels over 12 m revealed that the vast majority of fishing effort by Irish vessels occurs within the Irish EEZ while *c.* 55% of fishing effort is carried out by foreign vessels *e.g.* UK and French flagged vessels account for 21% and 18% respectively. Fishing effort by vessels over 12 m in length is dominated by demersal otter trawl, followed by pots, dredges, beam trawls, gill nets, seines and pelagic trawls.

- High levels of beam trawl effort are evident in the northern Celtic Sea of which Irish flagged vessels account for 89% of the total beam trawl effort. In the Celtic Sea the species composition from demersal beam trawls is highly mixed.

- Small areas of high pelagic trawl effort are evident in inshore locations along the south coast of which Irish flagged vessels account for 57%. Smaller vessels under 12 m with no VMS mainly operate inshore in the northern Celtic Sea and catches of herring dominate inshore landings, whereas catches of sprat are highly localised and mainly take place inside bays during the winter month e.g. mouth of the River Suir, bordering County Waterford and Kilkenny.

Overall, the initial investigation potentially shows a vibrant commercial fishing sector operating in both AoIs.



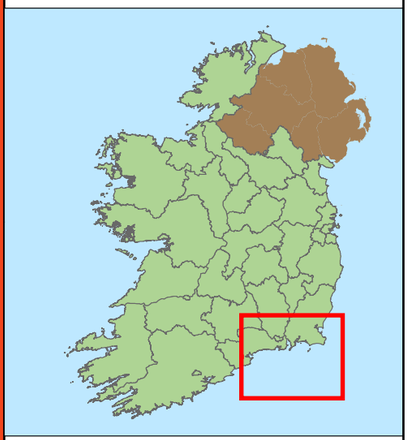
Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- 12 NM Limit
- ICES Rectangles

Average Annual Landing (M €)

- 1
- 4
- 7
- 8

Data Source: ICES



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 5-13: Average Annual Landings(M €) by ICES rectangles for all Vessels in the Project Areas and Adjacent waters from 2017 to 2021

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: RS	**Project No.** MDR1649
Checked By: AE	**File Ref:**
Approved By: CB	MDR1649-RPS-01-NCS-DR-Z-AG-0041
Scale: 1:343,139@ A3	**Projection:**
Date: 23/03/2023	ITM (IRENET95)

5.8.2 Key Issues and Proposed Scope

Table 5.13 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to commercial fisheries and aquaculture.

Table 5.13: Commercial Fisheries and Aquaculture Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ MI ▪ DCCAE ▪ SFPA ▪ BIM ▪ Central Statistics Office (CSO) ▪ IFI ▪ Irish Fishermen's Organisations ▪ Fishery liaison officers (FLOs), local fishermen and sea anglers ▪ Ireland's Marine Atlas at http://atlas.marine.ie/ ▪ Data on Irish Sea fisheries from ICES, NRW), MMO, Marine Scotland, Department of Agriculture, Environment and Rural Affairs in Northern Ireland (UK) ▪ The Fisheries Directorate of the Department of Environment, Food and Agriculture (DEFA) Isle of Man ▪ STECF (Commercial fisheries data submitted by EU Member States to the EC under the provisions of the Data Collection Framework (Regulation (EC) 199/2008).
Proposed Baseline Survey Work and Assessments	A desktop study and analysis will be carried out to determine the current status of commercial fishing activities in the area. This study will use publicly available data sources (including those listed above) and will be supplemented by information from the project FLO and from the ongoing consultation with the fishing industry. Consultation with the SFPA, the MI and BIM will also form a key part of this assessment.
Potential Impacts and Key Issues	The following key issues could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Displacement of fishing activity. ▪ Potential permanent and/or temporary reductions in access to key fishing grounds. ▪ Potential changes to fishing activity once the wind farm is operational. ▪ Increased potential for snagging fishing gear. ▪ Reduction in available seabed due to the presence of infrastructure. The chapter will focus on metrics of the fishing fleets, such as catch rates, fishing effort, key fishing grounds and fisheries trends for the last five years. The chapter will also look at the spatial aspects of fishing activity, such as key fishing grounds, effort and catches across the site and adjacent areas.
Technical Consultations	Consultation with key fisheries interests, associations and groups, including the MI, DCCAE, SFPA, BIM, relevant fisheries local actions groups (FLAGs) representatives, IFO, CSO, IFI, local fishermen and sea anglers to inform baseline data gathering process.
Relevant Standards and Guidance	▪ FLOWW Best Practice Guidance for Offshore Renewables Developments. ▪ Blyth-Skyrme, R.E. (2010) *Options and opportunities for marine fisheries mitigation associated with wind farms.* Final report for COWRIE contract FISHMITIG09. COWRIE Ltd, London and ▪ UKFEN (2013) Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments.

5.9 Shipping and Navigation

5.9.1 Baseline Environment

The Shipping and Navigation baseline has been established primarily within a study area defined as a 10 nm buffer of the NCS Offshore AoI (hereafter called the 'Study Area'). The use of a 10 nm (18.5km) study area is standard[5] for shipping and navigation assessments given it captures relevant vessel routeing in the vicinity while still remaining site specific to the project being studied.

5.9.1.1 Summary of Navigational Features

The Offshore AoI is located off the south coast of Ireland, which has several ports and harbours. These include Dungarvan, Dunmore East, Waterford Harbour, New Ross and Kilmore Quay.

The entrance to Waterford Harbour lies between Dunmore East and Hook Head. The distance from the mouth of the estuary to the berths at Belview Port (Port of Waterford) is approximately 10 nm (18.5km). The pilot station for Waterford Harbour is located approximately 0.5 nm (0.9km) from the Cable Corridor AoI, with pilotage being compulsory for commercial vessels. The inland port of New Ross is located further north on the River Barrow, approximately 17 nm (31.5km) from the sea via Waterford Estuary.

The entrance to Waterford Harbour is marked by a light, automatic identification system (AIS) and Racon on Hook Lighthouse situated on Hook Head (the southern point of the narrow Hook peninsula). The easternmost section of the Cable Corridor AoI makes landfall within Waterford Harbour limits.

Other harbours within the Study Area include Dungarvan Harbour (closed to commercial traffic), Helvick Harbour (small fishing harbour) and Dunmore East (busy fishing port).

Charted wrecks and obstructions, identifiable from the UKHO Admiralty Charts, are located throughout the Study Area, including four charted wrecks within the Offshore AoI. There are also two charted wrecks and an obstruction within the Cable Corridor AoI and a historic wreck south of the Offshore AoI.

There are three Royal National Lifeboat Institution (RNLI) stations located along the coast within the Study Area at (from west to east) Helvick Head, Tramore and Dunmore East.

Beyond the Study Area but relevant to navigation in this area are the traffic separation schemes (TSS) off Tuskar Rock and off Fastnet Rock, situated off the south-east and south-west coasts of Ireland, respectively. These are international routeing measures adopted by the International Maritime Organisation (IMO), and typically used by commercial vessels heading east-west off the south coast of Ireland.

An overview of the navigational features is provided in **Figure 5-14**.

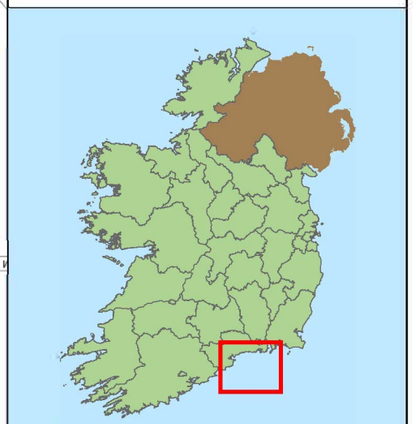
[5] Navigation Risk Assessments within the UK framework *i.e.*, those required to follow marine guidance note (MGN) 654 typically use a 10 nm study area.

Legend

- NCS Offshore AoI
- NCS Cable Corridor AoI
- Study Area

Navigational Features

- Aid to navigation
- Obstruction
- Pilot boarding station
- Ports & Harbours
- Wreck
- Subsea cable



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 5-14 Chart Overview of the Navigational Features of the Project AoI

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: DS	**Project No.** A4407
Checked By: JMC	**File Ref:** A4407-ANA-001
Approved By: AF	
Scale: 1:350,000@ A3	**Projection:** WGS84 World Mercator
Date: 17/03/2023	

NOTE:
1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence CYAL50252391
© Ordnance Survey Ireland/Government of Ireland.

5.9.1.2 Summary of Vessel Traffic

The vessel traffic baseline has been established via analysis of 2 x 4 weeks of seasonally weighted AIS data (see **Table 5.14**) within the Study Area. AIS covers virtually all commercial vessels, fishing vessels of 15 m length and above and a growing proportion of smaller fishing vessels and recreational craft who carry it voluntarily (but will be under-represented within the data).

An average of 16 unique vessels per day were recorded within the Study Area during the winter period, with this rising to an average of 27 per day during summer, mainly due to recreational vessel activity.

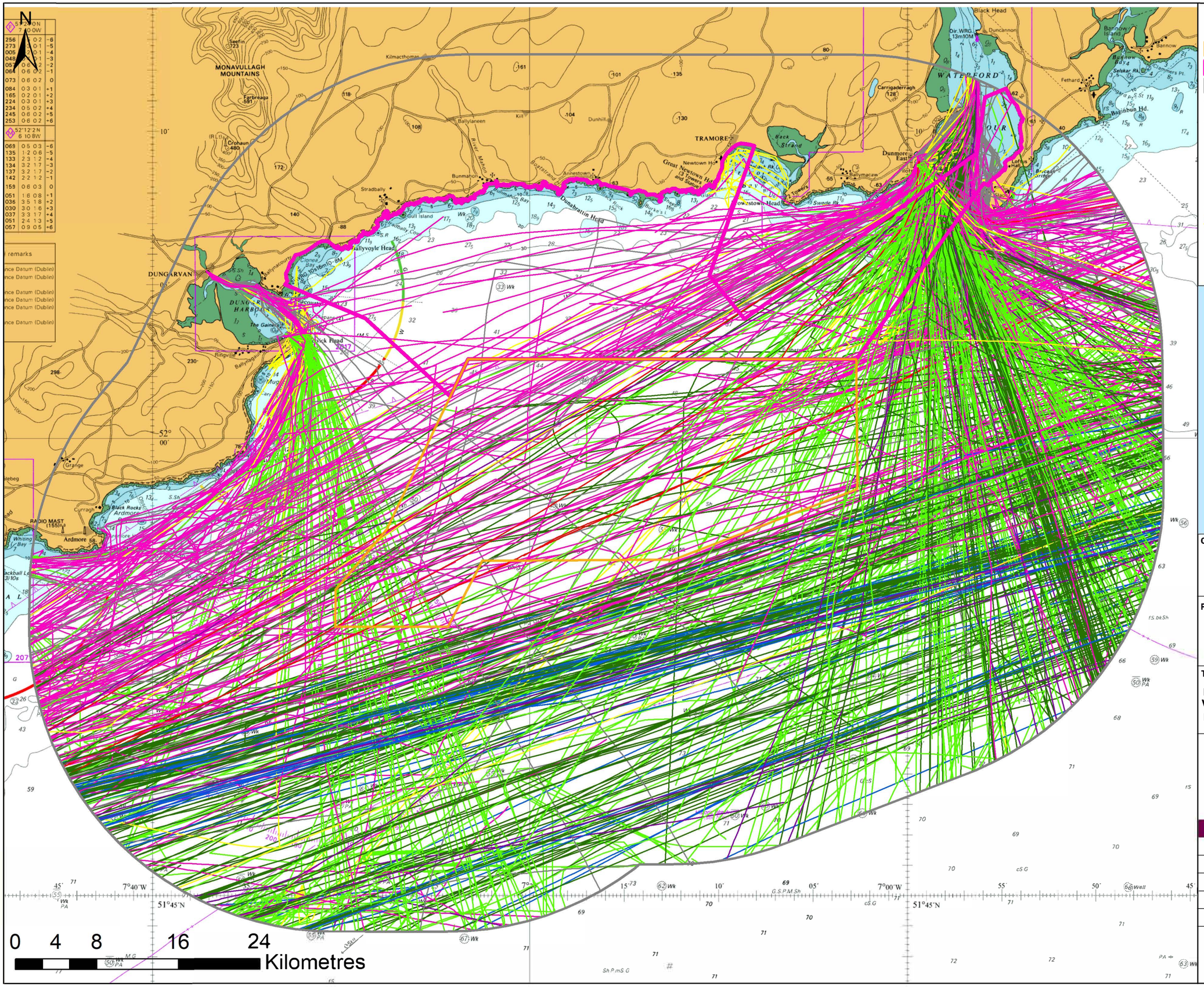
An average of two vessels per day intersected the Offshore AoI during winter, rising to five per day during summer. Again, this increase was observed to be primarily associated with recreational vessel activity, which tended to be nearshore.

Most commercial traffic (*e.g.*, cargo vessels and tankers) passed south of the Offshore AoI heading generally on east/west courses, *e.g.*, to/from Off Tuskar Rock and/or Fastnet Rock TSSs. There was also significant commercial traffic to / from Waterford, the majority of which passed to the east of the Offshore AoI.

Most fishing vessels in the area were heading north/south to and from Dunmore East Harbour and Helvick Harbour. During the survey period, the fishing vessels that were tracked passing through the Offshore and Cable Corridor AoIs appeared to be mainly transiting on passage as opposed to actively engaged in fishing.

Anchoring activity was observed within and near the entrance to Waterford Harbour in the vicinity of the pilot boarding station, including a proportion of vessels that anchored within the Cable Corridor AoI.

The vessel traffic data colour coded by vessel type is shown in **Figure 5-15**.

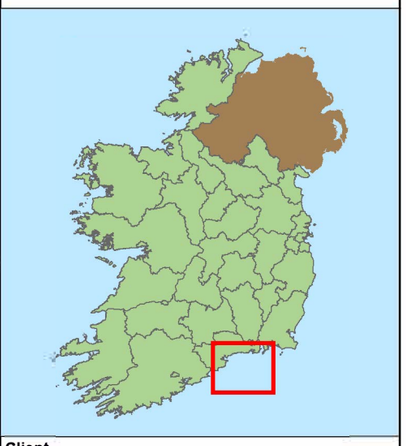


Legend

- NCS Offshore AoI
- NCS Cable Corridor AoI
- Study Area

Vessel Type

- Unspecified
- Fishing
- Dredger
- Passenger
- Cargo
- Tanker
- Other
- Recreational



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 5-15: Chart of the AIS Vessel Tracks (by Vessel Type, 56 Days, Winter and Summer AIS) passing within and close to the Site (8 Weeks, 2022)

RPS
anatec

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: DS	**Project No.** A4407
Checked By: JMC	**File Ref:** A4407 ANA-002
Approved By: AF	
Scale: 1:350,000@ A3	**Projection:** WGS84 World Mercator
Date: 17/03/2023	

2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence CYAL50252391

5.9.2 Key Issues and Proposed Scope

Table 5.14 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to shipping and navigation.

Table 5.14: Shipping and Navigation Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Admiralty Charts 2049-0 and 1123-0 (UKHO); ▪ Admiralty Sailing Directions (Irish Coast Pilot (NP 40) (UKHO)); ▪ AIS data comprising four weeks in Jan/Feb and four weeks in July 2022; ▪ Fishing VMS data; ▪ Ireland's Marine Atlas at http://atlas.marine.ie/; and ▪ Incident data from RNLI and Marine Casualty Investigation Board (MCIB)
Proposed Baseline Survey Work and Assessments	▪ Dedicated vessel-based surveys (radar, AIS and visual observations) comprising a minimum 28 days in total, including seasonal variations (2 weeks in winter and 2 weeks in summer) ▪ Survey data and other data sources will be used to inform a Navigational Risk Assessment (NRA) which will identify and consider impacts to shipping and navigation users. A consultation process will also be run including a Hazard Review Workshop involving a representative cross-section of national and local stakeholders. ▪ The findings and output of the NRA will be used to assess impacts within the Shipping and Navigation EIAR Chapter.
Potential Impacts and Key Issues	The following is a summary of issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Displacement of vessels; ▪ Vessel to vessel collision risk (third party to third party and third party to project vessel); ▪ Vessel to structure allision risk (including powered and drifting); ▪ Increased risk of anchor snagging; ▪ Effects on search and rescue (SAR) capability; and ▪ Cumulative impacts associated with other planned developments.
Technical Consultations	Consultation with the Marine Survey Office (MSO), Irish Coast Guard (ICG), Commissioners of Irish Lights (CIL), Irish Chamber of Shipping, Irish Sailing in addition to Navigation Stakeholder Workshop with wider local stakeholders including local ports/harbours, e.g., Waterford and Dunmore East, and local yacht / sailing clubs.
Relevant Standards and Guidance	▪ Strategic environmental assessment (SEA) of the OREDP in the Republic of Ireland (2010); ▪ MGN 654 – Safety of Navigation: ORE Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response[6]; ▪ Annex 1 to MGN 654: Methodology for Assessing the Marine Navigational Safety Risks of OREI; ▪ Annex 5 to MGN 654. OREIs: Requirements, Guidance and Operational Considerations for SAR and Emergency Response; ▪ MGN 372 – OREIs - Guidance to Mariners operating in the vicinity of UK OREIs; (*draft revision currently undergoing consultation process*) ▪ IMO Revised Guidelines for Formal Safety Assessment (2018);

[6] Note: The Marine Survey Office have indicated that equivalent Irish guidance will be published in 2022/23.

Scope of EIAR Chapter	Summary
	▪ International Association of marine aids to navigation and Lighthouse Authorities (IALA) Guidance RO139 / G1162 The Marking of Offshore Man-Made Structures (2021); and ▪ Guidance on EIS and NIS Preparation for ORE Projects (Department of Communications, Climate Action and Environment, 2017).

5.10 Aviation and Military

5.10.1 Baseline Environment

The NCS Offshore and Cable Corridor AoIs are located underneath the Dublin control area (CTA), within which the Irish Aviation Authority (IAA) is the main provider of air navigation services. In line with international aviation regulations, airspace in Ireland is categorised into seven classifications (Class A to Class G); the services provided within each classification are based on speed limitations, types of flights and rules for separation of aircraft. The NCS Offshore AoI is located in an area of Class G uncontrolled airspace which is established from the surface up to 2,500 ft. Above this altitude, Class C controlled airspace is established up to Flight Level 75 (7,500 ft) which forms part of the Shannon CTA. The northern boundary of the NCS Offshore AoI potentially overlaps Waterford Airport's control zone (CTR) which is Class C airspace established from the surface up to 5,000 ft, ten nm radius around the airport. Above 5,000 ft overhead the Waterford CTR, Class C airspace is established up to FL 245 (24,500 ft) which also forms parts of the Shannon CTA. Within these classifications of airspace, the following rules apply:

- **Class G Airspace:** Aircraft can operate in this area of uncontrolled airspace without any mandatory requirement to be in communication with, or receive a radar service from, an air traffic control unit. Pilots of aircraft operate under visual flight rules (VFR) in Class G airspace and are ultimately responsible for seeing and avoiding other aircraft and obstacles.

- **Class C Airspace:** Aircraft operating within Class C controlled airspace must be in receipt of an air traffic service from an appropriate air traffic control unit.

The NCS Cable Corridor AoI is located almost entirely within the Waterford CTR and its development will require close co-ordination with Waterford Airport.

The NCS Offshore AoI and NCS Cable Corridor AoI are located entirely in Irish airspace; specifically, within the Shannon flight information region (FIR). The FIR boundary between Irish and UK airspace is located 20 nm (37km) to the south-east of the NCS Offshore AoI where the Shannon FIR borders the London FIR.

5.10.2 Key Issues and Proposed Scope

Table 5.15 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to aviation and military.

Table 5.15: Aviation and Military Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ IAA Integrated Aeronautical Information Package (IAIP). ▪ IAA Obstacles to Aircraft in Flight - Order S.I. 215 (2005). ▪ IAA VFR Aviation Chart 1:500,000 (2022). ▪ UK Civil Aviation Authority Aeronautical Aviation Chart 1:500,000 (2022). ▪ Ireland's Marine Atlas at http://atlas.marine.ie/.
Proposed Baseline Survey Work and Assessments	Desktop study will be undertaken to characterise existing and future aviation baseline conditions within an identified study area. This will involve a review of the relevant aviation legislative and guidance documents as well as data sources such as aviation flying charts, flight information publications and previous EIAs. A review of the airspace will be carried out which will identify which aviation activities might be affected by the Project. An aviation and radar risk assessment will be carried out to ensure that all potential aviation activities are considered; this will include the following topics: ▪ Civil airport instrument flight procedures (IFP) ▪ Civil Air Traffic Control radar

Scope of EIAR Chapter	Summary
	▪ Local aviation activities ▪ Emergency helicopter operations (including Search and Rescue) ▪ Local airspace restrictions (including Prohibited, Restricted and Danger Areas) ▪ Military exercise and training areas ▪ Met Éireann meteorological radars The desktop study will identify any potential aviation issues in order that a clear path to resolution, or delivery of mitigation solutions can be clearly understood. The most problematic aviation issues to resolve are associated with air traffic control radar systems and airport IFPs. It will be important therefore, to identify whether any radar systems or airport IFPs are likely to be affected and to consult early with the relevant aviation stakeholders. If necessary, it will then be important to discuss potential mitigation measures that may need to be implemented. Early engagement with the relevant stakeholders will ensure that as many aviation issues as possible can be identified and, if required assessed as part of the EIAR.
Potential Impacts and Key Issues	The following is a summary of issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Creation of physical obstructions to aircraft in flight (civil and military); ▪ Potential interference with aviation radar systems; ▪ Potential effects on military exercise and training areas; ▪ Potential effects on aviation navigation aids; and ▪ Potential effects on communications.
Technical Consultations	▪ IAA (including Waterford Airport and its planning permission for a new runway); ▪ Ireland Department of Defence; ▪ UK Ministry of Defence; ▪ UK National Air Traffic Services Limited; and ▪ Other aviation/communications stakeholders.
Relevant Standards and Guidance	▪ IAA (En-Route Obstacles to Air Navigation) Order 1999 ▪ IAA Aeronautical Services Advisory Memorandum (ASAM) (Guidance Material for Obstruction Surveys) No: 023, Issue 2 2015 ▪ IAA ASAM (Guidance Material on Off-Shore Wind Farms) No: 018, Issue 2 2015 ▪ IAA (Obstacles to Aircraft in Flight) Order 2005 ▪ International Civil Aviation Organisation (ICAO) Annex 14 – Aerodromes.

5.11 Marine Archaeology and Cultural Heritage

5.11.1 Baseline Environment

The Project is characterised by areas of rock and hard substratum which is typical of the south coasts of Ireland while mud to muddy sand sediments dominate the deeper, offshore areas (ICES, 2022). Mud and sandy sediments are environments where the preservation potential of archaeological material is higher than in rock and hard substrate.

5.11.1.1 Summary of Submerged Prehistoric Archaeology

There is currently no evidence of human occupation of Ireland during the Palaeolithic (Westley and Woodman, 2020). During the Upper Palaeolithic ice sheets scoured the landscape and extended beyond the southern coast of Ireland covering the Project area (Westley and Woodman, 2020). During periods of glaciation, the Irish seabed would have been uninhabitable but during inter-glacial periods there is a potential for occupation when the seabed would have formed dry land (Westley and Woodman, 2020). However, even during inter-glacial periods the environment would have been peri-glacial and therefore unlikely to sustain the flora and fauna necessary for human occupation, therefore the potential for the survival of archaeological material dating to this period is very low.

Ice sheets retreated northwards around 14,000 years before present (BP), exposing the south-eastern areas of Ireland and therefore the Project area. Improvements in climate conditions during the Mesolithic would have brought about environments in which vegetation could thrive providing resources for human exploitation. The earliest incontrovertible evidence of full-scale human colonisation and settlement of Ireland dates to the Mesolithic (*c*. 11,500 to 10–10,500 BP (Westley and Woodman, 2020)). Finds of Mesolithic tools *e.g.*, flint tools in County Antrim and County Offaly indicate Mesolithic activity in the region. The first evidence of human occupation in the Waterford area dates to the Mesolithic Period also, as seen by the large quantities of Late Mesolithic artifacts found during the Bally Lough project (Zvelebil *et al*., 1996; WCCC, 2022) as the River Suir would have been an excellent resource for people at the time.

Landscape modelling undertaken in Brooks *et al.* (2011) indicates that the Project area would have been part of a terrestrial or intertidal landscape from 18,000 BP, with final submergence of the Project area occurring around 6,000 BP. The intertidal zone is an environment which encourages the growth of vegetation that could be utilised for food and resources and therefore represents an attractive environment for human exploitation. Recent investigations in the Blackwater valley and the Waterford harbour areas have uncovered numerous finds of flint flakes which indicates that Mesolithic people were exploiting the landscape (Waterford County Museum, 2014). No Mesolithic artifacts have been found in the Project area to date. The nearest identified Mesolithic site to the Project area is Ferriter's Cove in Country Kerry, a seasonal camp at which late Mesolithic lithics were discovered along with hearths, faunal remains, shell dumps and concentrations of burnt stone and some stake holes. The absence of Mesolithic evidence within the Project area may be attributed to a lack of archaeological investigation of the now submerged seabed. The potential for the survival of submerged prehistoric archaeological material dating to the Mesolithic is medium.

The potential for the survival of submerged prehistoric archaeological remains typically increases closer to the shore where there will be a greater potential for peat and therefore the survival of archaeological material will be more likely, but there is potential for peat remains to be found offshore (EirGrid, 2019). If peat and organic muds are present, there is a potential for geoarchaeological and paleoenvironmental evidence within the Project area, in addition, where these sediments are present there is a good potential for organic preservation.

5.11.1.2 Summary of Maritime Archaeology

Maritime Archaeology Potential

The maritime archaeology of Ireland is the product of a complex interplay of constantly evolving coastal and marine activities, international links and patterns of shipping, and sea use since the earliest human occupation of Ireland during the Mesolithic to the modern periods (NMS, 2022). This section reviews the potential presence of maritime archaeology within the Project area associated with these maritime activities, such as ship and

aviation wrecks and associated material. Military remains are also covered within the scope of the maritime archaeology considered in this section.

Records of known wreck sites and losses are biased towards the recent, predominantly post-medieval and Modern periods. Although the existence and survival of Mesolithic watercraft are highly speculative, Neolithic, Bronze and Iron Age, sea-going vessels are likely to have been lost in the seas off the south coast of Ireland. The post-Medieval and Modern periods present the greatest potential for unrecorded archaeology to be discovered. The increasing incorporation of metal structural elements into vessel designs during this period means that wrecks for the 19th and early 20th centuries are also often more visible on the seabed than their wooden predecessors. They are visible to bathymetric and geophysical survey, and also generate strong magnetic anomalies, and this greater visibility is reflected in the increased number of known wrecks (*i.e*. those that have been located on the seabed) for the post medieval and modern periods.

Twenty-five recorded losses have been identified within the NMS (2018) data, 17 of which are located within the Offshore AoI and eight within the Cable Corridor AoI. These are presented in **Appendix A**. Recorded losses represent maritime and aviation losses that are known to have occurred in the vicinity but to which no specific location can be attributed. Recorded losses are often grouped with reference to a geographic, hydrographic or other point of reference, making the positional data of these records unreliable. However, they do provide information on the historical marine traffic of the general region and therefore the archaeological potential.

There are a further 21 entries listed as “dead” by the UKHO, indicating that no remains have been located and therefore the wreck is considered not to exist at the location given. However, it is worth noting that ‘dead’ wrecks may still be present at the locations indicated but are buried or flattened and therefore no longer represent a navigational hazard. Archaeological interpretation of the geophysical survey data will clarify whether archaeological material survives at these locations.

Maritime and Aviation Archaeology within the Project

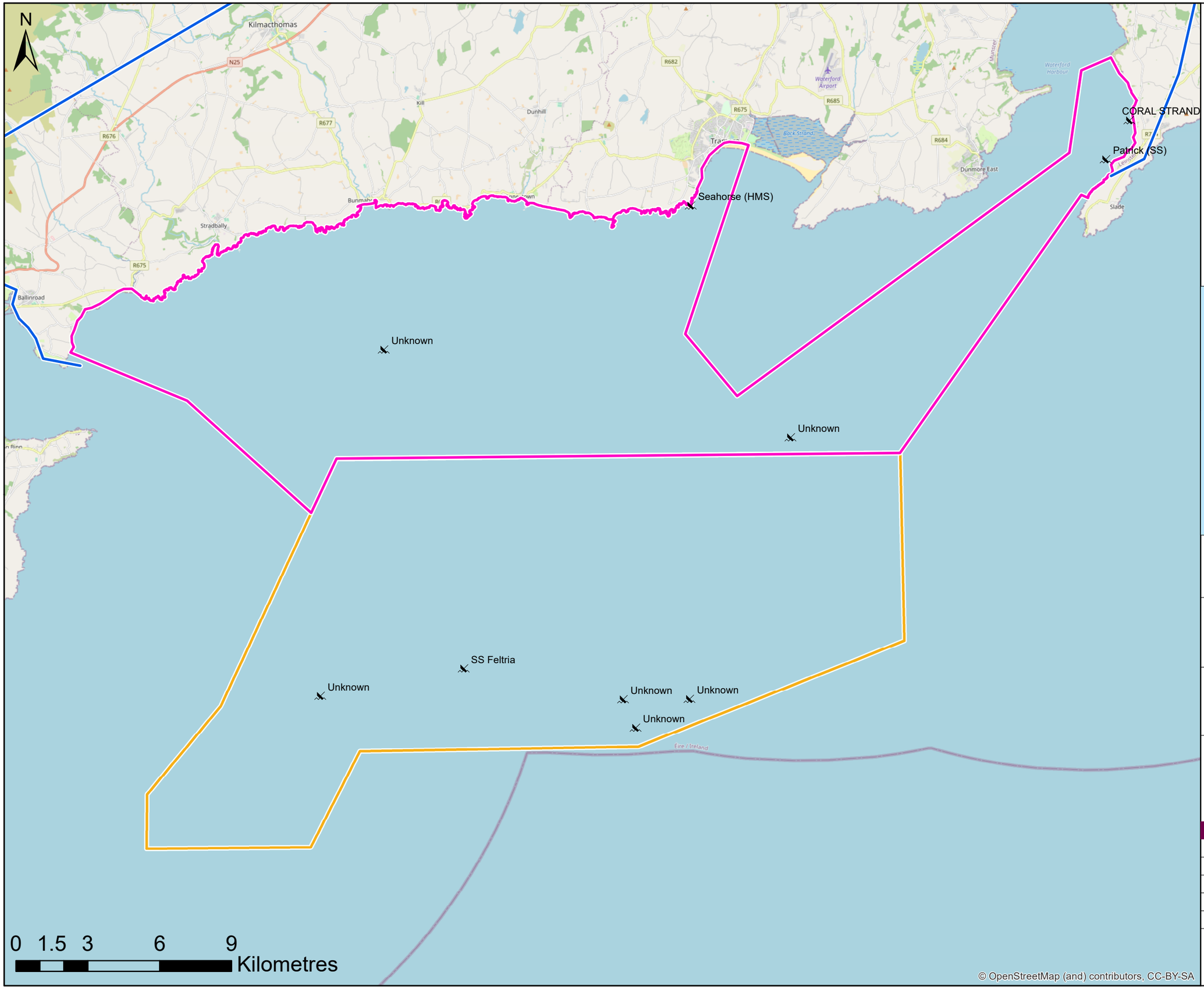
There are ten entries within the National Monuments Service (NMS) and UKHO data that may represent the presence of archaeological material within or on the boundary of the Project area (**Figure 5-16**).

There are five identified wreck sites within the Offshore AoI, four of which are unknown. The one named wreck within the Offshore AoI is the SS Feltria (W04904/UKHO11602), it was a British merchant ship on route from New York to Avonmouth when it was torpedoed and sunk by the German submarine UC-48 in 1917 (**Figure 5-16**).

There are five identified wreck sites within the Cable Corridor AoI (**Figure 5-16**), two of which are unknown but have been identified through survey and archaeological investigation and three that have been identified as the *Coral Strand* (UKHO79862), which was a modern fishing trawler which ran aground in Waterford Harbour in 2013, the *HMS Seahorse* (W05169/UKHO9713) transport ship built in London by the Hudson Bay company that foundered in Tramore Bay in 1816 with the loss of 363 lives and the SS *Patrick* (W09941/UKHO9839), a British paddle steamer which ran aground and was wrecked in 1880. Geophysical survey information available from INFORMAR has also identified a group of high points with associated scour that may be indicative of archaeological material, further geophysical surveys will help to determine if this anomaly is of archaeological interest.

Wrecks over 100 years old and archaeological objects underwater, irrespective of their age or location, are protected under Section 3 of the National Monuments (Amendment) Act 1987, which states that “a person shall not dive on, damage, or generally interfere with, any wreck which is more than one hundred years old” and that a licence needs to be sought from the NMS, DHLGH in order to survey shipwrecks over 100 years old and/or those that are protected by legislation. Wrecks that are less than 100 years old and the potential location of wrecks or archaeological objects may also be protected under Section 3 of the 1987 (Amendment) Act by the placement of an underwater heritage order if the wreck, area or object is considered to be of sufficient historical, archaeological or artistic importance to merit such protection (NMS, 2022).

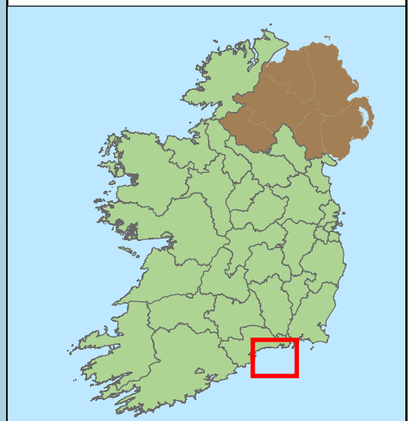
Full details of the maritime archaeology within the Project AoIs are presented in **Appendix A**.



Legend

- NCS Onshore
- NCS Cable Corridor
- NCS Offshore AoI
- 12 NM Limit
- Shipwrecks

Data Source: NMS, UKHO, Client



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 5-16: Shipwrecks within the Project AoI

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: RS	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0007
Approved By: CB	
Scale: 1:148,961@ A3	**Projection:** ITM (IRENET95)
Date: 20/12/2022	

NOTE:
1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence CYAL50252391
© Ordnance Survey Ireland/Government of Ireland.

5.11.2 Key Issues and Proposed Scope

Table 5.16 outlines the baseline data sources, initial evaluation of key issues, technical consultations, and relevant guidelines for the assessment in relation to marine archaeology and cultural heritage.

Table 5.16: Marine Archaeology and Cultural Heritage Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Sites and Monuments Record and Record of Monuments and Places. ▪ National Historic Shipwreck Inventory. ▪ Available online databases. ▪ National Monuments Service (NMS) Wreck Viewer (https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=89e50518e5f4437abfa6284ff39fd640. ▪ UKHO Global Wrecks and Obstructions (https://datahub.admiralty.co.uk/portal/apps/sites/#/marine-data-portal/items/b4fde7a1eea74227a126f126bbfdf8b0). ▪ Interactive bathymetric and seabed mapping (INFOMAR ▪ EMODnet Submerged Prehistoric Archaeology and Landscapes. https://www.emodnet-humanactivities.eu/view-data.php.
Proposed Baseline Survey Work and Assessments	▪ Desk-based survey of available information for known or potential marine archaeology receptors up to the HWM in the Project area. ▪ All site-specific geophysical and geotechnical survey data will be subject to archaeological review and assessment by a suitably qualified archaeologist.
Potential Impacts and Key Issues	The following issues could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Sediment disturbance and deposition leading to indirect impacts on archaeological receptors. ▪ Alteration of sediment transport regimes. ▪ Direct damage to deeply buried archaeological receptors (Submerged prehistoric archaeology). ▪ Direct damage to archaeological receptors (*i.e.* maritime, aviation archaeology and submerged prehistoric archaeology.
Technical Consultations	Consultation with key stakeholders (National Monuments Service's Underwater Archaeology Unit, Marine Survey Office, Water and Marine Advisory Unit in the DHLGH) potentially affected, as identified during preparation of the baseline.
Relevant Standards and Guidance	▪ National Monuments Acts (1930-2004) ▪ The Foreshore Act (1933) ▪ Merchant Shipping Act 1995 ▪ Heritage Act 1995 ▪ Dumping at Sea Act 1996 (and various amendments) ▪ Planning and Development Act 2000 (as amended) ▪ Minerals Development Act 2017 ▪ Frameworks and Principles for the Protection of the Archaeological Heritage (Department of Arts, Heritage and the Gaeltacht (DAHG), 1999) ▪ Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI) Framework and Principles for the Protection of the Archaeological Heritage (1999) ▪ DAHGI Policy and Guidelines on Archaeological Excavation (1999) ▪ European Convention on the Protection of the Archaeological Heritage (Valetta Convention)

Scope of EIAR Chapter	Summary
	▪ COWRIE Guidance for Assessment of Cumulative Impacts on the Historic Environment from ORE (2007) quoted in DCCAE Guidance on EIS and NIS Preparation for ORE Projects (2017) ▪ International Council on Monuments and Sites (ICOMOS) guidance, non-governmental international organisation dedicated to the conservation of the world's monuments and sites ▪ United Nations Educational, Scientific and Cultural Organization (UNESCO) guidance, who seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity ▪ Institute of Archaeologists of Ireland Code of Conduct for Archaeological Assessments (2006)

5.12 Offshore Infrastructure, Other Users and Communications

5.12.1 Baseline Environment

5.12.1.1 Recreational Activities

There are several monitored bathing waters of excellent quality including blue flag beaches along Ireland's south-east coast and within the Project area (Ireland's Marine Atlas, 2022). There are three blue flag beaches within and/or adjacent to the NCS Cable Corridor AoI (**Figure 5-17**). These are:

- Clonea Beach, which is approximately 5 km from Dungarvan in County Waterford, located within the NCS Cable Corridor AoI to the north-west.
- Tramore Beach which is approximately 13 km south of Waterford city located within the NCS Cable Corridor AoI to the north-east.
- Counsellors Strand at Dunmore East which is approximately 16 km from Waterford city, and Dunmore Strand which is adjacent to Dunmore East village. Both are directly adjacent to the east of the NCS Cable Corridor AoI.

There are additional blue flag beaches located around the headlands to the west and east of the Project area. These include Ardmore Beach, Youghal Front Strand, and Carne Beach. There are also two beaches of good water quality in the vicinity of the Project. These are Bunmahon Beach and Duncannon Beach (Ireland's Marine Atlas, 2022).

Sailing is popular along Ireland's south-east coast, particularly from Dungarvan, Dunmore East and Kilmore Quay, where vessel density on average ranges from 2 to 100+ hrs per km^2 per month (EMODnet, 2022). There are several sailing clubs in the area including Waterford Harbour Sailing Club, Dungarvan Harbour Sailing Club, Waterford Motorboat and Yacht Club and Ardmore Boat Club. There are also chartered boat services including Dunmore Boat trips and the traditional boat charters in Waterford Harbour. Activities from all of these sites could potentially intersect the Project area.

There are RNLI Lifeboat Stations at Youghal, Helvick Head, Tramore Pier, Dunmore East, Stonebrook and Kilmore Quay.

Several diving clubs are located in the south-east of Ireland, most notable of which are the Hook Head Sub Aqua club located adjacent to the NCS Cable Corridor AoI along its eastern boundary and the Wexford Sub Aqua club at Kilmore Quay. Wreck diving is popular with several wrecks noted within the Project area (see **Section 5.11**). There is also wreck diving at Saltee Islands located to the north-east approximately 20-30 km from the Project area. Hook Head is also a popular choice for divers located to the east and adjacent to the NCS Cable Corridor AoI, with several wrecks found around its headland (Diving Ireland, 2021).

Sea angling along the south-east coast is popular with Dunmore East, Duncannon and Ballyhack each birthing one licensed deep sea charter boat There are also three deep sea licensed charter boats at Dungarvan and Helvick landing catches such as blue shark, pollack, ling and cod. Shore fishing is also popular around Waterford Harbour with some beaches producing catches of bass, codling and twaite shad (Angling Ireland, 2022). Due to the wrecks present in the area catches of conger are also common. Shore fishing in this area mainly targets bass, flounder, dogfish and pollack. Sheltered inner bays support small boat angling where catches of bass, flatfish and dogfish are common (Angling Ireland, 2022).

Surfing is also popular along the Waterford coast with surf schools at Tramore and Bunmahon, both of which are in close proximity to the Project area. Kitesurfing is also common at South Beach Duncannon.

5.12.1.2 Energy Infrastructure

There is no existing offshore wind farm infrastructure within the Project AoI.

There are no wave and tidal energy developments within the Offshore and Cable Corridor AoI (EMODnet, 2022, Irelands Marine Atlas, 2022).

There are no current petroleum exploration and production authorisations (as issued by the Minister for Communications, Energy and Natural Resources under the Petroleum and Other Minerals Development Act, 1960) located within the Offshore and Cable Corridor AoIs. However, there are some exploitation and exploration licences in the vicinity of the Project area, the most significant of which are the Helvick LU Lease Undertaking) (approximately 27 km to the south of the Project area) and the Dunmore LU (approximately 26 km to the south of the Project area), the PL 01 (approximately 50 km to the south-west of the Project area) and the EL1/07 (approximately 64 km to the south-east of the Project area). There are no exploration wells within the Project area but there are several wells further offshore that range from 20 to 30 km south-west, south and south-east of the Project area (EMODnet, 2022, Irelands Marine Atlas, 2022) (see **Figure 5-17**).

There are currently no known, active or proposed carbon capture and storage, natural gas storage or underground coal gasification sites within the Project area. There are also no known coal deposits located in the Project area (EMODnet, 2022, Irelands Marine Atlas, 2022).

5.12.1.3 Cables and Pipelines

There are no subsea cables or telecommunication cables located within the Offshore and Cable Corridor AoIs (EMODnet, 2022, Irelands Marine Atlas, 2022, Oceanwise, 2022). However, there are six cables located to the west and east of the AoIs. These are the GTT Express, the UK-Ireland Crossing 1, the Ireland-France Cable-1 (IFC-1) from Cork and the Celtic, Solas, and the ESAT-1 from Kilmore Quay. (EMODnet, 2022, Oceanwise, 2022) (**Figure 5-17**). There are no pipelines located within the Offshore and Cable Corridor AoIs, however there is one offshore gas pipeline (now decommissioned) to the west of the Project area at Kinsale County Cork (Ireland's Marine Atlas, 2022, Oceanwise, 2022).

5.12.1.4 Other Users

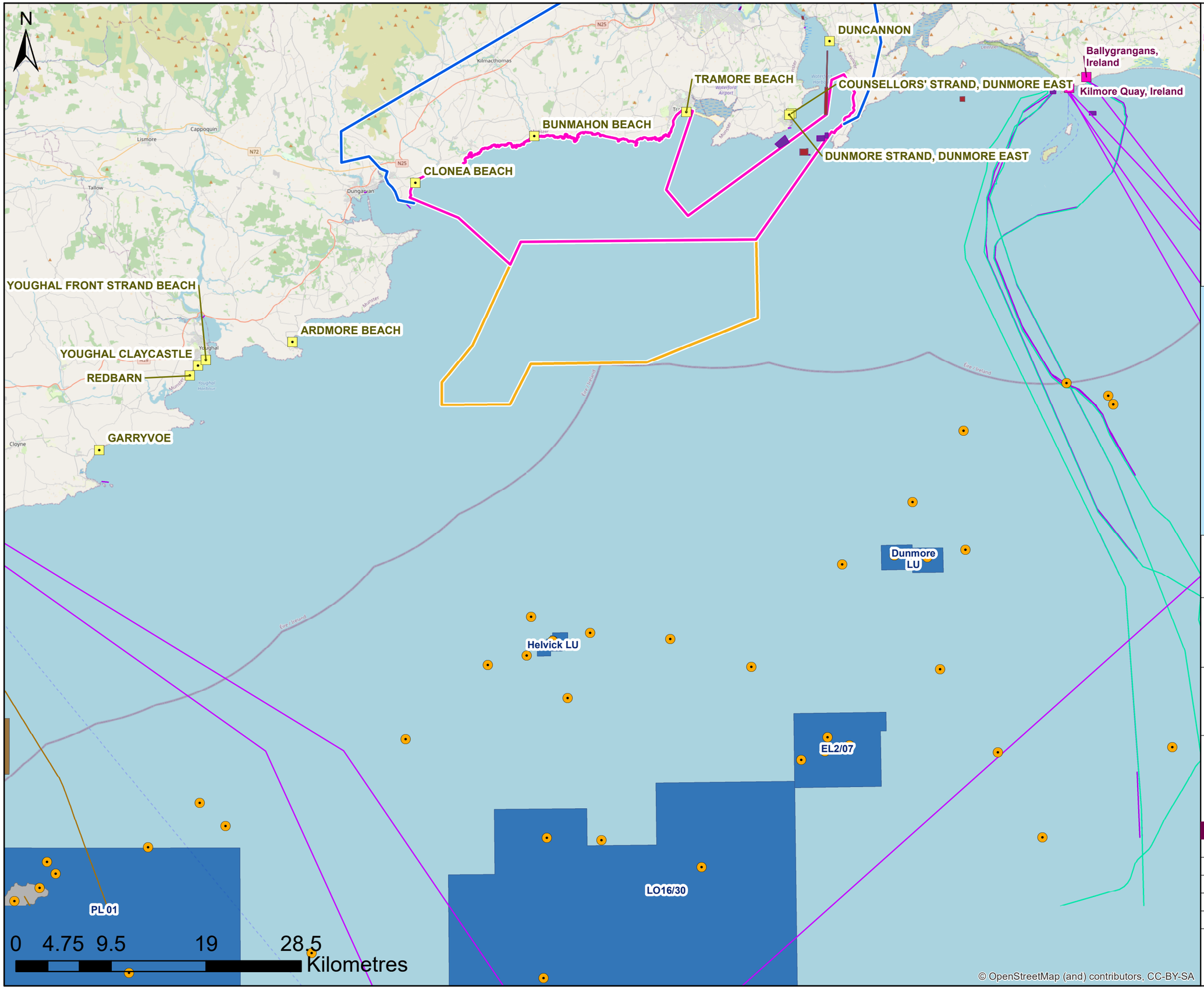
There are no dumping sites within the Offshore AoI. However, there are four dumping sites within the Cable Corridor AoI at the mouth of Waterford Harbour off Hook Head. Three of which are historic for dredged material and one that is currently operational for dredged material with a licence valid until 31/12/2025 by the Port of Waterford Company (EPA, 2022b) (**Figure 5-17**). There are also two sites that border the Cable Corridor AoI at the mouth of Waterford Harbour, one of which is a historic dumping site south-west of Dunmore East and one which is operational for dredged material with a license valid until 31/12/2025 by the Port of Waterford Company (EPA, 2022b) (**Figure 5-17**). There are several operational dredge areas within the Duncannon channel and further north at Passage East on the approach to Waterford Harbour but are beyond the Project boundary and therefore are not considered further.

The closest harbours to the Project are Dunmore East Fishery Harbour and the Port of Waterford, comprising three terminals as follows:

- Belview Bulk Terminal
- Belview Container Terminal
- Suir Shipping (bulk cargo)

5.12.1.5 Communications Infrastructure

Communications infrastructure identified that may potentially be affected by the Project include satellite communication, VHF radio, UHF communication, offshore microwave fixed links and television. No telecommunications cables have been identified within the Offshore and Cable Corridor AoI (**Figure 5-17**) Specific communications receptors in the vicinity of the Project will be identified through consultation.



Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- 12 NM Limit
- Landing Stations
- Wells
- Bathing Water Sites
- Subsea Cables

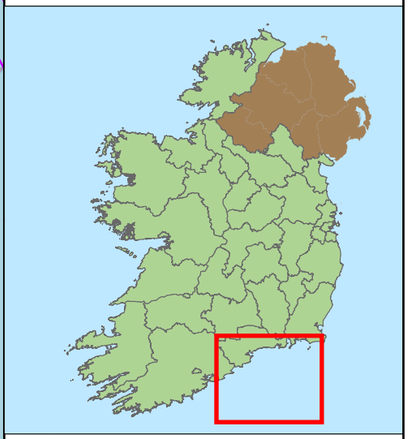
Dumping at Sea (Operational)

- Dredged Material

Dumping at Sea (Historic)

- Dredged material
- Dilute contaminated spent caustic soda waste
- Dredged material from maintenance dredging
- Waste derived from the manufacture of organic chemicals
- Total from all plough dredge sites
- MINF Irish Cable Route
- MINF Irish Offshore Gas Pipeline
- Oil and Gas
- MINF Oceanwise Cables
- Active Exploration/Exploitation Licences for Oil and Gas

Data Source: EMODnet, EPA, Oceanwise, Client



Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 5-17: Offshore Infrastructure Other Users and Communications within the NCS AoI

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: NR	**Project No.** MDR1649
Checked By: AE	**File Ref:**
Approved By: CB	MDR1649-RPS-01-NCS-DR-Z-AG-0005
Scale: 1:356,567@ A3	**Projection:**
Date: 29/03/2023	ITM (IRENET95)

NOTE:
1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence CYAL50252391

5.12.2 Key Issues and Proposed Scope

Table 5.17 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to offshore infrastructure, other users and communication.

Table 5.17: Offshore Infrastructure, Other Users and Communication Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Ireland's Marine Atlas (at http://atlas.marine.ie/) ▪ Human Activities (EMODnet, 2022) ▪ Angling Ireland ▪ Diving Ireland ▪ GSI(2021) https://www.infomar.ie/sites/default/files/pdfs/GDG%20INFOMAR%20ORE%20Review%20Report.pdf ▪ Oceanwise (2022) online geographic data ▪ EPA Dumping at Sea boundaries ▪ Consultation.
Proposed Baseline Survey Work and Assessments	▪ Desk-based study on all available information surrounding infrastructure, other users and communications in the Project. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on infrastructure and other users.
Potential Impacts and Key Issues	The following is a summary of issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Displacement and disruption of recreational activities. ▪ Impact on existing infrastructure (*e.g.* cables and pipelines, scour, sediment mobilisation). ▪ Impact on dredging and disposal areas. ▪ Increased airborne noise. ▪ Restrictions to port activities and users. ▪ Increased suspended sediment concentrations and associated deposition. ▪ Restrictions to potential aggregate resource availability. ▪ Impact on communications infrastructure.
Technical Consultations	Consultation with key stakeholders (Fáilte Ireland, Local Authorities for recreational, other Infrastructure users in the area) who may be potentially affected, as identified during preparation of the baseline.
Relevant Standards and Guidance	▪ European Boating Association (EBA) Position Statement, Offshore Wind Farms (EBA, 2019) ▪ Assessment of Impact of Offshore Wind Energy Structures on the Marine Environment (MI, 2000) ▪ International Cable Protection Committee (ICPC) Recommendations (ICPC, 2021) ▪ Guidance on EIA of ORE Development on Surfing Resources and Recreation (SAS, 2009) ▪ Guidelines on the Treatment of Tourism in an EIS (Fáilte Ireland, 2011)

6 Onshore EIAR Scope

This chapter outlines the key potential issues associated with relevant onshore environmental topics and identifies the specific methods and standards that will be used in the assessment. The most up to date available standards, guidelines and data has been referenced in this Scoping Report, however, it is recognised that amendments and updates will become available from time to time during the EIAR phase of the Project. The EIAR will reflect the most up to date information available at that time.

6.1 Population

6.1.1 Baseline Environment

The NCS Onshore AoI is based within County Waterford. The main population centres in the county are located at Waterford City, Tramore and Dungarvan. Otherwise, the county is primarily rural in nature with smaller towns and villages located roughly evenly throughout the county.

Population figures for County Waterford and the main settlements of relevance to the Project area are indicated on **Table 6.1** below. The last census took place during 2022, and only preliminary data for 2022 is currently available. It is anticipated that detailed census information for 2022 will become available during the planning stage of the Project. This information will be considered within the EIAR.

Table 6.1: Population of Waterford Town Centres between 2011 and 2022.

Population Centres	2011	2016	2022
Waterford County	**107,961**	**116,176**	**127,085**
Settlements with Population > 1,000			
Dungarvan	9,427	9,227	N/A*
Ballinroad	1,097	1,161	N/A*
Tramore	10,328	10,381	N/A*
Dunmore East	1,559	1,808	N/A*
Settlements with Population < 1,000			
Stradbally	420	438	N/A*
Lemybrien	206	192	N/A*
Kilmachthomas	871	834	N/A*
Kill	281	271	N/A*
Dunhill	209	216	N/A*
Kilmeaden	193	259	N/A*
Slieverue	499	476	N/A*
Checkpoint	334	318	N/A*
Passage East	806	827	N/A*

Population Centres	2011	2016	2022
Ardmore	435	434	N/A

** Not Available. 2022 census results are currently at preliminary stage only.*

The overall trend in population for County Waterford is of growth. Since 2011, the population of the county as a whole has grown by approximately 18%. Once detailed census data for 2022 is available, it will be possible to identify where the main areas of growth are within the county.

6.1.2 Key Issues and Proposed Scope

Table 6.2 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to population.

Table 6.2: Population Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ CSO ▪ Pobal ▪ Project Ireland 2040 - NPF & NDP 2018-2027 ▪ Regional Spatial & Economic Strategy for the Southern Regional Assembly ▪ Waterford County Development Plan (CDP) 2015-2021 ▪ Economic and Social Research Institute (ESRI) Quarterly Economic Commentary ▪ Housing Agency ▪ Department of Housing Local Government and Heritage / Myplan.ie ▪ Other technical disciplines as relevant, *e.g.*, Commercial Fisheries, Shipping and Navigation Infrastructure and Other Users, Air Quality, Noise and Vibration, Traffic and Transport, Climate Change and Risk of Major Accidents
Proposed Baseline Survey Work and Assessments	▪ Desktop analysis of the local area and its facilities including population level, population age structure, households and economic activity. ▪ Windscreen survey to confirm general land uses around the Project elements and provide an overview of the area and its environs. ▪ The chapter will include reference to surveys undertaken as part of other technical disciplines such as Air Quality, Noise and Vibration, Traffic and Transport, Climate Change and Risk of Major Accidents. ▪ Re-run assessment with up-to-date project information and provide new outputs on the potential direct, indirect and induced socio-economic effects.
Potential Impacts and Key Issues	The following is a summary of issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Socio-economic aspects such as income and employment generation. ▪ Land use – consideration of severance, loss of rights of way or amenities or other changes likely to ultimately alter the character and use of the surroundings. ▪ Consideration of direct, indirect and induced socio-economic impacts on the local, regional and national economy from the construction period and during operation. ▪ In addition, the EIA will touch on economic impacts where it is challenging to place a value on including: the opportunity for skills training, negative impacts on the tourism industry; wider economic development opportunities; and development of new turbine production facilities.
Technical Consultations	▪ Waterford County Council

Scope of EIAR Chapter	Summary
Relevant Standards and Guidance	▪ See EIA guidance documents listed in **Section 4.1.4**.

6.2 Human Health

6.2.1 Baseline Environment

The Project is located off the coast of Co. Waterford (South-East Regional Authority Area (RAA)).

6.2.1.1 Age Profile

The age profile in Co. Waterford (2016 data) shows that the percentage of young people aged 14 years and under is 21.1%, which is equal to the national average for Ireland. The percentage of people aged 65 and over is 14.9%, which is higher than the national average of 13.4% (CSO, 2016a, b). The black and minority ethnic (Black, Asian, Irish Traveller and "other") population is 4.5%, which is lower than the national average of 5.6% (CSO, 2016a).

6.2.1.2 Life Expectancy and Health

Life expectancy at birth in the South-East RAA in 2016 was 79.3 years for males and 83.1 years for females (CSO, 2020a). This is slightly lower than the national average of 79.6 years for males and 83.4 for females in 2015 (CSO, 2016c).

Healthy life expectancy (HLE) statistics are only available at National level. Healthy life years at birth in Ireland are 66.6 years for males and 67.9 for females, the third highest rate in the EU and four years above the EU average (CSO, 2016c). General health status is, however, available at county level. In Co. Waterford in 2016, 87.0% of the population was in Good or Very Good general health status (CSO, 2016a).

6.2.2 Key Issues and Proposed Scope

Table 6.3 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to human health.

Table 6.3: Human Health Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ CSO ▪ Pobal ▪ Project Ireland 2040 – NPF & NDP 2018-2027 ▪ Government of Ireland, Healthy Ireland outcomes framework 2019 ▪ Regional Spatial & Economic Strategy for the Southern Regional Assembly ▪ Waterford CDP 2015-2021 ▪ Other EIA technical disciplines as relevant.
Proposed Baseline Survey Work and Assessments	▪ Desktop analysis of the local population health data using publicly available statistics. Where data is available small area statistics will be used, *e.g.* electoral division, other data will be at the local authority level. ▪ Four study area populations will be used, the landfall population, including nearshore and offshore effects, the cable corridor population, the population near the OnSS and the population near the O&M facility. For each population representative small area data will be selected, *e.g.* based on more deprived areas. ▪ The baseline will inform the identification of relevant vulnerable groups, *e.g.* with increased sensitivity due to age, income level, health status, social disadvantage or access and geographical factors. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on human health.

Scope of EIAR Chapter	Summary
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Changes in access to open space, blue space and recreation affecting health related behaviours and lifestyles, including associated with coastal leisure ▪ Changes to transport, public rights of way and cycle routes affecting population health ▪ Potential for education and upskilling of workforce, benefiting population health ▪ Employment and investment, jobs benefiting population health or adverse effects on commercial fisheries and other aspects of the coastal economy ▪ Reduction of climate change risk, contributing to reducing climate change-related health risks ▪ Changes in air quality, affecting population health ▪ Water quality and soil contaminants, affecting drinking water and bathing water quality ▪ Temporary noise disturbance affecting population health ▪ Public concern and understanding of EMF risks ▪ Wider societal benefits of energy infrastructure supporting public health ▪ Cumulative Impact Assessment (CIA).
Technical Consultations	▪ Waterford County Council ▪ Director of Public Health for the Regional Health ▪ The Environmental Health Services section of the Health Service Executive (HSE) and ▪ The health chapter is also informed by the Project wide scheme description and consultation ▪ The following technical chapters will also be considered: – Project Description; – Marine Processes; – Commercial Fisheries; – Shipping and Navigation; – Aviation, and Military; – Infrastructure, Other Users and Communications; – Land and Agriculture; – Soils, Geology and Hydrology; – Hydrology and Flood Risk; – Air Quality; – Climate; – Material Assets; and – Traffic and Transport.
Relevant Standards and Guidance	▪ Institute of Public Health, Health Impact Assessment Guidance (IPH, 2021). ▪ Effective scoping for Human Health in EIA (IEMA, 2022a). ▪ Determining Significance for Human Health in EIA (IEMA, 2022b). ▪ Health in EIA: A Primer for a proportionate Approach (IEMA, 2017). ▪ EMF & You - Information about Electric & Magnetic Fields and the Electricity Transmission System in Ireland (EirGrid, 2017). ▪ International Commission on Non-Ionising Radiation Protection (ICNIRP) guidelines (ICNIRP, 1998). and ▪ World Health Organisation (WHO) guidelines on air quality and noise (WHO,1999) (WHO, 2009) (WHO, 2018) (WHO, 2021).

6.3 Biodiversity (Terrestrial and Aquatic Ecology)

6.3.1 Study Area

For the purposes of scoping, terrestrial habitats are considered to be those above the HWM. This includes sand dunes, but does not include saltmarshes, as these habitats are regularly inundated with seawater and are covered by the Subtidal and Intertidal Ecology topic (see **Section 5.2.1**). For the purposes of the EIAR, it is expected that the Onshore AoI will be further refined following landfall, onshore cable corridor, OnSS and O&M selection, therefore the study area for terrestrial biodiversity will focus on the selected area.

6.3.2 Baseline Environment

6.3.2.1 Overview

Much of the Onshore AoI is located in agricultural lands, with land boundaries mostly delineated by hedgerows and treelines. Commercial forestry and semi-natural woodlands also occur less frequently, with built areas such as houses, roads, and urban centres also present.

6.3.2.2 Designated Sites for Nature Conservation

The Onshore AoI is located in the vicinity of multiple sites designated for nature conservation. The review of designated sites considered European, national and international protected sites designated for nature conservation within the Onshore AoI, including any potentially linked hydrologically.

In total, five SACs (Hook Head SAC, River Barrow and River Nore SAC, Tramore Dunes and Backstrand SAC, Lower River Suir SAC and Glendine Wood SAC), three SPAs (Mid-Waterford Coast SPA, Dungarvan Harbour SPA and Tramore Back Strand SPA), 23 proposed NHAs (the Lower River Suir (Coolfinn, Portlaw), Lough Cullin, Belle Lake, Carrickavrantry Reservoir, Dungarven Harbour, Dunmore East Cliffs, Islandtarnsey Fen, Tramore Dunes and Backstrand, Ballyhack, Barrow River Estuary, Ballykelly Marsh, Hook Head, Waterford Harbour, Grannyferry, Ballin Lough (Waterford), Ballyvoyle Head to Tramore, Castlecraddock Bog, Fennor Bog, Kilbarry Bog, Kings Channel, Lissaviron Bog, Stradbally Woods and Duncannon Sandhills, and one wildfowl sanctuary (Lough Cullin) were identified. There are no Natural Heritage Areas (NHA) within the onshore AoI and none which are considered to have any connectivity with the proposed Project, therefore, NHAs are not considered at this scoping stage.

6.3.2.3 Protected Habitats

A number of protected habitats within SACs have been identified within the Onshore AoI. This desk study focuses only on those above the HWM, which includes the following:

Terrestrial

- Annual vegetation of drift lines [1210]
- Perennial vegetation of stony banks [1220]
- Vegetated sea cliffs [1230]
- Embryonic shifting dunes [2110]
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
- Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
- Humid dune slacks [2190]
- Wet heath [4010]

- Dry heath [4030]
- Alpine and subalpine heath [4060]
- Calaminarian grassland [6130]
- Hydrophilous tall herb [6430]
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]
- Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0].

Aquatic

- Soft water lakes with base rich influences [3130]
- Hard water lake habitat [3140]
- Floating river vegetation [3260]

Figure 6-1 below shows the distribution of these protected habitats, where available from NPWS, along with designated sites relevant to terrestrial biodiversity. Please note that where only high resolution grid square data were available, these habitats have not been shown on the map as these do not display mapped extent of these habitats (including soft water lakes with base rick influences, hard water lake habitat and floating river vegetation).

N

Templetney Quarry pNHA
Kilsheelin Lake pNHA
Toor Wood pNHA
Nier Valley Woodlands pNHA
Nier Valley Woodlands SAC
Comeragh Mountains SAC
Dungarvan Harbour SPA
Helvick Head SAC
ork/Waterford) SAC
Glendine Wood SAC
Stradbally Woods pNHA
Ballyvoyle Head To Tramore pNHA
Mid-Waterford Coast SPA
Ballin Lough (Waterford) pNHA
Castlecraddock Bog pNHA
Lissaviron Bog pNHA
Islandtarnsey Fen pNHA
Carrickavrantry Reservoir pNHA
Tramore Back Strand SPA
Tramore Dunes and Backstrand SAC
Tramore Dunes And Backstrand pNHA
Belle Lake pNHA
Waterford Harbour pNHA
Dunmore East Cliffs pNHA
Hook Head pNHA
Bannow Bay SAC
Duncannon Sandhills pNHA
River Barrow And River Nore SAC
King's Channel pNHA
Ballyhack pNHA
Kilbarry Bog pNHA
Lower River Suir SAC
Grannyferry pNHA
Lower River Suir (Coolfinn, Portlaw) pNHA
Portlaw Woods pNHA
River Suir Below Carrick-On-Suir pNHA
Tibberaghny Marshes pNHA
Fiddown Island pNHA
Hugginstown Fen SAC
Hugginstown Fen pNHA
Kylecorragh Wood pNHA
Brownstown Wood pNHA
Oaklands Wood pNHA
Ballykelly Marsh pNHA
Barrow River Estuary pNHA
Lough Cullin pNHA
Boley Fen pNHA

Kilometres
0 2 4 8 12

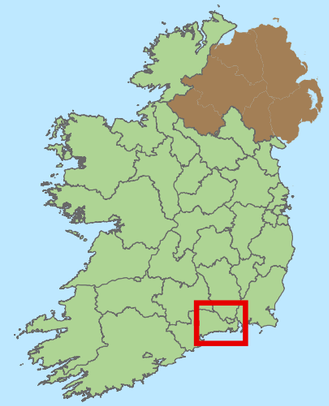
Habitats

- Maram Dunes
- Embryonic shifting dunes
- Alluvial Forests [91E0]
- Alpine and Subalpine Heath [4060]
- Annual Vegetation of Drift Lines [1210]
- Calaminarian Grassland [6130]
- Dry Heath [4030]
- Embryonic Shifting Dunes [2110]
- Fixed Coastal Dunes (grey dunes) [2130]
- Humid Dune Slacks [2190]
- Hydrophilous Tall Herb [6430]
- Old Oak Woodlands [91A0]
- Perennial Vegetation of Stony Banks [1220]
- Shifting Dunes (white dunes) [2120]
- Vegetated Sea Cliffs [1230]
- Wet Heath [4010]

Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Proposed Natural Heritage Area (pNHA)

Data Source: NPWS



Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 6-1: Location of protected habitats (above the high-water mark) in relation to the Onshore AoI

rps
West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details	
Drawn By: PK	**Project No.** MDR1649
Checked By: AE	**File Ref:**
Approved By: CB	MDR1649-RPS-01-NCS-DR-Z-AG-0006
Scale: 1:250.000@ A3	**Projection:**
Date: 22/12/2022	ITM (IRENET95)

6.3.2.4 Species

Protected/rare species

Protected, threatened, and rare species have the potential to occur at any of the onshore landfall locations, onshore cable routes and/or OnSS and O&M facility. In order to inform the onshore baseline environment, an initial high-level desktop assessment of ecological constraints was undertaken for the Onshore AoI. Surveys will confirm the presence/likely absence of these species in the areas impacted by the onshore works. Additional guidance documents prepared by relevant agencies and organisations on good practice relating to biodiversity and development will also be taken into consideration in the assessment of biodiversity.

Aquatic

Both the Lower River Suir SAC and the River Barrow and River Nore SAC are designated for the QI fish species sea lamprey (*Petromyzon marinus*), brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*), twaite shad (*Alosa fallax fallax*) and salmon (*Salmo salar*). There is potential for interaction with these species during the migratory phase of their lifecycle. These species are known to be sensitive to changes in environmental conditions and additional data on the watercourse is required to inform the aquatic baseline. Many river waterbodies occur inside the Onshore AoI and will require appropriate aquatic surveys outlined in **Table 6.4**.

Freshwater pearl mussel *Margaritifera margaritifera* is listed as a QI for both the Lower River Suir SAC and River Barrow and River Nore SAC. This species is also listed under Annex II and V of the EU Habitats Directive; it is legally protected in Ireland under Schedule 1 of the Wildlife (Amendment) Act 2000 (Protection of Wild Animals) and the European Communities (Birds and Natural Habitats) Regulations 2001. Freshwater pearl mussel is endangered worldwide and in serious decline throughout its range (DAFM, 2018). Parts of the Onshore AoI are classed as *Margaritifera* sensitive areas (Mahon, Suir and Tay).

Terrestrial Mammals

Otter (*Lutra lutra)* is an Annex II species on the E.U. Habitats Directive and is listed as one of the QI species for both the Lower River Suir SAC and the River Barrow and River Nore SAC. Otter is also listed on Annex IV of the Habitats Directive and is therefore protected throughout its range in Ireland. A national otter survey of Ireland was carried out in 2010-2012, which found occurrences of otter in the Onshore AoI, as well as National Biodiversity Data Centre (NBDC) records. Due to their low-density distribution, otter populations are susceptible to habitat fragmentation. There may also be potential for an indirect effect on food sources for this species, if the fish population in the Lower River Suir, River Barrow or River Nore are affected.

The NBDC search also returned the following terrestrial mammals: badger, pygmy shrew, pine marten, red squirrel and hedgehog, which are all protected under the Wildlife Act. These terrestrial mammals are considered in the ecological surveys outlined in **Table 6.4**.

Bats

Bat species are protected under the Wildlife (Amendment) Act 2000 and Annexes II and IV of the Habitats Directive (92/43/EEC). Both bats themselves and their roosts are protected, and it is an offence to disturb or interfere with them without a licence. They can be found roosting in both vegetation and structures and are known to use habitats such as trees, hedgerows and other linear features as commuting corridors between roosts and foraging habitat. The NBDC search returned the following Annex IV bat species: brown long-eared bat (*Plecotus auritus*), Daubenton's bat (*Myotis daubentonii*), pipistrelle (*Pipistrellus sensu lato*), soprano pipistrelle (*Pipistrellus pygmaeus*), Leisler's (*Nyctalus leisleri*) and Nathusius's pipistrelle (*Pipistrellus nathusii*). The majority of the Onshore AoI is classed under the bat suitability index as *Moderate*, with the areas around the Lower River Suir classed as *High* (Lundy *et al.*, 2011).

Terrestrial Invertebrates

Marsh fritillary (*Euphydryas aurinia*) is an Annex II species on the E.U. Habitats Directive. Marsh Fritillary butterfly is considered one of the most endangered Lepidoptera species in Ireland. There have been a number

of occurrences of this species within the Onshore AoI and was last recorded in 2018. General habitat surveys will confirm the presence/likely absence of this species.

Ornithology

The Dungarvan Harbour SPA is designated for the following QI species: great crested grebe (*Podiceps cristatus*), light-bellied Brent goose (*Branta bernicla hrota*), shelduck (*Tadorna tadorna*), red-breasted merganser (*Mergus serrator*), oystercatcher (*Haematopus ostralegus*), golden plover (*Pluvialis apricaria*), grey plover (*Pluvialis squatarola*), lapwing (*Vanellus vanellus*), knot (*Calidris canutus*), dunlin (*Calidris alpina*), black-tailed godwit (*Limosa limosa*), bar-tailed godwit (*Limosa lapponica*), curlew (*Numenius arquata*), redshank (*Tringa totanus*) and turnstone (*Arenaria interpres*). The Mid-Waterford Coast SPA is designated for the following QI species: cormorant (*Phalacrocorax carbo*), peregrine (*Falco peregrinus*), herring gull (*Larus argentatus*) and chough (*Pyrrhocorax pyrrhocorax*). The Tramore Back Strand SPA is designated for the following QI species: light-bellied Brent goose (*Branta bernicla hrota*), golden plover (*Pluvialis apricaria*), grey plover (*Pluvialis squatarola*), lapwing (*Vanellus vanellus*), dunlin (*Calidris alpina*), black-tailed godwit (*Limosa limosa*), bar-tailed godwit (*Limosa lapponica*) and curlew (*Numenius arquata*). The NBDC data search identified numerous other bird species using the Onshore AoI. The broad habitats of these species have been determined using relevant sources mentioned in **Table 6.4**.

Invasive Species

Invasive alien species (IAS) refers to both invasive plants and animals. IAS have the potential to occur at any onshore landfall location, onshore cable route and/or OnSS and O&M sites. For the purposes of this scoping exercise, IAS are those contained within the third schedule to the European Communities (Birds and Natural Habitats Regulations) 2011 (as amended).

Following an NBDC data search of the Onshore AoI, a number of invasive plant species were identified including: American skunk-cabbage (*Lysichiton americanus*), common cord-grass (*Spartina anglica*), giant knotweed (*Fallopia sachalinensis*), giant-rhubarb (*Gunnera tinctoria*), Indian balsam (*Impatiens glandulifera*), Japanese knotweed (*Fallopia japonica*), New Zealand pigmyweed (*Crassula helmsii*), rhododendron*Rhododendron ponticum*, salmonberry (*Rubus spectabilis*), sea-buckthorn (*Hippophae rhamnoides*), Spanish bluebell (*Hyacinthoides hispanica*) and three-cornered garlic (*Allium triquetrum*). Detailed habitat surveys will record the presence and location of any IAS within the areas of impact.

6.3.3 Key Issues and Proposed Scope

Table 6.4 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to biodiversity (terrestrial and aquatic ecology, including intertidal birds).

Table 6.4: Biodiversity (Terrestrial & Aquatic Ecology, including Intertidal birds) Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ NPWS (species and habitat datasets, conservation objectives, site synopsis, designated area boundary data) ▪ NBDC records for protected species, bat landscape model and invasive species ▪ Waterford CDP (WCCC, 2022) ▪ EPA mapping (EPA, 2022b) ▪ EPA Water Quality Data (Trodd and O'Boyle, 2020) ▪ GSI mapping (GSI, 2022) ▪ Information on the conservation status of birds in Ireland (Gilbert *et al.,* 2021) ▪ Irish Wetlands Survey

Scope of EIAR Chapter	Summary
Proposed Baseline Survey Work and Assessments	▪ The timing of the ecological surveys will take account of constraints in terms of seasonality, recognised optimal survey windows and relevant licensing requirements. ▪ Surveys will be carried out during the most appropriate time of the year and during suitable conditions, following relevant guidance for target receptors. ▪ The scope of ecological surveys will include all proposed infrastructure locations (including O&M facility and grid connection site) and temporary construction works locations. ▪ Biodiversity surveys will include the following: – Habitats (agricultural, woodland, hedgerow and built environment) – Fieldwork approximately 150 m either side of proposed cable route to establish zone of ecological influence. – The entire length of the route will be surveyed as will lands required for junction bays and construction related elements (such as temporary works areas). Other lands adjacent to the route identified during the field survey may also require surveying. – This survey will include potential for protected species (habitats, structures etc.). – Phase 1 initial surveys of the footprint of the proposed onshore infrastructure, in cognisance of Fossitt (2000). – Phase 2 surveys of Annex I habitats, in cognisance of the Habitats Directive and national survey guidance (Perrin, 2008; O'Neill, 2013). ▪ Protected species – Species-specific/activity surveys will be undertaken where suitable habitat is identified from the terrestrial habitat surveys above, *e.g.*: o Bat surveys in cognisance of Collins (2016) and Kelleher and Marnell (2006). o Otter surveys in cognisance of National Road Authority (NRA) (2008a). o Badger surveys in cognisance of Scottish Badgers (2018), Harris *et al*. (1989), NRA (2009) and NRA (2005). o Freshwater pearl mussel monitoring survey Stage 1 and 2 (NPWS, 2004), Stage 3 and 4 monitoring surveys (Moorkens and Killeen, 2020). ▪ Aquatic habitat characterisation: – Sampling for watercourse crossings will be required. – Upstream and downstream surveys of aquatic receptors including salmonid, crayfish and lamprey habitat assessment, macroinvertebrate (Q-value) survey, crayfish survey (if required) and general aquatic plant survey including aquatic IAS, general habitat, and hydro-morphological descriptions. ▪ Flora and IAS – will be undertaken as part of the terrestrial habitats survey. ▪ Breeding birds: – Identification of calls, sightings and breeding behaviours during vantage point/transect surveys at the proposed cable route and OnSS and O&M locations, in cognisance of Bibby *et al.* (2000) and Gilbert *et al*. (2021). ▪ Intertidal birds – Monthly vantage point surveys, with a focus on the landfall/intertidal area in cognisance of BTO's wetland bird survey (WeBS) and BirdWatch Ireland's I-WeBS. ▪ Wintering birds: – Identification of calls, sightings and behaviours during vantage point/transect surveys at site specific locations identified during the preliminary walkover during the winter season in cognisance of SNH (2017), Bibby *et al*. (2000) and Gilbert *et al*. (2021). ▪ The requirement to undertake additional or specific surveys separate from those listed above (which were identified from a review of online databases) cannot be ruled out, *e.g.* targeted surveys for amphibians and reptiles may be required based on findings from the initial terrestrial surveys. This may also be relevant based on location of proposed infrastructure and/or site compounds. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on terrestrial and aquatic ecology within a defined study area

Scope of EIAR Chapter	Summary
Potential Impacts and Key Issues	The following issues could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ The impact of temporary and permanent habitat loss ▪ The impact of habitat disturbance ▪ The impact of habitat fragmentation and species isolation ▪ The impact of pollution caused by accidental spills/contaminant release ▪ The impact of spreading third schedule invasive species ▪ Mortality/injury to protected/rare species ▪ Disturbance to protected/rare species and/or disturbance of QI
Technical Consultations	Consultation with the following key stakeholders potentially affected, as identified during preparation of the baseline should be carried out: ▪ NPWS (Development Applications Unit); ▪ IFI; ▪ Waterford County Council (Heritage/ Biodiversity Officers); ▪ Birdwatch Ireland; and ▪ Bat Conservation Ireland.
Relevant Standards and Guidance	▪ Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018). ▪ Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016). ▪ A guide to habitats In Ireland (Fossit, 2000). ▪ Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.,* 2011). ▪ Bat Surveys: Best Practice Guidelines, 3rd Edition. Bat Conservation Trust (Collins, 2016). ▪ Bat mitigation guidelines for Ireland (Marnell *et al.,* 2022). ▪ Environmental Planning and Construction Guidelines Series (NRA, 2005 – 2011). ▪ The New Atlas of Breeding Birds in Britain and Ireland (Gibbons *et al.,* 1993). ▪ Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2008a).

6.4 Land and Agriculture

6.4.1 Baseline Environment

6.4.1.1 Summary of the Current Agricultural Land Use for Waterford

Waterford has a rich history in farming and is famed for its dairy production and in particular its cheeses. The county utilises an area of some 122,231 ha for agricultural purposes (CSO, 2020b). The county has one of the largest average farm sizes of 47 ha, compared to the country average of 32.4. There are some 2,600 farms in the county in 2020.

The standard output[7] (SO) for Waterford in 2020 is one of the highest in the country at €31,001, compared to a country average of €13,566. This is part due to the large average farm size but it is also indicative of the quality of farming in the county. However, it should be noted that the SO in 2010 was €61,693, so it has seen a drop in output of some 50% over the intervening ten years.

Table 6.5 shows the main farm practices in Waterford. From this table it can be seen that most of the farming in Waterford revolves around the grazing of livestock in the form of specialist beef and dairy farms, with 67% of the farms in Waterford involved in these enterprises.

The number of farms in the county has reduced by some 10% since 2010 from 2,761 to 2,600 in 2020. There is also a reduction in the utilisable agricultural area (UAA) of the county from 2010 to 2020 of 12,906 ha or almost 10% of the UAA for the county. It is difficult to envisage what brought about this change in UAA (12,906 ha).

6.4.1.2 Summary of the growing season and soils

The duration of the growing season in Ireland is determined principally by soil temperature. The critical temperatures that determine the start and end of growth varies among different crops, however as grass is the predominant crop in the county, it grows actively when soil temperature is consistently above 6°C (Diamond and Sills, 2011).

Looking at the average soil temperatures for the year it can be seen that the median length of the grass growing season is 300 days at sea level in the coastal area around Dunmore East in the south-east of the county and it is a little longer in the Ardmore area in the south-west. However, the temperature does not reach, on average, the 330 days experienced in the coastal areas west of Cork City, which have the longest growing season in the country. The length of the growing season decreases northwards in the county nevertheless, the lowlands of the entire county enjoy a significant advantage over the midland and east-midland areas of the country, where the growing season is shorter by 30 days or more.

The soils in the areas of interest are predominantly brown earth mixed with areas of gley. The areas with the brown earths will be the better lands and can be used for all agricultural enterprises with little limitations. However, the gleyed soils will have restricted drainage and will subsequently have more limited agricultural value when compared to the brown earths.

[7] The standard output (SO) of an agricultural product is defined as the average monetary value of the agricultural output at farm-gate prices. SO is not a measure of farm income. It does not take into account costs, direct payments, value added tax or taxes on products (CSO. 2020b)

Table 6.5: Farming in Waterford (CSO, 2020b).

Enterprise Type	Number of Farms 2020	Percentage of Total 2020
Specialist Tillage	101	4%
Specialist Dairy	689	27%
Specialist Beef Production	1,033	40%
Specialist Sheep	170	7%
Mixed grazing	144	6%
Mixed crops and livestock	50	2%
Mixed field crops	344	13%
Other	69	3%
Total	**2,600**	**100%**

6.4.2 Key Issues and Proposed Scope

Table 6.6 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to land and agriculture.

Table 6.6: Land and Agriculture Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Department of Agriculture, Food and the Marine (Census of Agriculture) ▪ Waterford County Council ▪ EPA ▪ EPA/ Teagasc/ GSI geographic information system (GIS) Map of National Soil Types, 2006 ▪ Geological Survey of Ireland ▪ Ordnance Survey Ireland (OSI) maps ▪ Aerial photography.
Proposed Baseline Survey Work and Assessments	▪ Windscreen survey of current land uses, and field walk around at the OnSS/landfall points (including O&M facility and grid connection route). ▪ Review of aerial photography. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on land and agriculture within a defined study area.
Potential Impacts and Key Issues	The following is a summary of issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities:

Scope of EIAR Chapter	Summary
	▪ Change in landuse by removal of soil, or being developed, making it no longer available for agricultural (*i.e* landtake). ▪ The Project impacts on agricultural lands/enterprise. In this instance not from landtake but rather an effect such as change in drainage that impacts the agriculture use of the field may be limited. There is also a need to consider and assess the indirect effects of such affects as noise or change in air quality. ▪ No permenent severance of properties is predicted. However temporary severance during construction may occur and will be considered and assessed. ▪ The trenching activities may sever water and electrical services temporarily and permanently (where severance of services occurs alternative arrangements wil be provided).
Technical Consultations	▪ Waterford County Council ▪ Local tourism and commercial interests ▪ Department of Agriculture, Food and the Marine ▪ Potentially affected land owners ▪ Geological Survey of Ireland
Relevant Standards and Guidance	▪ Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of EIS (IGI, 2013). ▪ Guide to Process and Code of Practice for National Road Project Planning and Acquisition of Property for National Roads, March 2003 (revised 2005). ▪ EPA/ Teagasc/ GSI GIS Map of National Soil Types, 2006 (http://gis.teagasc.ie/soils/map.php). ▪ Census of Agriculture 2010, final results (www.cso.ie) (CSO 2020b). ▪ DMRB Volume 11, Section 2, Part 5, HA 205/08 (Highways Agency, 2008) with respect to overarching assessment principles. ▪ DMRB Section Volume 11, Section 3, Part 6 'Land Use' (Highways Agency, 2001) for the assessment of effects on land use assets. ▪ Agricultural Land Classification of England and Wales, MAFF, 1988. ▪ EIA of National Road Schemes – A Practical Guide, November 2008.

6.5 Soils, Geology and Hydrogeology

6.5.1 Baseline Environment

6.5.1.1 Soils and Subsoils

The soils (Teagasc Soils) within the Onshore AoI, including south County Kilkenny, south-east County Waterford, and south-west County Wexford, are composed primarily of acid brown earths/ brown podzolic (AminDW), mineral alluvium (AlluvMIN), and surface water/groundwater gley acidic (AminPD). Extensive areas of Made Ground are present within urban centres *e.g.*, Waterford City and Tramore. Peaty soils are present to the north and east of Dungarvan, with areas of blanket bog associated with the Comeragh Mountains.

GSI mapping identifies the existing subsoils (quaternary sediments) within the Onshore AoI as consisting of till derived from acidic volcanic rocks (TAv), extending from Waterford City south-west to Bunmahon. Further west, subsoils are composed of till derived from basic igneous rocks (TBi), and till derived from Lower Palaeozoic shales (TLPS). Subsoils of the Hook Head peninsula and land north from Fethard to Ramsgrange is also composed of TLPS. Estuarine silts and clays are present around Tramore Bay. **Figure 6-2** shows the soils within the Onshore AoI.

6.5.1.2 Bedrock Geology

The regional bedrock geology within the Onshore AoI is quite complex including formations from the Carboniferous, Devonian and Ordovician Periods. The coast east of Dungarvan is underlain by the Bunmahon Formation, consisting of basalts and shale. Much of the inland area from Kilmacthomas south-east to Tramore is underlain by the Campile Formation, described as felsic volcanics (typically feldspar and quartz). The Booley Bay Formation underlies a significant portion of the east/south-east portion of the Onshore AoI, characterised by grey to black mudstones with siltstones, extending east from Tramore to Saltmills in County Wexford. North of Waterford City and extending into County Kilkenny there are several concentric formations characterised by dark limestones, shales, sandstone and mudstone. **Figure 6-3** shows the bedrock geology within the Onshore AoI.

6.5.1.3 Economic Geology

The EPA (2022b) extractive industries register for County Waterford lists 19 active quarries in the region, 12 of these are within the Onshore AoI. The region has a rich history of mining for minerals, both metallic (copper) and non-metallic (milstone/slate). A significant number of historic copper mine shafts are present along the Waterford coastline, concentrated around Bunmahon. There are numerous areas identified by the GSI as having high to very high potential as an aggregate resource, particularly around Stradbally, County Waterford.

6.5.1.4 Geological Heritage

There are numerous sites of geological significance within the Onshore AoI, predominantly along the coastline, including the Copper Coast UNESCO Geopark, which extends for 17 km along the County Waterford coastline from Stradbally to Kilfarrasy. In addition, the Hook Head peninsula in County Wexford is Ireland's most important fossil site.

6.5.1.5 Geo-Hazards

There are approximately six recorded landslide events within the Onshore AoI, mainly within the vicinity of Waterford City. Exceptional rainfall events are attributed as the main cause of these landslides. As the topography is relatively low-lying within the Onshore AoI and particularly along the coast, the potential geo-hazard risks are low. Coastal erosion rates will vary considerably depending on the local geological conditions and some areas where there is more rapid erosion will be carefully considered and assessed.

6.5.1.6 Hydrogeology

The following are the primary designated WFD groundwater bodies present within the Onshore AoI; Dunmore East, Tramore, Waterford, Fethard, Adamstown, Inistioge, Mullinavat and Clonmel. Groundwater flows on a regional scale are likely to flow towards the major surface waterbodies, *i.e.*, the River Suir and River Barrow, and also towards the coast.

Groundwater vulnerability is predominantly classified as 'high' to 'medium', with frequent areas classified as 'rock at or near surface or karst' and 'extreme', particularly evident along the coastline (GSI, 2021). Several karst features are identified to the north-west of Waterford City. The regional bedrock aquifers are classified as 'Regionally Important Aquifer – Fissured (Rf)' (extends south-west from Waterford City to Dungarvan), 'Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones' (extends north-east from Tramore to the eastern boundary of the Onshore AoI), and 'Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones' (around Dunmore East). There are no gravel aquifers identified within the Onshore AoI.

One public water supply source protection zone (SPZ) lies within the Onshore AoI; the Kilmacthomas public water supply Scheme, approx. 1.5 km to the south of Kilmacthomas, County Waterford.

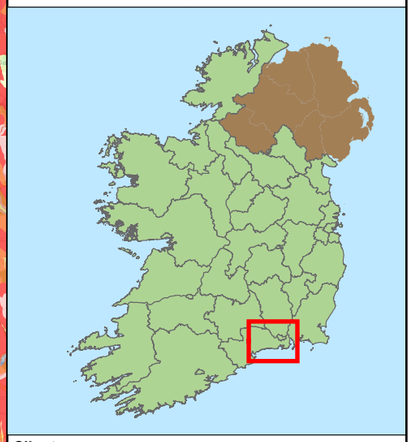
There are a large number of private wells mapped within the County Waterford sector of the Onshore AoI, mainly due to the largely rural nature of this area. Based on initial review of the GSI's groundwater flood risk maps there are no areas identified as being at risk from groundwater flooding, at either low, medium or high probability.

N

Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI

Data Source: EPA, Teagasc



Soil Description

- AeoUND - Aeolian Undifferentiated
- AlluvMIN - Mineral Alluvium
- AminDW - Acid Brown Earths/ Brown Podzolics
- AminPD - Surface Water/ Groundwater Gleys Acidic
- AminPDPT - Peaty Gleys Acidic
- AminSP - Surface Water/ Groundwater Gleys Shallow
- AminSPPT - Peaty Gleys Shallow
- AminSRPT - Podzols Peaty
- AminSW - Lithosols/ Regosols
- BminDW - Grey Brown Podzolics/ Brown Earths Basic
- BminPD - Surface Water/ Groundwater Gleys Shallow Basic
- BminSP - Surface Water/ GroundwaterGleys Shallow
- BminSRPT - Lithosols Peats
- BminSW - Rendzinas/ Lithosols
- BktPt - Blanket Bog
- FenPt - Fen Peat
- Cut - Cut Bog
- Lacustrine
- Marine Sands
- Marine Sediment
- Scree
- Made Ground
- Water

0 1.75 3.5 7 10.5 Kilometres

Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 6-2: Soils within Onshore AoI (Teagasc)

RPS
West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: PK	Project No. MDR1649
Checked By: AE	File Ref:
Approved By: CB	MDR1649-RPS-01-NCS-DR-Z-AG-0032
Scale: 1:164,458@ A3	Projection:
Date: 20/12/2022	ITM (IRENET95)

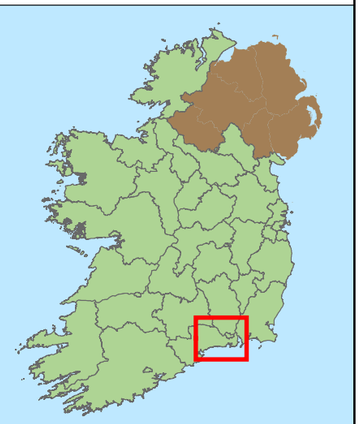
NOTE:
1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence CYAL50252391
© Ordnance Survey Ireland/Government of Ireland.

N

Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI
- Anticlinal Axis
- Area
- Dyke
- Fault
- Ghost Line
- Lithological boundary offshore
- Synclinal Axis
- Thin stratigraphical unit, diagrammatic
- Thrust, barbs on hanging-wall side
- Unconformity, dots on younger side
- X-Section
- Bedrock Outcrops

Data Source: GSI



Bedrock Geology (Bedrock Units 1:100k)

UNIT NAME

- Andesite
- Ardmore Member
- Ballindysert Formation
- Ballynaclogh Formation
- Ballyquinn Member
- Ballysteen Formation
- Ballytrasna Formation
- Bunmahon Formation
- Campile Formation
- Carrighalia Formation
- Comeragh Conglomerate Sandstone Group
- Coumaraglin Formation
- Coumshingaun Conglomerate Formation
- Croughaun Formation
- Crows Point Formation
- Diorite
- Dolerite
- Dunabrattin Formation
- Feldspar porphyry
- Gabbro
- Garraun Member
- Granite (undifferentiated)
- Gyleen Formation
- Helvick Formation
- Kilclooney Member
- Kilmacthomas Formation
- Kilnafrehan Conglomerate Formation
- Kiltorcan Formation
- Knockmealdown Sandstone Formation
- Muggorts Bay Formation
- Rhyolite
- Ross Member
- Sheskin Formation
- Tramore Limestone Formation
- Tramore Shale Formation
- Treanearla Formation
- Waulsortian Limestones
- in Campile Formation
- shale units in Campile Formation

0 1.753.5 7 10.5 Kilometres

Data Sources: GSI
Contains Irish Public Sector Data (Geological Survey Ireland) licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence

Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 6-3: Bedrock Geology within Onshore AoI (GSI)

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: PK	**Project No.** MDR1649
Checked By: AE	**File Ref:** MDR1649-RPS-01-NCS-DR-Z-AG-0032
Approved By: CB	
Scale: 1:172,488@ A3	**Projection:** ITM (IRENET95)
Date: 20/12/2022	

NOTE:
1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence CYAL50252391

6.5.2 Key Issues and Proposed Scope

Table 6.7 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to soils, geology and hydrogeology.

Table 6.7: Soils, Geology and Hydrogeology Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ GSI ▪ Teagasc ▪ EPA ▪ OSI maps ▪ OPW Flood Risk Mapping ▪ NPWS ▪ Kilkenny, Waterford and Wexford County Councils ▪ Aerial photography.
Proposed Baseline Survey Work and Assessments	▪ The Institute of Geologists of Ireland (IGI) recommend a site visit and walkover survey to inform development of an initial conceptual site model, as the first part of the Soils, Geology and Hydrogeology EIA process. ▪ This would generally entail a visual survey of the proposed grid route study area, with a focus on identifying areas of rock outcropping, faces of exposed subsoil, potential interactions with designated sites, identification of groundwater dependent ecosystems (*e.g.* wetlands), etc. This is largely a ground-truthing exercise where up to date mapping is available. ▪ Windscreen survey of and field walk around at OnSS, landfall locations and O&M faciliy site. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on soils, geology and hydrogeology within a defined study area.
Potential Impacts and Key Issues	The following is a summary of issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Land use change/ removal of soil and changing groundwater vulnerability class ▪ Local alterations to water tables/dewatering ▪ Potential impacts to water abstractions for public supplies/ private wells and ▪ Potential impacts to geological heritage areas/county geological sites (Copper Coast Geo Park).
Technical Consultations	▪ Kilkenny, Waterford, and Wexford County Councils ▪ GSI ▪ EPA
Relevant Standards and Guidance	▪ Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of EIS (IGI, 2013). ▪ Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008b). ▪ Guidance on Land Contamination Risk Management (LCRM), (Environment Agency (EA) UK, 2020). ▪ Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (EPA, 2013).

6.6 Hydrology and Flood Risk

6.6.1 Baseline Environment

The Onshore AoI mainly falls under the hydrometric area no 16 (Suir) and 17 (Colligan-Mahon). The north-eastern part of the Onshore AoI lies within the Suir River catchment area, while the southern part drains directly into the sea via a number of smaller river channels including the Colligan and Mahon rivers.

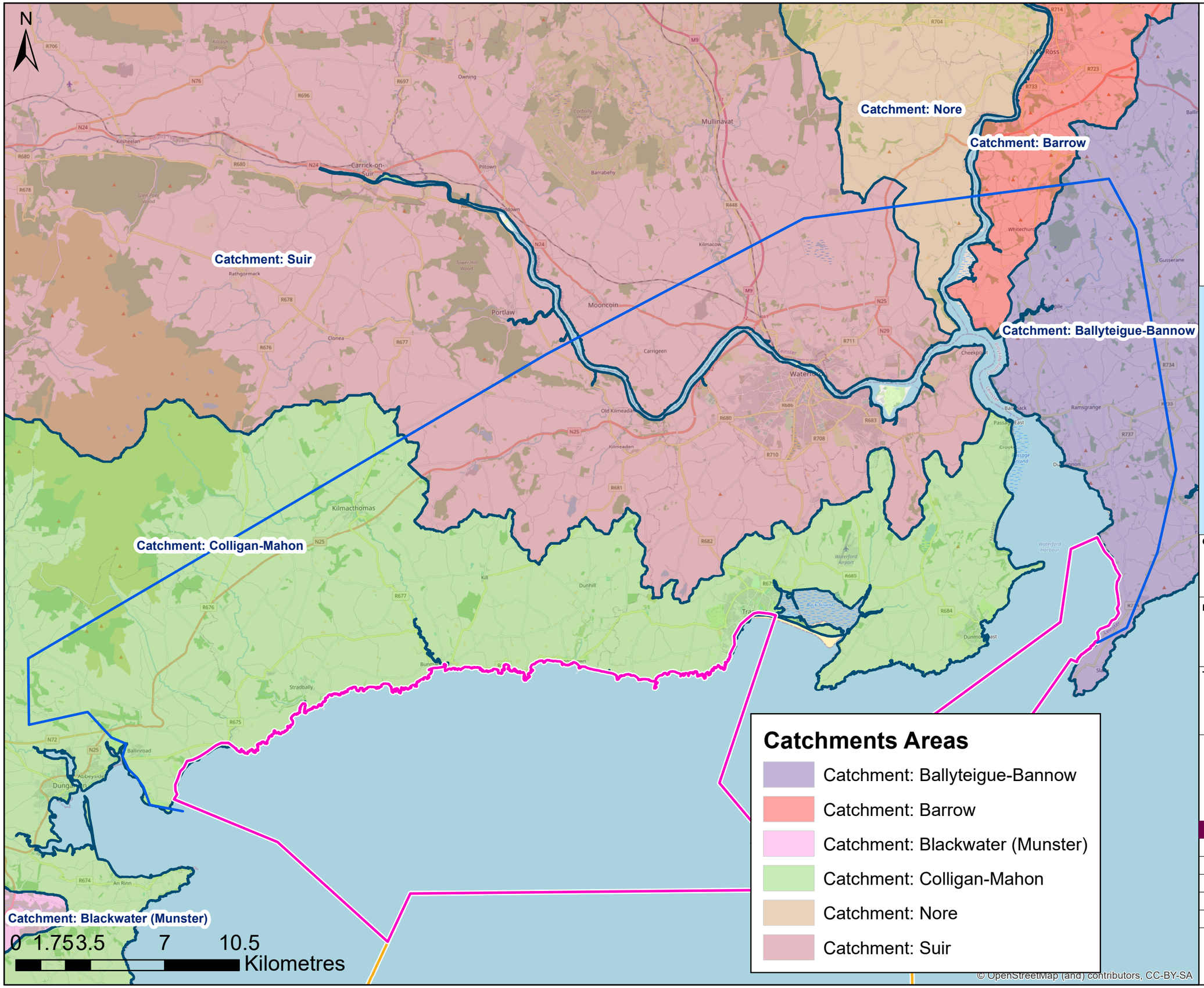
The Onshore AoI also falls under the Water Frame Directive (WFD) River Basins No. 16 (Suir) and 17 (Colligan-Mahon). It also encroaches the Barrow-Suir-Nore Estuary (*EPA Code: IE-SE_100_0100*) transitional waterbodies, and the Tramore Back Strand (*EPA Code: IE_SE_120_0000*), Tramore Bay (*EPA Code: IE_SE_110_0000*) & Eastern Celtic Sea (*EPA Code: IE_SE_050_0000*) coastal waterbodies.

The River Suir has an approximate upstream catchment area of 3,559 km^2 upstream of its confluence with the River Barrow. The long-term average annual rainfall (SAAR) within the River Suir catchment area ranges from 867 mm to 2,168 mm with the SAAR value at Waterford in the order of 980 mm. The hydrometric area 17 (Colligan-Mahon) has an approximate catchment area of 654 km^2. SAAR at Tramore is in the order of 950 mm.

The low-lying flood plains of River Suir, Nore and Barrow are liable to flooding during the winter period. The downstream tidal reach of River Suir and the southern coastal edges of the Onshore AoI are also liable to flooding from the high tidal events coupled with strong wind. The OPW CFRAM study prepared flood maps showed some flooded areas along the River Suir channel within the Onshore AoI (source: www.floodinfo.ie). **Figure 6-4** shows the hydrological features within the Onshore AoI, while **Figure 6-5** shows flood risk.

6.6.1.1 Water Quality Risk Assessment Approach

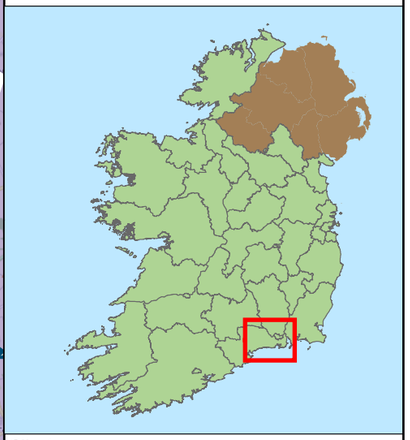
Similar to the flood risk assessments, water quality impact assessments will be carried out in accordance with the Transport Infrastructure Ireland (TII) *"Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes"* (NRA, 2008b). Appropriate mitigation measures will be recommended in order to minimise any significant impacts on water quality. In this, recommendations provided in the NRA (2004a) "*Guidelines for the Crossing of Watercourses during Construction of National Road Schemes"* and CIRIA 648 "*Control of Water Pollution from Linear Construction Projects*" will be followed.



Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI

Data Source: EPA, WFD



Client
North Celtic Sea Wind Limited

Project
North Celtic Sea
Positive Energy for a Sustainable Future

Title
Figure 6-4: Hydrological features within Onshore AoI

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By:	PK	**Project No.**	MDR1649
Checked By:	AE	**File Ref:**	MDR1649-RPS-01-NCS-DR-Z-AG-0039
Approved By:	CB		
Scale:	1:167,659@ A3	**Projection:**	ITM (IRENET95)
Date:	22/12/2022		

N

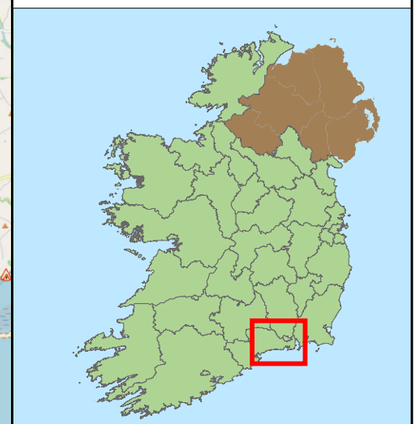
0 2 4 8 12
Kilometres

© OpenStreetMap (and) contributors, CC-BY-SA

Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI

Data Source: OPW



River Flood Extents

- River Flood Extents - Present Day - High Probability
- River Flood Extents - Present Day - Medium Probability
- River Flood Extents - Present Day - Low Probability

Coastal Flood Extents

- Coastal Flood Extents - Present Day - High Probability
- Coastal Flood Extents - Present Day - Medium Probability
- Coastal Flood Extents - Present Day - Low Probability

Past Flood Events

- Recurring Flood Event
- Single Flood Event

Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 6-5: Flood risk within the Onshore AoI

RPS
West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: PK	**Project No.** MDR1649
Checked By: AE	**File Ref:**
Approved By: CB	MDR1649-RPS-01-NCS-DR-Z-AG-0038
Scale: 1:180,000@ A3	**Projection:**
Date: 21/12/2022	ITM (IRENET95)

6.6.2 Key Issues and Proposed Scope

Table 6.8 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to hydrology and flood risk.

Table 6.8: Hydrology and Flood Risk Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Waterford County Council ▪ EPA ▪ OPW ▪ CFRAMS and flood risk mapping/ Hydro-data mapping (floodinfo.ie; waterlevel.ie) ▪ EPA Water Quality Data (www.epa.ie) ▪ Aerial photography ▪ Relevant Flood Risk Management Plans. ▪ The Planning System and Flood Risk Management Guidelines for Planning Authorities (DEHLG, 2009a) ▪ Climate Change Sectoral Adaptation Plan, Flood Risk Management (OPW, Sept. 2019)" ▪ TII Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008b). ▪ NRA (2004a) Guidelines for the Crossing of Watercourses during Construction of National Road Schemes and CIRIA 648 Control of Water Pollution from Linear Construction Projects
Proposed Baseline Survey Work and Assessments	▪ Walkover Survey: – Walkover survey will be required to have an appreciation of the existing hydrological regime, flooding risk and hydraulic constraints, particularly at the sub-station, O&M facility, grid connection site, landfall and working compound areas. ▪ Water Quality Data (sampling and testing) – for baseline condition: – The water quality impact assessments will be carried out by analysing the relevant baseline information gathered from the EPA and also through sample collection (grab sampling and testing). Project specific water quality data wil be collected during the initial stage of the Project. ▪ Topographical survey data, particularly at the river crossings (river channel cross sectional information): – Where the power transmission cables will be required to cross a natural watercourse and be constructed using an open trench construction technique, channel topographical survey information will be required. This survey information will be used in determining any hydrological and hydraulic impacts during the construction stage of the project. The impact assessment will be carried out through building a hydraulic model for the relevant river channels. – The hydrological impact assessments will be carried out by analysing the relevant baseline information gathered for the scheme area and also considering the proposed engineering designs of the physical infrastructures required for the Project, and also through consultation with the Project aquatic ecologist and material assets specialist. Site visits will also be carried out to get an appreciation on the existing hydrological environment and the potential impacts that may cause to this environment due to the construction of the proposed scheme. – The water quality impact assessments will be carried out by analysing the relevant baseline information gathered from EPA and also through collecting Project specific water quality data during the initial stage of the Project.

Scope of EIAR Chapter	Summary
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ The Project will involve construction of buried power transferring cables including at the watercourses crossings, and construction of OnSS and temporary working compounds during the construction stage of the Project (including O&M facility and grid connection site); ▪ During the construction stage, particularly at the watercourse crossings, impacts on the existing flooding risk could occur. Furthermore, construction of a OnSS could cause increased flooding risks unless an appropriate mitigation measure is implemented. ▪ The design flood flows at the watercourses crossings will be estimated in accordance with the flood studies report (FSR) and flood studies update (FSU) recommended methodologies. Appropriate allowances to cater for the future climate change impacts will also be applied to the design flow estimates. ▪ The hydrological impact assessments will be carried out by analysing the relevant baseline information gathered for the scheme area and also considering the proposed engineering designs of the physical infrastructures required for the Project, and also through consultation with the Project aquatic ecologist and material assets specialist. Site visits will also be carried out to get an appreciation of the existing hydrological environment and the potential impacts that may cause to this environment due to the construction of the Project. ▪ Water quality of receiving water bodies could significantly be impacted, from either routine runoff or spillages of harmful substances. This could lead to loss in habitats and aquatic animal population (fishes and others). The physical accumulation of sediment (silt and clays) resulting from the construction sites and OnSS area can also alter habitats by covering surfaces as well as smothering flora and fauna. ▪ The water quality impact assessments will be carried out by analysing the relevant baseline information gathered from EPA and also through collecting Project specific water quality data during the initial stage of the Project.
Technical Consultations	▪ Waterford County Council ▪ OPW ▪ EPA
Relevant Standards and Guidance	▪ The Planning System and Flood Risk Management Guidelines (DEHLG, 2009a) ▪ Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology Hydrogeology for National Road Schemes (NRA, 2008b) ▪ Managing Flood Risk in Ireland Summary Leaflet (OPW, 2022). ▪ The Sustainable Drainage System (SuDs) Manual C697 (CIRIA, 2007). ▪ The EU Floods Directive (EU Commission, 2007).

6.7 Air Quality

6.7.1 Baseline Environment

The EPA prepares annual reports on the national emissions to comply with the annual reporting requirements of the Convention on Long Range Transboundary Air Pollution and the National Emissions Ceiling Directive (NEC). The 2021 report (Ireland's Air Pollutant Emissions 1990-2030, EPA, 2021[8]) has been referenced to establish the national baseline of these pollutants which are summarised in **Table 6.9**.

Table 6.9: Ireland's NEC 2020 and 2030 Targets.

Pollutant	2010-20 Targets under 2001/81/ EC (kT)	Emissions Trends (kT)						Targets under 2016/2284/EU (kT)	
		2014	2015	2016	2017	2018	2019	2020	2030
SO_2	42	17.59	15.89	14.44	14.98	14.62	10.87	25.57	10.96
NO_x	65	108.2	107.5	110.2	108.2	107.9	98.03	66.84	40.62
NMVOC	55	108.0	108.5	109.8	114.9	115.1	113.8	56.34	51.08
NH_3	116	114.2	119.5	124.8	128.6	135.2	125.4	112.1	107.5
$PM_{2.5}$	N/A	13.84	13.81	13.09	12.99	13.56	11.79	15.61	11.23

Under the Clean Air for Europe Directive (2008/50/EC), EU member states must designate 'zones' for the purpose of managing air quality. For Ireland, four zones were defined in the Air Quality Standards Regulations (S. I. 180 of 2011). The zones were amended on 1 January 2013 to take account of population counts from the 2011 CSO Census and to align with the coal restricted areas in the 2012 Regulations (S.I. No. 326 of 2012). The four zones and the main areas in each zone are defined as:

- **Zone A:** Dublin Conurbation;
- **Zone B:** Cork Conurbation;
- **Zone C:** Other cities and large towns comprising Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Letterkenny, Celbridge, Newbridge, Mullingar, Balbriggan, Greystones, Leixlip and Portlaoise; and
- **Zone D:** Rural Ireland, *i.e.* the remainder of the State excluding Zones A, B and C.

The onshore section of the Project falls within the EPA air quality Zone D which covers rural Ireland. These rural areas generally have the best (lowest values) background air quality in Ireland as these are located away from large towns and cities where residential heating and traffic sources lead to increased pollution levels. The EPA monitors pollutant levels for all pollutants listed in S.I. 180 of 2011, as amended, on a continuous basis at a series of monitoring stations around the country. Data has been compiled from the EPA database for Zone D to represent the rural background and to inform this assessment and this is summarised in **Table 6.10**. Data

[8] Ireland's Air Pollutant Emissions 2019 (1990-2030). Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-air-pollutant-emissions-2019-1990-2030.php

is compared to the statutory limits for the protection of human health (S.I. 180 of 2011) and the World Health Organisation (WHO) Guidelines (WHO, 2021).

Table 6.10: Ambient Air Quality in Ireland (Zone D).

Pollutant	Average	Concentration (µg/m^3)						Limit (SI 180 of 2011)	WHO Guidelines
		2015	2016	2017	2018	2019	2020		
NO_2	Annual	5.5	6.3	4.4	4.7	5.7	7.6	40	10
PM_{10}	Annual	12.5	11.8	9.9	11.8	14.3	11.2	40	15
$PM_{2.5}$	Annual	8	9	7.4	9.4	9.3	7.8	25	5

6.7.2 Key Issues and Proposed Scope

Table 6.11 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to air quality.

Table 6.11: Air Quality Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ An Post GeoDirectory ▪ Ireland's Air Pollutant Emissions 1990-2030 ▪ Air Quality in Ireland 2015-2021 – Indicators of Air Quality Air Quality in Ireland.
Proposed Baseline Survey Work and Assessments	▪ A desktop study of the relevant publications will be undertaken to establish the local sources of emmissions for the baseline and the potential effects of these soures will be considered and assessed in this chapter. These local sources of emissions (*e.g.*, EPA monitoring stations) and potential effects will be considered through analysis. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on air quality within a defined study area.
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Impacts to air quality for sensitive receptors, primarily during construction/ decommissioning phases both from dust generation and from traffic-related emissions. ▪ Atmospheric deposition on sensitive designated habitats during construction. ▪ Positive indirect operation impacts from reduced combustion for electricity generation.
Technical Consultations	▪ Waterford County Council ▪ OPW.

Scope of EIAR Chapter	Summary
Relevant Standards and Guidance	▪ Local Air Quality Management Technical Guidance LAQM.TG (09). ▪ World Health Organization (WHO) (2021). WHO global air quality guidelines: particulate matter ($PM_{2.5}$ and PM_{10}), ozone, nitrogen dioxide, sulphur dioxide and carbon monoxide. ▪ Institute of Air Quality Management (IAQM) (2014) Guidance on the assessment of dust from demolition and construction. ▪ NRA (2011) Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (Rev. 1) –referred to hereafter as the 'NRA Guidelines'. ▪ Technical Instructions on Air Quality Control – TA Luft, German Federal Ministry for Environment, Nature Conservation and Nuclear Safety, (July 2002).

6.8 Climate

6.8.1 Baseline Environment

Greenhouse gases (GHG) in the atmosphere are rising as a result of human activity, largely emanating from the agricultural, transport, energy and residential sectors. The main existing sources of GHG in the vicinity of the Project and the wider area are from existing road traffic, rail, shipping, agriculture, residential space heating, commercial and industrial activity and waste facilities.

At a national level, according to the latest "*Ireland's Provisional Greenhouse Gas Emissions 1990-2021*" report (EPA, 2022c), total national GHG emissions in 2021 are estimated to have increased by 4.7% on 2020 levels to 61.53 million tonnes carbon dioxide equivalent (Mt CO_2 eq[9]). This increase in total emissions was driven by increased use of coal and oil for electricity generation and increases in both the Agriculture and Transport sectors. It highlights that further transformative measures will be needed to meet National climate ambitions.

The provisional estimates of GHG emissions indicate that Ireland will exceed its 2021 annual limit, without the use of flexibilities, set under the EU's Effort Sharing Regulation (ESR) by 2.71 Mt CO_2 eq. The data are still provisional, therefore, the EPA cannot make a determination on compliance to date. 2021 was the first year over which compliance with targets set in the ESR were assessed.

Emissions in the energy industries sector increased by 17.6% or 1.53 Mt CO_2 eq in 2021. This is attributable to a tripling of coal and oil use in electricity generation as gas fired plants were offline. Electricity generated from wind and hydro decreased by 16% and 20% respectively in 2021. Emissions intensity of power generation increased from 296 g CO_2/ kWh in 2020 to 331 g CO_2/ kWh in 2021.

Looking forward, the EPA state in their 2022 report, "*Ireland's Greenhouse Gas Emissions Projections 2020-2040"* (EPA, 2022d), that implementation of the '*With Additional Measures*' (WAM) scenario (including those in the CAP 2021 (Government of Ireland, 2021)[10] is projected to save 58 Mt CO_2 eq over the period 2021-2030 compared to the '*With Existing Measure*s' (WEM) scenario. This represents a reduction of 1.8% per annum in emissions over the period. These projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 to 2030, assuming full implementation of the CAP 2021 and the use of the flexibilities available. Future, more ambitious targets as presented in the European Climate Law (EC, 2021)[11] and Ireland's Carbon Budget 2022 will require many additional measures *e.g.*, a 51% reduction in the total amount of greenhouse gas emissions by 2030, relative to 2018 (DECC, 2022b).

6.8.2 Key Issues and Proposed Scope

Table 6.12 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to climate.

[9] Carbon dioxide equivalents are commonly expressed as million tonnes of carbon dioxide equivalents, abbreviated as Mt CO_2eq

[10] Ireland's CAP 2021 published November 2021, which superseded the 2019 CAP.

[11] European Climate Law: https://ec.europa.eu/clima/eu-action/european-green-deal/european-climate-law_en (European Commission, 2021)

Table 6.12: Climate Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Ireland's Provisional Greenhouse Gas Emissions 1990-2021 ▪ Ireland's Greenhouse Gas Emissions Projections 2021-2040 ▪ Materials balance / bill of quantities.
Proposed Baseline Survey Work and Assessments	▪ A desktop study of the relevant publications will be undertaken to establish the baseline. These local sources of emissions and potential effects will be considered through analysis and modelling. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on climate.
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Direct greenhouse gas generation and mitigation through the construction phase through material choices, transport and construction activities. ▪ Direct greenhouse gas generation and mitigation through the gas insulated substation (if required) – Sulphur Hexafluoride (SF_6) and consideration of potential for leaks/greenhouse gas warming potential. ▪ Indirect positive greenhouse gas reduction from the Project through the reduction in reliance on fossil fuel combustion for energy.
Technical Consultations	▪ Waterford County Council Eastern & Midlands Climate Action Regional Office (CARO).
Relevant Standards and Guidance	▪ EU Guidance on Integrating Climate Change and Biodiversity into EIA (2013) (EPA, 2015) ▪ IEMA (2022c) Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2nd Edition ▪ Highways Agency (2021) Design Manual for Roads and Bridges: Environmental Assessment Techniques, Part 14 LA 114 – Climate. Version 0.0.1, June 2021, UK Highways Agency ▪ IEMA (2020) EIA Guide to: Climate Change Resilience and Adaptation ▪ GCB (2016) Publicly Available Specification (PAS) 2080: Carbon Management in Infrastructure[12]

[12] PAS (Publicly Available Specification) 2080, developed by the Construction Leadership Council's Green Construction Board (GCB), sets out the principles and components of a carbon management system and requirements on the whole value chain.

6.9 Noise & Vibration

6.9.1 Baseline Environment

The airborne noise study area extends from County Wexford to County Waterford with significant coastal populations at Rosslare Harbour, Tramore and Dungarvan. Smaller settlements are located at Kilmore Quay, Fethard, Dunmore East, Annestown, Bunmahon and Ardmore. Many of the coastal settlements have caravan/mobile home parks located nearby. While these developments are rarely occupied on a full-time basis they can be particularly noise sensitive due to their light construction. The coast east of Bunmahon is relatively low lying, but west of Bunmahon the coast is elevated, and the majority of coastal residences have sea views.

The coastal area is generally high amenity with many beaches and several golf clubs. The Waterford to Dungarvan Greenway is a popular coastal amenity.

Noise sources include the surf on the shore. The Celtic Sea is exposed to the prevailing south-westerly winds and surf noise can be significant. Road traffic noise is limited to local roads on the coast which are routed radially towards settlements on the coast. Road traffic noise is not expected to be high. The windfarm will be located upwind of the noise sensitive locations for the majority of the time.

The largest onshore windfarm in the study area is located south of Bridgetown in County Wexford with two wind turbines located west of the Ring peninsula.

Agriculture with extensive tillage farming is carried out in the study area. This may lead to agricultural machinery operating late in the evening and early morning during the Summer/Autumn period.

6.9.2 Key Issues and Proposed Scope

Table 6.13 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to noise and vibration.

Table 6.13: Noise and Vibration Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Waterford County Council ▪ Wexford County Council ▪ EPA ▪ GeoDirectory ▪ Noise Action Plan 2019-2023 – Waterford City and County Council ▪ Wexford County Council Noise Action Plan 2019-2023 ▪ Noise monitoring levels.
Proposed Baseline Survey Work and Assessments	▪ To describe the baseline noise environment and to subsequently assess the impact of construction noise at onshore locations during construction, an unattended survey of noise levels in the receiving environment and at selected residential locations at and near the coast will be undertaken. ▪ To describe the baseline noise environment and to subsequently assess the impact of construction and in the case of the OnSS, operational noise of turbines and OnSS attended noise measurements will be undertaken at noise sensitive locations in proximity to the following: – Landfalls – HDD / open cut trench crossings – OnSS locations – O&M facility – Grid connection site

Scope of EIAR Chapter	Summary
	An airborne noise model for construction, including offshore construction and all onshore construction activities will be developed. The impacts will be assessed with reference to best practice guidance, e.g. British Standard BS5228 and BS4142. Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on noise and vibration within a defined study area.
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Impacts to sensitive receptors, primarily during construction/ operational/ decommissioning phases from traffic-related noise (onshore and temporary increase in shipping traffic) and also OnSS (including O&M facility and grid connection site). ▪ Airborne noise in relation to the offshore elements.
Technical Consultations	▪ Waterford County Council ▪ Wexford County Council ▪ Project design engineers
Relevant Standards and Guidance	▪ International Organization for Standardization (ISO) 1996-1:2016 - Description and Measurement of Environmental Noise ▪ British Standard BS5228:2009+A1:2014 Noise and Vibration Control on Construction and Open Sites ▪ EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4, January 2016) ▪ Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, 2004b) ▪ UK Department of Transport Document, Calculation of Road Traffic Noise, CRTN' 1988 In consideration of the overlap with the offshore noise assessment, the following standards and guidance may apply: ▪ EPA Guidance Note on Noise Assessment of Wind Turbine Operations at EPA Licensed Sites (NG_3) ▪ Wind Energy Development Guidelines (DECLG, 2006a) [currently being updated] ▪ ETSU-R-97, The Assessment and Rating of Noise from Wind Farms (1996) Department of Trade and Industry, UK ▪ Institute of Acoustics, A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (2003) ▪ BS4142-Methods for rating and assessing industrial and commercial sounds BS4142/2014+A1/2019 ▪ BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting ▪ BS 6472-2:2008 Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration ▪ BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration

6.10 Cultural Heritage (including Archaeological and Architectural Heritage)

6.10.1 Baseline Environment

The county of Waterford has a rich and varied archaeological heritage dating from Neolithic times (*c.* 4500 to *c.* 2500 before Christ (BC). Known Neolithic activity in the county is mostly confined to the mouth of the River Suir, however, coastal locations have attracted human settlement and activity from prehistoric times onwards and it is likely that the Waterford coastline stretching east / north-east from Dungarvan is no exception.

Bronze Age activity (*c.* 2500 to *c.* 450 BC) in the county is concentrated on the Comeragh Mountains, however scattered monuments exist in the rest of the county. One possible example is a standing stone recorded near the mouth of the River Dalligan, north-east of Clonea Strand (RMP WA032-021001). The function of standing stones has been much debated, with some possibly acting as property / territorial boundaries and others as grave markers. Their primary function is likely to have been as grave markers, as the majority of those excavated (or otherwise disturbed) have been found to be associated with burial of predominantly Early Bronze Age date. The date of burials found in the cliffs nearby (RMP WA032-020) is not known but it is possible that they are prehistoric in date as two burial cairns (typically Bronze Age in date) are recorded on the opposite side of the Dalligan river (WA032-023, -022001).

Further north-east along the coast, at Bunmahon strand, two promontory forts straddle the bay (RMP WA025-123 & -065). These sites represent activity in the pre-Christian period, with such sites being typically Iron Age in date (*c*. 450 BC to *c.* 450 AD (*Anno Domini)*), though occupation at some may have extended into the early medieval period (*c*. 450 to *c*. 1100 AD) and possibly as late as the 13th century. A promontory fort is essentially a fortified coastal headland, with seaward sides naturally defended by a cliff while one or more straight or curved ramparts of earth or stone, with accompanying ditches, protect the landward side. Their primary function is uncertain, as few such sites have been excavated, but they may have acted as settlements, trading posts, or temporary refuges, and they demonstrate an engagement with the sea and maritime activity during this period.

One of the promontory forts (WA025-065) is associated with two ogham stones, indicating that occupation or activity here probably continued into the early medieval period. Ogham was a writing system or script created for an early form of the Irish language and our earliest ogham inscriptions on stone are approximately dated on linguistic grounds to between the 4th and the 7th century AD. Ogham stones are found in most counties in Ireland, but occur in highest numbers in the south-west, in counties Kerry, Cork and Waterford. While most have been found in association with ecclesiastical sites, there are other examples of such stones found at promontory forts.

There are also examples of ringforts located on the agricultural land extending in from the coast (*e.g.* WA032-023 to -025 east of Clonea Strand and WA025-051 north of Bunmahon), pointing to early medieval settlement in the wider landscape. Improvements in agriculture from the 5th century AD resulted in a wave of settlement expansion and population increase in rural Ireland, leading to the construction of the ringfort, or its Irish equivalent, the rath, modern landscape's most common archaeological site. Ringforts are circular enclosures, essentially habitation sites or farmsteads. They were not simple isolated homesteads, however, and should be considered within their contemporary settlement landscape, which would have consisted of unenclosed settlements, farms and fields, routeways and natural resources. Typically, they are sited on good, well-drained soils, usually over the 100 m contour, close to a water source, and often located in proximity to routeways (ridges, eskers, moraines). That settlement of this coastline continued into the medieval period is evidenced by the deserted medieval settlement close to Bunmahon (WA024-093001).

The Waterford Copper Coast (declared a UNESCO Global Geopark in 2015), which extends along the coastline for 25 km between Tramore and Dungarvan, is a testament to the extensive mining activities of the late 18th and 19th centuries. Remnants of this industrial heritage can be found in the buildings and sites around the area, as for example in the cliffs near Bunmahon, where a mine pit head and path survive, as do the remains of mine workers' cottages. At the height of the mining boom in the mid-19th century the population of Bunmahon / Knockmahon had soared from 200 to 5,000. The works at Knockmahon penetrated 400 m beneath ground level and the same distance out under the sea, and flooding was a constant threat. By 1879

the mines had closed, a result of cheaper sources of copper becoming available abroad, and Bunmahon's population shrank again to the low hundreds.

6.10.2 Key Issues and Proposed Scope

Table 6.14 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to cultural heritage (including archaeological and architectural heritage).

Table 6.14: Cultural Heritage (including Archaeological and Architectural Heritage) Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Waterford County Council CDP ▪ Local Authority heritage data ▪ Dept. Housing, Local Government and Heritage (DHLGH), National Monument Service: National Monuments in State Care: Ownership & Guardianship ▪ DHLGH, Sites listed in the Record of Monuments and Places (RMP) and Archaeological Survey of Ireland. Sites and Monuments Records (SMR) database ▪ National Museum of Ireland topographical files ▪ Excavations Bulletin and Database (Excavations.ie) ▪ Place names (logainm) ▪ Data gathered from field work (industrial, cultural, marine heritage and areas of archaeological potential) ▪ INFOMAR ▪ OSI mapping ▪ Aerial photography ▪ Other documentary, cartographic and literary sources
Proposed Baseline Survey Work and Assessments	▪ Field surveys (walkover surveys) of the proposed cable routes, landfall locations, substation sites, O&M facility and grid connection site. ▪ Following on from the desktop and field walkover surveys there may be a requirement to under take additional archaeological investigations at sites deemed to have a high likelihood of containing features. These may include: – Archaeological geophysical survey – archaeological test trenching, and archaeological monitoring of ground disturbance works. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on cultural heritage within a defined study area.
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: Potential impacts to heritage or setting for national and recorded monuments, areas of archaeological potential, buildings/features on the architectural heritage record of protected structures, demesne houses/ garden landscape, or architectural conservation areas and unrecorded cultural/ industrial heritage features.
Technical Consultations	▪ Waterford County Council Heritage Officer ▪ Dept. Housing, Local Government and Heritage – Development Applications Unit ▪ National Monuments Service ▪ Architectural Policy and Built Heritage (DHLGH) ▪ An Taisce ▪ The Heritage Council

Scope of EIAR Chapter	Summary
Relevant Standards and Guidance	▪ Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 ▪ Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and TII, 2017 ▪ Council of Europe (1985). Convention for the Protection of the Architectural Heritage of Europe (ratified by Ireland 1997), 'Granada Convention' ▪ Council of Europe (1992). European Convention on the Protection of the Archaeological Heritage (ratified by Ireland 1992), 'Valetta Convention' ▪ Council of Europe (2005). Framework Convention on the Value of Cultural Heritage for Society, 'Faro Convention' ▪ Cultural Heritage Guidelines for Electricity Transmission Projects (Courtney Deery for EirGrid, 2015) ▪ Department of Arts Heritage and the Gaeltacht (DAHG) (2011), Architectural Heritage Protection Guidelines for Planning Authorities ▪ Department of Arts, Heritage and the Gaeltacht (DAHG) (2015). National Landscape Strategy for Ireland 2015-2025 ▪ Department of Arts, Heritage, Gaeltacht and Islands (now Department of Culture, Heritage and Gaeltacht) (1999). Framework and Principles for the Protection of the Archaeological Heritage ▪ Heritage Act, 1995 ▪ Historic England (2015), Historic Environment Good Practice Advice in Planning, Note 3: The Setting of Heritage Assets ▪ ICOMOS (1999). International Cultural Tourism Charter ▪ ICOMOS Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005 ▪ ICOMOS (2011). Guidance on Heritage Impact Assessments for Cultural World Heritage Properties ▪ National Monuments Act, 1930 to 2014 ▪ NRA (2006). Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes ▪ Planning and Development Act 2000 to 2017 ▪ The Heritage Council (2010), Proposals for Ireland's Landscapes ▪ The Heritage Council (2013), Historic Landscape Characterisation in Ireland: Best Practice Guidance ▪ The UNESCO World Heritage Convention, 1972.

6.11 Seascape / Landscape and Visual Amenities

6.11.1 Baseline Landscape and Seascape

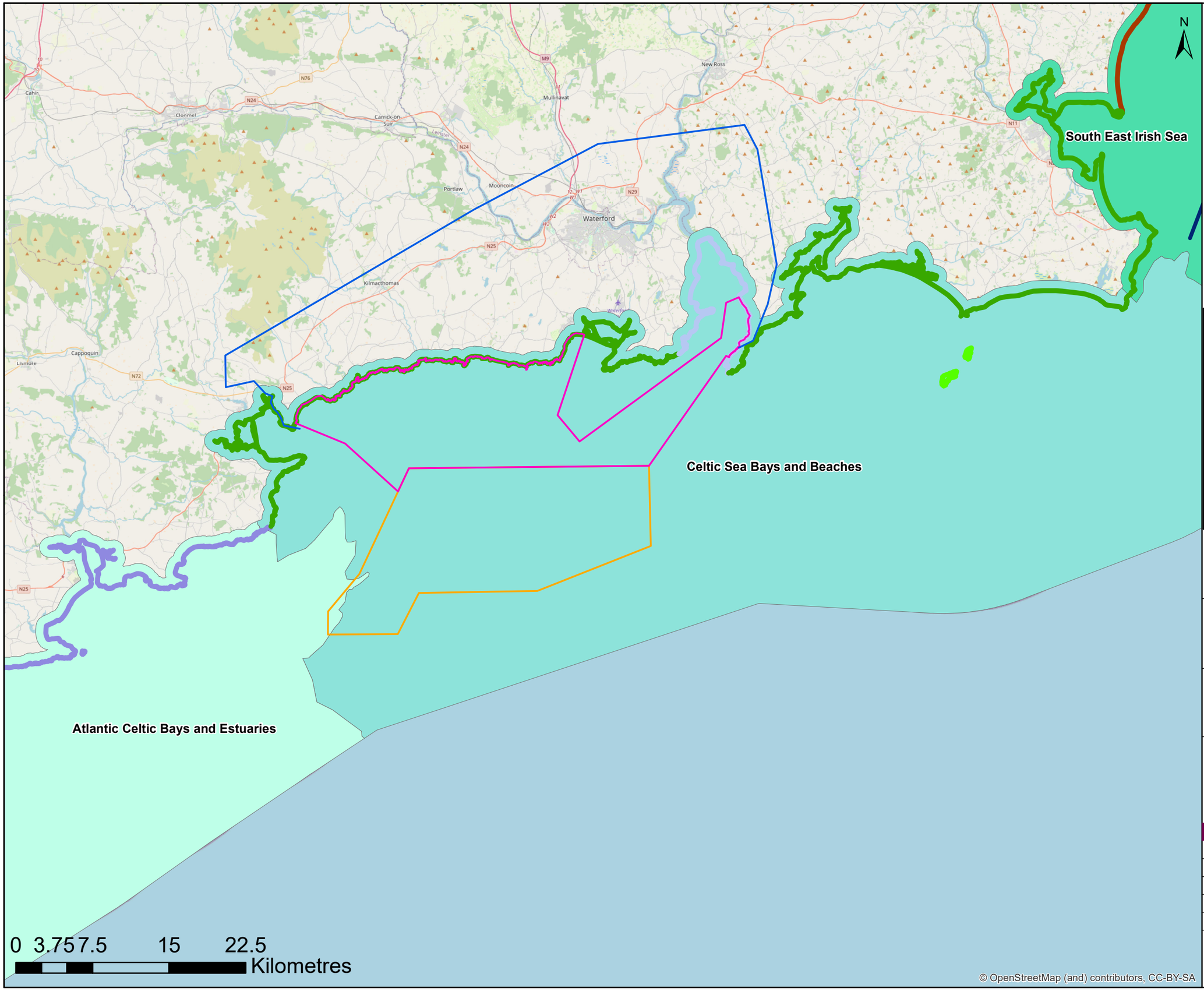
The seascape, landscape and visual impact assessment (SLVIA) Study Area (60km radius) for the NCS Offshore AoI will encompass the entire Waterford coastline and coastal hinterlands as well as smaller and more discrete sections of both the Cork and Wexford coastlines. The NCS Onshore AoI and the NCS Cable Corridor AoI fall within the broader SLVIA Study Area, albeit without interacting with the Cork coastline.

The recent Regional Seascape Character Assessment for Ireland (2020) provides an excellent description of the seascape units that are relevant to the NCS project. This document divides the coastline of the Republic of Ireland into 13 seascape types with the most relevant one being 'Type 7 - Broad estuarine bays & complex low plateau and cliff coastline' predominantly along the Waterford section of coastline. As shown in **Figure 6-6** below, the relevant Cork section of coastline is 'Type 9 – Complex indented small peninsulas, low cliffs & small sandy beaches', while there is a section of Type 2 – Large Estuary' associated with Waterford harbour which lies between County Waterford and County Wexford. The seascape character types are then divided into 15 no. geographically specific Seascape Character Areas, with the most relevant one for this project being 'SCA12 – Celtic Sea Bays and Beaches'. This is described as:

"*… a stretch of coastline in Counties Waterford and Wexford. The coast is defined by a series of very broad shallow bays with low-lying hinterlands, divided by the key protruding headlands; Helvick Head, Brownstown Head, Hook Head, Forlorn Head and Carnsore Point.*

The seascape also includes two longer estuaries; Waterford Harbour and Bannow Bay which, historically, have been strategically important landing places and are particularly associated with Viking and Anglo-Norman settlement. The settlements of Tramore and Dungarvan grew at the two most concave and sheltered bays along the coastline and other settlements such as Kilmore Quay and Dunmore East grew up around fishing villages.

The coastal hinterland is fertile and very low-lying. While much of the coastal edge is formed of sand or shingle beach, towards the western end of the region, along the Copper Coast Geopark, low and medium sized cliffs and distinctive offshore rocks enclose small coves and beaches. A significant extent of the coastline is experiencing deposition."



Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI

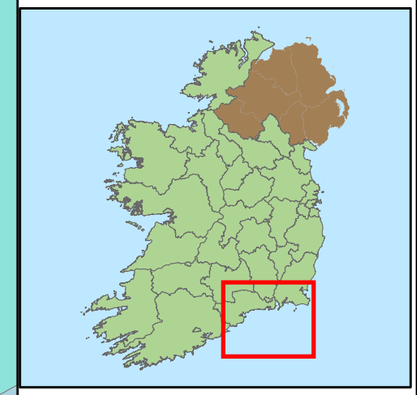
Seascape Coastal Type

- Broad estuarine bays and complex low plateau and cliff coastline
- Complex indented small peninsulas, low cliffs and small sandy beaches
- Large Estuary

Seascape Character

- Atlantic Celtic Bays and Estuaries
- Celtic Sea Bays and Beaches
- South East Irish Sea

Data Sources: Waterford CDP



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 6-6: Seascape Character Areas and Coastal Types Waterford CDP

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: LD	**Project No.** MDR1649
Checked By: CD	**File Ref:**
Approved By: RB	MDR1649-RPS-01-NCS-DR-Z-AG-0060
Scale: 1:350,000@ A3	**Projection:**
Date: 23/03/2023	ITM (IRENET95)

The coastal hinterland of the broad NCS Offshore AoI and the NCS Onshore AoI are predominantly that of rolling fertile farmland. The main exception being the Comeragh Mountain range, which rises to the north of Dungarvan, firstly as foothills of marginal grazing and forestry plantations before steepening into smooth mountain moorland with a plateau ridge and dramatic corrie lakes such as Coumshingaun. The recently adopted (July 2022) Waterford CDP includes an updated Landscape and Seascape Character Assessment. This includes seven landscape types and associated sensitivities. The most sensitive of these are the 'Coastal' Strip and the 'Uplands', while the 'Farmed Lowlands' and 'Foothills' that lies between are assigned 'Low' sensitivity. The landscape sensitivities within the NCS Onshore AoI are shown in **Figure 6-7** below.

N

0 2 4 8 12
Kilometres

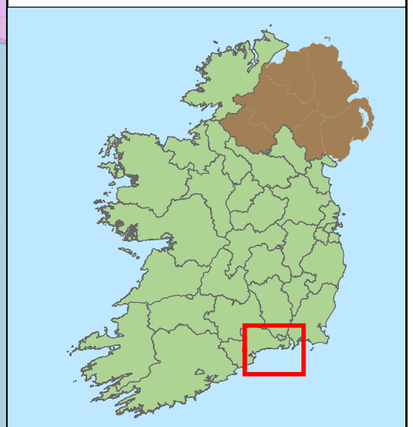
© OpenStreetMap (and) contributors, CC-BY-SA

Legend

- NCS Onshore AoI
- NCS Cable Corridor AoI
- NCS Offshore AoI

Protected Views

- Scenic Routes
- Most Sensitive
- High Sensitive
- Low Sensitive
- Least Sensitive
- Co Wexford Lowlands LCU
- Co Wexford Coastal LCU
- Co. Wexford River Valley LCU



Client

North Celtic Sea Wind Limited

Project

North Celtic Sea
Positive Energy for a Sustainable Future

Title

Figure 6-7: Landscape Sensitivity from Waterford CDP

West Pier Business Campus,
Dun Laoghaire,
Co Dublin,
Ireland.

Tel: +353 (0) 1 4882900
Email: ireland@rpsgroup.com
Web Page: rpsgroup.com/ireland

Issue Details

Drawn By: JM	**Project No.** MDR1649
Checked By: RS	**File Ref:**
Approved By: CW	MDR1649-RPS-01-NCS-DR-Z-AG-0055
Scale: 1:200,000@ A3	**Projection:**
Date: 22/03/2023	ITM (IRENET95)

The Wexford Landscape Character Assessment identifies areas with distinct, recognisable and consistent pattern of elements that makes it different from its neighbouring landscape as landscape character units (LCUs). The LCUs within the NCS Onshore AoI include the Coastal, River Valley and Lowlands LCUs. Landscape sensitivity ratings have been assigned for each unit. The landscape sensitivity rating for the Coastal LCU is 'High', 'Moderate to High' for the River Valley LCU and 'Low to Moderate' for the Lowlands LCU.

The Wexford Landscape Character Assessment also identifies 'Distinctive Landscape features which, for policy purposes, are treated as another LCU'. The landscape sensitivity rating for these distinctive landscapes is 'high'. The Hook Peninsula has been designated as one of these distinctive landscapes.

The principal watercourse is the River Suir which is contained within the northern portion of the Onshore AoI, where it passes through the largest settlement of that AoI being Waterford City. The River Blackwater enters the sea at the settlement of Youghal in East Cork where it is contained within the wider western study area of the Project, but none of the specific AoIs. Other key coastal settlements include Dungarvan and Tramore with the latter being relevant to both the Onshore and Cable Corridor AoIs. The village of Kilmacthomas is located further inland on a section of the N25 national road that runs between the larger settlements of Waterford City and Dungarvan.

6.11.1.1 Baseline Visual Amenity

There are no visual designations contained in the current Wexford CDP, However, the Waterford CDP has designated both scenic routes and scenic views. **Figure 6-7** above shows that numerous county Waterford designations are contained within the NCS Onshore AoI.

Key tourism, heritage and recreational features that will be considered as seascape / landscape and visual receptors include popular beaches at Tramore, Bunmahon and Clonea as well as numerous other small coves along the Waterford coastline. These frequently host caravan parks that swell with summer holiday makers. A 25 km section of this same coastline is also designated as a UNESCO Global Geopark being of outstanding geological interest. There is a greenway cycling route between Dungarvan and Waterford City that generally follows a former railway line. Local walking routes can be found within and around coastal settlements while the Nire Valley trails traverse the Comeragh range. Sean Kelly is a local cycling icon and has two circuits named after him. There are lighthouses as well as several golf courses within the coastal environs. Key visual receptor locations are set out in **Table 6.15** below.

Table 6.15: Key Visual Receptors.

Key Visual Receptor Location / Feature	Relevant Receptors
Tramore Beach	Recreational Visitors and Tourists
Bunmahon Beach	Recreational Visitors and Tourists
Clonea Beach	Recreational Visitors and Tourists
Other Beaches and coves hosting caravan parks	Recreational Visitors and summer holiday makers
Waterford Greenway (Coastal section / sea views)	Recreational Visitors and Tourists
Local Walking Loops (Colligan Wood; Anne Valley Walk; Dunmore East Coastal Path)	Recreational Visitors and local residents
Nire Valley Trails within the Comeragh Mountains	Recreational hill walkers
Sean Kelly Cycling Routes (Coastal Route / Comeragh Mountains Circuit)	Recreational Cyclists

Key Visual Receptor Location / Feature	Relevant Receptors
Golf Courses; Tramore, Gold Coast Golf Resort, Dungarvan, Faithlegg	Recreational Golfers
Lighthouses at Ballymacourty and Hook Head	Recreational Visitors and Tourists
Major settlements including Dungarvan, Waterford City	Residents and Visitors
Coastal Settlements including Stradbally, Bunmahon, Annestown, Tramore, Dunmore East, Duncannon, Fethard	Residents and tourists

6.11.2 Key Issues and Proposed Scope

Table 6.16 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to seascape / landscape and visual amenities.

Table 6.16: Seascape / Landscape and Visual Amenities Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Waterford County Council/ CDP Policy, Baseline landscape character, scenic routes and protected views; ▪ Wexford County Council/ CDP Policy, Baseline landscape character, designated Landscapes ▪ Cork County Council/ CDP Policy, Baseline landscape character, designated landscapes and scenic routes ▪ NIAH inventory of designed landscapes ▪ Met Éireann Weather data. ▪ Recreational assets including walking routes (irishtrails.ie, Long Distance Walkers Association , sea based recreational data ▪ GeoDirectory data relating to residential dwellings for onshore elements ▪ OSI mapping at scape 1:50,000; and ▪ Aerial Photography.
Proposed Baseline Survey Work and Assessments	▪ An initial study area of 60 km maximum from the outermost wind turbines is selected for initial desk based ZTV analysis of the offshore turbines. The extent of this study area to be refined down for the assessment and is expected to include the required study area for the offshore windfarm array. An initial 5 km study area distance centered on the cable route, OnSS and O&M will be established and a 5 km radius study area will apply from the site boundary of the proposed substation location (if a new substation is required) and O&M location. ▪ Appraisal of options to take account of turbine height, number and layout from key viewpoint locations to be agreed with local authorities. ▪ Outputs to be in reporting format supported by photo wirelines from viewpoint locations agreed with consultees. ▪ Wind Turbine Options - zone of theoretical visibility (ZTV) and wireline views from selected viewpoint locations for turbine layout options. ZTV to illustrate theoretical visibility of wind turbines to hub height and wind turbines to tip height (Two ZTVs). Site based assessment to include selection of key sensitive viewpoint locations. Options reporting may be supported by wireline illustrations of the various options from key viewpoint locations. ▪ SLVIA – Seascape, Landscape and Visual Impact Assessment undertaken with reference to the baseline above with reference to a study area of up to a maximum 60 km radius. ▪ The assessment of impacts and effects on landscape and seascape will address the following: – Effects on seascape character (with reference to seascape character baseline)

Scope of EIAR Chapter	Summary
	– Effects on landscape character and, – Effects on national and county landscape designations. – The assessment of impacts and effects on visual amenity will address the following: – Effects on scenic routes and protected views designated in the Waterford and Cork CDP and, – Effects on viewers at a range of viewpoint locations specifically selected for the assessment. A range of viewer types will be considered including residents of dwellings, recreational visitors (especially those for whom landscape is an important part of the experience), road users (including visitors and commuters). ▪ The assessment of impacts and effects will also consider the more sensitive sea-based receptors, as a desk-based exercise informed by the shipping and navigation assessment. This will consider specifically recreational sea-based receptors and visitors and those travelling by passenger ferry. ▪ The assessment of cumulative impacts and effects on landscape, seascape and visual amenity will take account of existing and planned wind farms within the environs of the Proposed Development. ▪ The SLVIA will be supported by illustrated figures as follows: ▪ Baseline landscape and seascape character ▪ Baseline designated landscapes ▪ Baseline designated scenic routes and views ▪ ZTV wind turbine hub height and viewpoint locations ▪ ZTV turbine tip height and viewpoint locations ▪ Photomontages of the offshore elements of the proposed development from selected viewpoint locations (note –onshore elements might also be included dependent on the specific viewpoint) ▪ Photomontages of the onshore elements of the proposed development from selected viewpoint locations (note –offshore elements might also be included dependent on the specific viewpoint) ▪ Cumulative photomontages / wirelines of the offshore elements from selected viewpoint locations.
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Nationally designated landscapes *e.g.*, the Copper Coast. Closest turbine will a minimum of 10km from the shore. A detailed study will be required to analyse potential effects on the integrity of these landscapes. ▪ Locally designated landscapes of Wexford (Distinctive Landscapes) ▪ Waterford designated protected views along the coastline of Waterford; and ▪ Waterford scenic routes along the coast from Helvic Head to Dungarvan and then following the entire route of the R675 from Ballinroad to Waterford via Bunmahon and Tramore. The section of the N25 national secondary road between Ballinroad and McGrath's Cross is also a designated scenic route and there are more elevated scenic routes affording broad vistas from within the Comeragh range.
Technical Consultations	▪ Options appraisal selection of viewpoints to be consulted on with Waterford County Council; ▪ Detailed scope of work including landscape and visual receptors for inclusion in assessment with all prescribed bodies; ▪ Planning Authorities: – Waterford – Wexford – Cork ▪ Stakeholders: – Heritage Council – Irish trails

Scope of EIAR Chapter	Summary
	– Fáilte Ireland ▪ An Taisce
Relevant Standards and Guidance	▪ Landscape Institute and Institute of Environmental Management and Assessment (IEMA) (2013) Guidelines for Landscape and Visual Impact Assessment. 3rd edition. Routledge. ("GLVIA3") ▪ SNH (2017a) Siting and designing wind farms in the landscape. Version 3 ▪ SNH (2017b) Visual Representation of Wind Farms: Good Practice Guidance. Version 2.2 ▪ SNH (2012a) Onshore Renewables: Guidance on assessing the impact on coastal landscape and seascape ▪ SNH (2012b) Assessing the cumulative impact of onshore wind energy developments ▪ Maritime Ireland – Guide to Best Practice in Seascape Assessment (2001) ▪ Regional Seascape Character Assessment for Ireland (2020)

6.12 Traffic and Transport

6.12.1 Baseline Environment

Where possible the cables will be laid in the local roads in alignment with EirGrid Technical Specifications.

The majority of the roads adjacent to the coastlines in County Waterford and Wexford are rural local roads that traverse the countryside and link in with regionals roads. Along these rural local roads there is typical ribbon residential development, local National schools and entrances to sporting and commercial developments. These local roads are typical paved with limited road markings and over the side drainage via ditches and channels and can have high verges with extensive vegetation in close proximity to the road edge.

The horizontal alignment of these local roads varies significantly and can have a direct impact on sightlines and safety. This will be a key consideration (in addition to road widths) when developing traffic management proposals and possible passing bays to facilitate the construction of joint bays.

Traffic levels will be expected to be low on rural roads except for tourist seasons when there are influxes to beaches along the Waterford coastline.

In terms of National Road infrastructure, the N25 traverses through County Waterford, including the bypassing of Waterford City. In addition, the N25 Waterford to Glenmore Scheme is at Options Selection stage. This road upgrade will continue to provide a high-quality linkage to Rosslare Europort and facilitate inter county travel.

Driving a car is the predominate mode of travel for the population travelling to work, school or college in County Waterford, as shown in **Table 6.17**. However, there are still 14.6% of the population in Waterford that use active travel modes, such as walking and cycling as a means of travel.

Table 6.17: Mode of Travel for the Population Travelling to Work, School or College in Waterford (CSO, 2016d).

Means of Travel	Population aged 5 years and over by means of travel to work (Number)	Population aged 5 years and over by means of travel to school or college (Number)	Population aged 5 years and over by means of travel to work, school or college (total) (Number)
On foot	4,016	5,492	9,508
Bicycle	598	281	979
Bus, minibus or coach	732	3,745	4,477
Train, DART or LUAS	78	45	123
Motorcycle or scooter	137	25	162
Car Driver	29,307	1,611	30,918
Car passenger	2,360	14,461	16,918
Van	2,752	46	2,798
Other (inc. lorry)	279	6	285

Means of Travel	Population aged 5 years and over by means of travel to work (Number)	Population aged 5 years and over by means of travel to school or college (Number)	Population aged 5 years and over by means of travel to work, school or college (total) (Number)
Work mainly at or from home	2,682	61	2,743
Not stated	2,016	1,087	3,103
Total	**44,957**	**26,960**	**71,917**

6.12.2 Key Issues and Proposed Scope

Table 6.18 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to traffic and transport.

Table 6.18: Traffic and Transport Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	Discussions with Waterford City & County Council (and/or Kilkenny County Council /Wexford County Council dependent on the location of the onshore infrastructure): ▪ OSI mapping ▪ Topographical surveys ▪ Existing road networks ▪ Baseline traffic counts *e.g.*, traffic survey. ▪ Road Safety Authority Collison Data
Proposed Baseline Survey Work and Assessments	▪ **Site Accessibility Survey** windscreen survey to get an understanding of the road widths. Horizontal and vertical alignments and verge characteristics of the roads impacted by the scheme. ▪ **Baseline traffic counts** Traffic survey to record the volume/type/speeds of vehicles using individual sections of roads and junctions that are directly impacted by the scheme. A scheme specific specification will be prepared once clarity is got on the roads and junctions impacted. ▪ **Road Condition surveys** Analysis and testing on the strength of the road surfacing and identify any defects or failures. ▪ **Road Safety Audit** A Road Safety Audit – Stage 1 wil lbe carried out for the proposed scheme by an audit team with approved TII training. This audit will identify any problems that could generate safety risks on the road network, and it will provide mitigation measures.
Potential Impacts and Key Issues	▪ The key aspect from a traffic perspective is the impact of the Project works associated with the construction of the onshore cable, the OnSS (including O&M facility and grid connection site) and the temporary impact on public local roads, sensitive receptors such as schools and local community facilities and accesses to houses and farms. ▪ Due to the often-narrow road widths on the access roads to beaches or other coastline locations there is a risk of conflict between construction and public vehicles who are passing on the road network. Temporary traffic impacts associated with haulage during construction – no generation of permanent operational traffic volumes. Vehicular traffic associated with construction of onshore elements, with reference to key sensitive receptors in proximity to the proposed development. Prediction of the likely impact the Project could have on

Scope of EIAR Chapter	Summary
	adjacent receptors (operating performance of the access junctions and adjacent public road network) are dependent on the following: – Size of vehicles loads and routes used by traffic – Impact the Project could have on adjacent receptors (ensuring that all residential accesses, junctions are maintained during the works) – Loads within the vehicles. – Routes used by traffic (associated with construction of onshore elements, with reference to key sensitive receptors in proximity to the proposed development) ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project on traffic will be considered and assessed within a defined study area.
Technical Consultations	Waterford City & County Council (and/or Kilkenny County Council /Wexford County Council depending on the location of the onshore infrastructure).
Relevant Standards and Guidance	▪ Transport Assessment Guidelines (TII, May 2014). https://www.tiipublications.ie/library/PE-PDV-02045-01.pdf ▪ National Transport Authority (Guidance Documents). https://www.nationaltransport.ie/planning-and-investment/strategic-planning/guidance-documents/ and ▪ Planning Guidelines (Tii) https://www.tii.ie/technical-services/environment/planning/

6.13 Material Assets

6.13.1 Baseline Environment

There are no guidelines or criteria to define the size of the study area for the assessment of Material Assets. However, the Material Assets Study Area will be defined by RPS for the purpose of this assessment as the area in which there is potential for direct and indirect impact on Material Assets as a result of the Project. This includes the area within the planning boundary for the onshore infrastructure of the Project and an area extending 300 m from this boundary.

A detailed desktop review of existing studies and datasets will be carried out to gather data regarding Material Assets within the Material Assets Study Area. A summary of the key desktop reports that will contribute to the assessment are as follows:

- Utility Providers existing assets datasets to inform baseline mapping for the assessment:
  - GNI;
  - EirGrid;
  - ESB;
  - Uisce Éireann; and
  - Eir.
- Waterford CDP 2022 – 2028;
- Wexford CDP 2022 – 2028;
- GeoDirectory; and
- OSi 50,000 mapping.

6.13.1.1 Energy Infrastructure

Power Generation

Great Island Power Station is located on the eastern shore of Waterford Harbour, approximately 4 km to the west of Campile, County Wexford. This is a 460 MW power station operated by SSE Thermal. It is fuelled by natural gas and was commissioned in 2015.

There are five operational onshore wind farms in Co. Waterford, with one onshore wind farm at the planning stage. At the time of writing, there are four solar farms with conditional planning permission in Co. Waterford[13].

Electricity Grid

A number of 220 kV overhead power lines extend from Great Island Power Station. One of these travels west, to the north of Waterford City to a OnSS in the townland of Cullenagh which lies to the west of the city. It extends as far as another OnSS in the townland of Knockraha, County Cork. Two 220 kV lines extend north-east from the power station. One of these extends in a more northerly direction to Kellis OnSS which lies approximately 5 km to the west of Tullow, County Carlow. The other takes a more north easterly path to a OnSS to the north of Arklow.

[13] https://www.eplanning.ie/WaterfordCCC/

A number of 110kV overhead electricity lines also cross the NCS Onshore AoI. These radiate from the Great Island Power Station to Dungarvan, Cahir, Kilkenny and Wexford – Enniscorthy – Gorey.

The wider area is well served by the electricity network as evidenced by the high voltage (HV) network described above and the generally dispersed nature of housing and businesses which are connected via the medium and low voltage networks, much of which follow local roads.

There are also two interconnectors planned for the area namely; Celtic Interconnector, making landfall at Claycastle Beach in Youghal and connecting the Irish and French electricity grids and the Greenlink Interconnector, from Pembroke Port in Wales connecting into Great Island OnSS in Wexford. In 2022, a Foreshore Licence was granted by the DHLGH, and a marine licence was granted by the MMO in the UK for the Celtic Interconnector. The Celtic Interconnector Project is now moving to construction phase, planned to commence in parts of east Cork in early 2023. The project is due to be completed in 2026. In 2022, civil engineering works began to install the 23 km of underground cable in roads and agricultural land along the onshore route of the Greenlink Interconnector. The Greenlink Interconnector is planned for commissioning in 2024.

Natural Gas Network

Two high pressure gas transmission pipelines serve the NCS Onshore AoI. Both of these are spur lines from the Cork – Dublin 70 bar gas transmission pipeline. One of these is the Clonmel – Waterford Pipeline which serves Waterford City. This is a 19 bar, 200 mm diameter pipeline which terminates to the south-west of Waterford City in the townland of Ballybeg. A four bar gas distribution network extends into the city from this point. The other gas transmission pipeline extends from a location just south of Kilkenny to the River Barrow where it splits to serve Belview Port to the south and Great Island power station to the east. It is a 70bar, 400 mm line. The line to Great Island was also recently extended to the outskirts of Wexford Town. A four bar gas distribution network extends from this point into the town.

Telecommunications

Eir owns and operates an extensive conventional land-based telephone network which uses copper wire. This extends throughout the region and is installed mainly on pole mounted overhead lines within the road network.

There is an extensive mobile network within the NCS Onshore AoI with good connectivity generally. The full extent of this network and the quality of service available will be determined at EIAR stage.

A number of telecommunications companies including Eir, ESB National Telecoms, BT Ireland/Iarnród Éireann and Aurora operate fibre optic cable networks within the area. These are typically installed adjacent to other major infrastructure including the road, gas and electricity networks.

Water / Wastewater Infrastructure

Water and wastewater infrastructure within the NCS Onshore AoI, including treatment facilities, pipeline networks and discharge pipelines/outfalls are mainly located in the urban settlements of Dungarvan, Stradbally, Tramore, Waterford City and Dunmore East. Smaller public water/wastewater schemes will also exist in some village communities. This public infrastructure is operated by the local authority/Uisce Éireann. As for any typical rural area, there will also be local water supply schemes, some of which will be privately owned and operated. Many homes and businesses in rural settings will also rely on septic tanks for wastewater treatment. All water and wastewater schemes are required to be registered with the local authority/ Uisce Éireann.

Transportation

Roads

The area is well served with a mixture of roads including motorways, national roads, regional roads and local roads. The N25 links Wexford City to Waterford City via New Ross. North of Waterford City is the M9 which links Waterford to Carlow and other towns such as Kilcullen and Newbridge. Connection with the Greater Dublin Area is via the M9/M7 motorway from Waterford City and the M11 from Wexford Town. In terms of other regional and local roads, the area is well served, and all areas are accessible.

Railways

Waterford City is served by railway connections to Limerick (via Tipperary) in the west and to Dublin (via Kilkenny and Carlow) to the north.

Cycleways

The Waterford Greenway runs for approximately 46 km from Dungarvan to Waterford City along a former railway line.

Quarries

There are 19 active quarries listed on the EPA's Extractive Industry Register for County Waterford, 12 of which are located within the Onshore AoI.

Airports

Waterford Airport is located within the NCS Onshore AoI and is located *c*. 22 km north of the NCS Offshore AoI. Waterford Airport does not currently support any passenger services, however, the airport is mainly used for private business aircrafts, leisure and training purposes. Further information on aviation is provided in **Section 5.10**.

6.13.2 Key Issues and Proposed Scope

Table 6.19 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to material assets.

Table 6.19: Material Assets Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Waterford County Council; and ▪ EPA.
Proposed Baseline Survey Work and Assessments	▪ Desktop assessment of material assets potentially affected by the Project. ▪ An assessment of direct and indirect impacts on material assets is required for the onshore elements of the Project. This will examine the potential for impacts of the construction and operation of the Project on services such as electricity, gas, telecommunications; roads & traffic; and use of natural resources. This assessment will refer to the EPA EIA guidelines and consider any relevant responses received during project consultation. Material assets can also include architectural and archaeological heritage, and the cultural heritage, however this will be captured separately in the Culture Heritage section. Waste management will be captured separately in the Waste section.
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Temporary or permanent severance of the following: – Property access; – Sewer; – Electrical cable; – Telecommunications cable; – Gas supply; and – Water supply.

Scope of EIAR Chapter	Summary
Technical Consultations	To ensure all potential issues are considered and assessed, the following wil be consulted: ▪ Waterford County Council ▪ Irish Rail ▪ EirGrid ▪ ESB ▪ Gas Networks Ireland ▪ Uisce Éireann ▪ EPA.
Relevant Standards and Guidance	See EIA guidance documents listed in **Section 4.1.4**.

6.14 Waste

6.14.1 Baseline Environment

6.14.1.1 Waste Management Infrastructure and Services in Waterford

The National Waste Collection Permit Office Holder (NWCPO) publishes[14] a register of facilities that lists 35 local authority authorised waste management facilities authorised by Waterford County Council (NWCPO, 2022). The range of materials that each service provider collects is defined by permit and include many that manage community waste disposal. Separately, the EPA lists[15] the following waste management facilities in County Waterford which provide a range of waste management services (**Table 6.20**).

Table 6.20: Waste Management Facilities Authorised by EPA in County Waterford.

Reg No.	Name, Location
W0018-01	Waterford City & County Council, Kilbarry Landfill Site, Kilbarry, Waterford City.
W0032-03	Waterford City & County Council, Dungarvan Waste Disposal Site, Ballynamuck Middle, Dungarvan, Waterford.
W0075-02	Waterford City & County Council, Tramore Waste Disposal Site, Tramore Intake & Tramore Burrows, Tramore, Waterford.
W0116-02 (IED)	Starrus Eco Holdings Limited, Starrus Eco Holdings Limited (Butlerstown), Six Crossroads, Carriganard, Butlerstown, Waterford.
W0177-03 (IED)	Starrus Eco Holdings Limited, Starrus Eco Holdings Limited (Waterford City), Carrignard, Six Crossroads, Business Park, Waterford City, Waterford.
W0187-01	Waterford City & County Council, Waste Management Facility, Garrynagree & Reanagullee Townlands, Dungarvan, Co Waterford, Waterford.
W0189-01	Waterford City & County Council, Waterford County Council Materials Recovery Facility, Shandon, Dungarvan, Waterford.
W0190-01	Bord Gáis Éireann, Waterford Gasworks, Waterside, Waterford.
W0212-01	Bord Na Móna Recycling Limited, Advanced Environmental Solutions (Ireland) Limited, Killowen, Portlaw, Waterford.
W0245-01	Molaisin Compost Limited, Kilmolash, Cappoquin, Waterford.
W0234-02	Waterford City & County Council, Waterford City Composting Facility, Green Road, Kilbarry, Six Crossroads Business Park, Waterford City, Waterford.

[14] http://facilityregister.nwcpo.ie/

[15] https://epawebapp.epa.ie/terminalfour/waste/waste-search.jsp?class=%25&status=%25&county=Waterford&Submit=Search+by+Combination

The NWCPO (2022) lists[16] waste collectors authorised to collect waste in County Waterford, including 34 that have an address in County Waterford, and many others with addresses outside County Waterford. The range of materials that each service provider collects is defined by permit and include many that manage community waste disposal.

6.14.2 Key Issues and Proposed Scope

Table 6.21 outlines the baseline data sources, initial evaluation of key issues, technical consultations and relevant guidelines for the assessment in relation to waste.

Table 6.21: Waste Key Issues and Proposed Scope.

Scope of EIAR Chapter	Summary
Baseline Data Sources	▪ Information provided by the design team on the predicted waste quantities and characterisations, *e.g.*, hazardous, or non-hazardous. ▪ Waterford County Council (hazardous areas, Seveso sites etc.) ▪ Southern Regional Waste Management Plan (to be replaced by a National Plan in early-2023) ▪ EPA (Section 22 Register of Historic Landfills)
Proposed Baseline Survey Work and Assessments	▪ A desktop survey of the existing licensed waste facilities that will be available to the Project will be undertaken. ▪ The scope of the evaluation will be based on a desktop review of legislation, historic landfill databases and guidance documents. ▪ Utilising the collated baseline data, and under the direction of the relevant guidance, the potential effects of the proposed project will be considered and assessed on waste.
Potential Impacts and Key Issues	The following is a summary of the issues that could arise from the Project during the construction, operational and maintenance and decommissioning phases, both from the Project alone and cumulatively with other projects/activities: ▪ Onshore and offshore waste generated from the construction and operational phases of the Project on materials and waste will be considered and assessed; ▪ The HDD/open cut trench crossings will generate a volume of waste materials that will be considered and assessed. ▪ The scope will consider the likelihood for significant impacts arising, having regard to the nature of the receiving environment and the nature and extent of the proposal.
Technical Consultations	▪ Waterford County Council Regional Waste Management Office
Relevant Standards and Guidance	▪ Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DECLG, 2006b) ▪ The Waste Management Act 1996 (as amended).

[16] www.nwcpo.ie/permitsearch.aspx

7 Informal Scoping Consultation

7.1 Consultation

Consultation is an essential part of the planning process and will continue throughout the EIA process. Furthermore, there will be continual efforts to keep the public updated on changes to project description and scoping as we progress through the process.

Pre-application consultation will take place with the CA[17], which in the case of this Project is An Bord Pleanála (ABP). Consultation will also be undertaken with the other statutory bodies, public and interest groups.

It should be noted that this consultation is about hearing and understanding the views of the CA, statutory bodies, members of the public and interest groups and is not about selling the Project. The consultation period will run for 6 weeks, which will provide sufficient time for consultees to respond to requests for views and information. It should be further noted that any views expressed at the scoping stage will not preclude the making of further comments and, possibly, objecting at a later stage in the EIA process (Guidance on EIA, Scoping, EC, June 2001).

All participants in scoping will be invited to comment on the Project design, on its potential environmental impacts and their mitigation, and on any alternatives which they consider should be investigated. Consultees are recognised by the Project Team as an invaluable source of local knowledge and it would be extremely useful to obtain any information they have on the local area, and on any special local issues.

The views expressed during the consultation will feed into the EIAR. This consultation with both ABP and others will provide an opportunity to:

- Identify concerns and measures about the Project and use these to inform the preparation of the EIAR;
- Incorporate mitigation measures where possible into the design of the Project in the early stages;
- Take into consideration the expertise and knowledge of local communities, experts and interest groups;
- Encourage participation in decisions yet to be made;
- Take into consideration concerns during the consultation process and, if required, make changes to the Project accordingly; and
- Ensure members of the community/public are fully informed with up to date information about all aspects of the development throughout the full duration of the Project.

This Scoping Report is intended to set out the proposed content (scope) of the EIAR. Scoping is an iterative process and this report will be subject to updating as the Project progresses.

This report provides information for a number of stakeholder streams as follows:

- In support of pre-application discussions; and
- Material to support consultation to a range of bodies to inform the scoping of the EIAR. In this early scoping stage, letters have been sent to a cross section of stakeholders, informing them of the Project and that this Scoping Report is available for comment. This consultation will form part of the wider Project

[17] CA are those entitled to authorise or give consent to a project. In the planning system, this means planning authorities and ABP. In the case of this project the CA will be ABP.

stakeholder consultation. This consultation through the various mediums, including information clinics, will continue throughout the EIA process.

A full list of proposed statutory bodies, prescribed bodies, including environmental interest groups and includes catch all listings for the general public, community associations and elected representative stakeholder is provided in **Table 7.1**.

Table 7.1: Proposed Schedule of Consultees.

Consultee List for the Project
An Taisce
Bat Conservation Ireland
Birdwatch Ireland
Bord Iascaigh Mhara (including local FLAG representatives)
Central Statistics Office
Chambers Ireland and Local Chambers of Commerce
Coastwatch Ireland
Commission for Railway Regulation
Commission for Regulation of Utilities
Commissioners of Irish Lights
Community Groups and Associations
Construction Industry Federation
Copper Coast UNESCO Global Geopark
Córas Iompair Éireann
Department of Agriculture, Food and The Marine
Department of Defence - Naval and Air Corps
Department of Housing, Local Government and Heritage
Department of the Environment, Climate and Communications
Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media
Department of Transport, Tourism & Sport
Diving Ireland
Dublin Airport Authority

Consultee List for the Project
Eastern & Midlands Climate Action Regional offices
EirGrid
Elected Representatives
Enterprise Ireland
Environmental Interest Groups
Environmental Protection Agency
ESB Networks
Fáilte Ireland
Fair Seas
Gas Networks Ireland
General Public
Geological Survey of Ireland
Health and Safety Authority
Health Service Executive
Heritage Council
Industrial Development Authority of Ireland
Inland Fisheries Ireland
Irish Aviation Authority
Irish Business and Employers Confederation
Irish Coastguard
Irish Federation of Sea Anglers
Irish Fish Producers Organisations
Irish Fishermen's Organisations
Irish Marine Federation
Irish Maritime Development Office
Irish Navy

Consultee List for the Project
Irish Rail
Irish Sailing Association
Irish Surfing Association
Irish Tourist Industry Confederation
Irish Trails
Irish Whale and Dolphin Group
Local Authority (where the area of the local authority might be affected by the development)
Local Port and Harbour Authorities
Maritime Area Regulatory Authority
Marine Institute
Marine Renewables Research Centre
Marine Survey Office
Minister for Agriculture, Food and The Marine
Minister for Business, Enterprise and Innovation
Minister for Culture, Heritage and The Gaeltacht
Minister for Defence
Minister for Environment, Climate and Communications
Minister for Housing, Local Government and Heritage
Minister for Housing, Planning and Local Government
Minister for Justice and Equality
Minister for Transport
Minister for Rural and Community Development
National Inshore Fisheries Forum
National Maritime College of Ireland
National Monuments Service
National Parks and Wildlife Service

Consultee List for the Project
National Transport Authority
Office of Public Works
Relevant regional assembly
Royal National Lifeboat Institution
Sea Angling Ireland
Sea Fisheries Protection Authority
South East Regional Inshore Fisheries Forum
Southern Regional Assembly
Sustainable Energy Authority Ireland (SEAI)
The Arts Council / An Chomhairle Ealaíon
The Heritage Council
Transport Infrastructure Ireland
Údarás na Gaeltachta
Uisce Éireann
Underwater Archaeology Unit
Waterford Airport Authority
Waterford County Council
Waterford Public Participation Network
Waterways Ireland
Wexford County Council
Wexford Public Participation Network

7.2 Next Steps

As part of the EIA scoping process, a consultation programme will be undertaken with the broad cross-section of stakeholders identified in **Table 7.1** above, ensuring that they have the required information on which to make their submissions. An email and postal address have been provided below to receive scoping consultation submissions. Stakeholders will then have six weeks to respond with their submissions.

All submissions made in relation to this Scoping Report will be considered in the preparation of the EIAR.

All scoping responses are to be sent to the details below:

RPS,

West Pier Business Campus,

Dun Laoghaire,

Co Dublin,

A96 N6T7

Email Address: NCSscopingreport@rpsgroup.com

Telephone: 01 488 2900

The contact details for the Developer are as follows:

North Celtic Sea Wind Limited.

c/o Energia Renewables

Mill House,

Ashtown Gate,

Navan Road,

Dublin,

D15 H70K.

8 References

ABPmer Ltd., Met Office and SeaRoc UK Ltd. (2008a). Guidelines for the Use of Metocean Data Through the Lifecycle of a Marine Renewables Development CIRIA C666.

ABPmer, Met Office and POL (2008b). Atlas of UK Marine Renewable Energy Resources: Atlas Pages. A Strategic Environmental Assessment Report.

Angling Ireland (2022). Sea Angling along the south-east Coast. Available at: https://fishinginireland.info/sea/south/

Band, B. (2012). Using a collision risk model to assess bird collision risks for offshore windfarms. Guidance document. SOSS Crown Estate.

Beiboer, F. and Cooper, B. (2002). Potential Effects of Offshore Wind Developments on Coastal Processes. Report by ABP Marine Environmental Research Ltd (ABPmer). Crown, pp. 127.

Berrow, S., J. O'Brien., Ryan, C., Bolin, V., O' Connor, I. (2010a). Inshore Cetacean Surveys for the Irish Sea. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Berrow, S., Whooley, P., O'Connell, Wall, D. (2010b). Irish Cetacean Review (2000-2009). Irish Whale and Dolphin Group, pp. 60.

Berrow, S., O'Bren, J., Ryan. C., McKeogh, E., O'Connor, I. (2011). Inshore Boat-based Surveys for Cetaceans – Irish Sea. Report to the National Parks and Wildlife Service. Irish Whale and Dolphin Group. pp. 24.

Bird Watch Ireland (BWI) (2022) Map of I-WeBS Sites. Available at: https://bwi.maps.arcgis.com/apps/View/index.html?appid=1043ba01fcb74c78bc75e306eda48d3a [Accessed September 2022].

Blyth-Skyrme, R.E. (2010). Options and opportunities for marine fisheries mitigation associated with wind farms. Final report for Collaborative Offshore Wind Research into the Environment contract FISHMITIG09. COWRIE Ltd, London.

Bonner, W.N. (1990). The natural history of seals. Facts on File Inc. New York.

Brooks, A.J, Bradley, S.L., Edwards, R.J., Goodwyn, N. (2011). The palaeogeography of Northwest Europe during the last 20,000 years. Journal of Maps, Brown and May Marine Limited. Site E3 – Preliminary Fisheries Risk Assessment, pp. 573-587.

Brooks, A.J., Whitehead, P.A., Lambkin, D.O. (2018). Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects. NRW Report No: 243, Natural Resources Wales, Cardiff, pp. 119.

BSG (2014). North Sea Ferries Bat Migration Research Report. Worton Park, Worton, Oxfordshire. [Available at: https://www.bsg-ecology.com/wp-content/uploads/2014/12/North-Sea-Ferry-Bat-Migration-Research-Report-2014.pdf, accessed February 2023].

Carroll, B., Cooper, B., Dewey, N., Whitehead, P., Dolphin, T., Rees, J., Judd, A., Whitehouse, R., and Harris, J. (2010). A further review of sediment monitoring data commissioned by Collaborative Offshore Wind Research into the Environment (COWRIE) LTD (project reference ScourSed 09).

CEFAS (2016). Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme.

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland. Chartered Institute of Ecology and Environmental Management.

CIEEM (2019). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2.

CIRIA (2007). The SuDs Manual C697.Available at: Advanced Technovation Ltd - The SUDS manual (C697) (adv-technovation.com) [Accessed September 2022].

CAP (2021). Securing our Future. Department of Communications, Climate Action & Environment, Ireland. Available at: gov.ie-Climate Action Plan 2021 (www.gov.ie) [Accessed 08 December 2022].

Collins, J. (ed.) (2016). Bat surveys for Professional Ecologists: Good Practice Guidelines (3rd ed). The Bat Conservation Trust, London ISBN-13 978-1-872745-96-1.

Cook, J., McCarthy, A., Holloway, S., Oliver, G. (2008). Survey Guidance for Assessing Bat Activity at Proposed On-shore Wind Farms. In Practice, 62, pp. 24-27.

Coughlan C. and Stips, A. (2015). Modelling the tides on the North West European Shelf. EUR 27114. Luxembourg (Luxembourg): Publications Office of the EU.

Coughlan, M., Wheeler, A.J., Dorschel, B., Long, M., Doherty, P., Morz, T. (2019) Stratigraphic model of the Quaternary sediments of the Western Irish Sea Mud Belt from core, geotechnical and acoustic data, Geo-Marine Letters.

Coull, K. A., Johnstone, R., Rogers, S. I. (1998). Fishery sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd. Available at: http://cefas.defra.gov.uk/media/29947/sensi_maps.pdf [Accessed September 2022].

Council of Europe (1985). Convention for the Protection of the Architectural Heritage of Europe (ratified by Ireland 1997), 'Granada Convention'.

Council of Europe (1992). European Convention on the Protection of the Archaeological Heritage (ratified by Ireland 1992), 'Valetta Convention'.

Council of Europe (2005). Framework Convention on the Value of Cultural Heritage for Society, 'Faro Convention'. Council of Euope Treaty Series- No. 199.

Courtney Deery for EirGrid (2015). Cultural Heritage Guidelines for Electricity Transmission Projects. A Standard Approach to Archaeological, Architectural and Cultural Heritage Impact Assessment of High Voltage Transmission Projects. [Available at: https://www.eirgridgroup.com/site-files/library/EirGrid/Cultural-Heritage-Guidance-for-Electricity-Transmission-Projects.pdf, accessed 02 February 2023]

Cronin, M., Duck, C., Ó Cadhla, O., Nairn, R., Strong, D., O'Keeffe, C. (2004). Harbour seal population assessment in the Republic of Ireland: August 2003. Irish Wildlife Manuals No. 11. National Parks & Wildlife Service, Department of Environment, Heritage and Local Government., 7 Ely Place, Dublin 2, Ireland.

Cronin, M., McGovern, E., McMahon, T and Boelens, R. (2006) Guidelines for the Assessment of Dredge material for Disposal in Irish Waters. Marine Environment and Health Series, No 24, 2006. Marine Institute, Galway.

CSO (2016a). Census Mapping. Available at: https://visual.cso.ie/?body=entity/ima/cop/2016&boundary=C03849V04599&guid=2ae19629-149e-13a3-e055-000000000001 [Accessed September 2022].

CSO (2016b). Census 2016 – Profile 3 – An Age Profile of Ireland / E3005-Population 2016. Available at: https://data.cso.ie/table/E3005 [Accessed September 2022].

CSO (2016c). Measuring Ireland's progress 2016. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-mip/mip2016/hh/ [Accessed September 2022].

CSO (2016d). Census 2016 - Means of Travel to Work. Available at: Means of Travel to Work - CSO - Central Statistics Office [Accessed September 2022].

CSO (2020a). Irish Life Tables 2015-2017. Available at: https://www.cso.ie/en/releasesandpublications/er/ilt/irishlifetablesno172015-2017/ [Accessed September.2022].

CSO (2020b). Census of Agriculture 2020 – Preliminary Results. Available at: Farm Structure - CSO - Central Statistics Office [Accessed September 2022].

DAFM (2018). DRAFT Plan for Forests & Freshwater Pearl Mussel in Ireland Consultation Document. Available at: https://assets.gov.ie/DRAFT Plan for Forests & Freshwater Pearl Mussel In Ireland. Accessed 09 December 2022.

DAHG (2011). Architectural Heritage Protection Guidelines for Planning Authorities. Stationary Office, Dublin.

DAHG (2014). Guidance to Manage the Risk to Marine Mammals from man-made Sounds Sources in Irish Waters. Department of Arts, Heritage and the Gaeltacht. Available at: https://www.npws.ie/sites/default/files/general/Underwater%20sound%20guidance_Jan%202014.pdf

DAHG (2015). National Landscape Strategy for Ireland 2015-2025. Stationary Office, Dublin.

Davies, J., Baxter, J., Bradley, M., Connor, D., Khan, J., Murray, E., Sanderson, W., Turnbull, C. and Vincent, M. (2001). Marine Monitoring Handbook March 2001. UK Marine SACs Project.

DCCAE (2017). Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects. Department of Communications, Climate Action and Environment, Ireland.

DCCAE (2018). Guidance on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects.

DECC (2022a). Sectoral Emissions Ceilings (September 2022). Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/234926/2ebb2431-d558-4a54-a15c-605817c37b2f.pdf#page=null

DECC (2022b). Carbon Budgets. Available at: https://assets.gov.ie/222805/697ec730-a09f-4216-a54a-6a5cd0b358df.pdf Accessed: 10/02/23.

DECC (2023). Accelerating Ireland's Offshore Energy Programme – Policy Statement on the Framework for Phase Two Offshore Wind. March 2023.

DECLG (2006a). Wind Energy Development Guidelines [Currently updated].

DECLG (2006b). Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.

DEHLG (2009a), The Planning System and Flood Risk Management Guidelines for Planning Authorities. Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin 2.

DEHLG (2009b). Conservation plan for cetaceans in Irish waters. Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin 2, pp. 97.

DEHLG (2010a). AA of Plans and Projects in Ireland. Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government, Dublin.

DEHLG (2010b). Department of Environment Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities.

DAHG and Islands (1999). Frameworks and Principles for the Protection of the Archaeological Heritage. Stationary Office, Dublin.

Department of Trade and Industry, UK (1996). The Assessment and Rating of Noise from Wind Farms (ETSU-R-97).

Diamond, J. and Sills, P. (2011). Soils of Co. Waterford. National Soil Survey of Ireland. Soil Survey Bulletin No.44.

Diving Ireland (2021). South-East Region. Available at: https://diving.ie/dive-sites/. [Accessed September 2022].

DMRB (2020). LA 104 Environmental assessment and monitoring. Sustainbility and environment appraisal. Available at: https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true Accessed: 13/02/23.

EA UK (2020). Land Contamination Risk Management (LCRM). Available at: Land contamination risk management (LCRM) - GOV.UK (www.gov.uk) [Accessed September 2022].

EC (2000). Communication from the Commission on the Precautionary Principle, Office for Official Publications of the European Communities, Luxembourg

EC (2007). Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission.

EC (2009). Estuaries and Coastal Zones within the Context of the Birds and Habitats Directives – Technical Supporting Document on their Dual Roles as Natura 2000 Sites and as Waterways and Locations for Ports. European Commission.

EC (2011a). Guidance document on the implementation of the Birds and Habitats Directive in estuaries and coastal zones with particular attention to port development and dredging. European Commission.

EC (2011b). European Commission Staff Working Document ‘Integrating biodiversity and nature protection into port development’.

EC (2013). Interpretation Manual of EU Habitats. Version EUR 28. European Commission.

EC (2014). The EU EIA Directive. Available at: https://environment.ec.europa.eu/law-and-governance/environmental-assessments/environmental-impact-assessment_environmental impact assessment (europa.eu).

EC (2017a). Guidance on EIA Scoping. Directive 2011/92/EU as amended by 2014/52/EU), Publications Office. Available at: https://data.europa.eu/doi/10.2779/286012 [Accessed September 2022].

EC (2017b). Guidance on EIA Report. Directive 2011/92/EU as amended by 2014/52/EU), Publications Office. Available at: Environmental Impact Assessment - Environment - European Commission (europa.eu) [Accessed September 2022].

EC (2018). European Commission Notice “Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC”, Office for Official Publications of the European Communities, Luxembourg.

EC (2021a) Commission Notice. Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC European Commission

EC (2021b). European Climate Law. Available at: European Climate Law (europa.eu) [Accessed September 2022].

EirGrid (2017). EMF & You - Information about Electric & Magnetic Fields and the Electricity Transmission System in Ireland.

EirGrid (2019). Celtic Interconnector Offshore Constraints Report. Available at: https://www.eirgridgroup.com/site-files/library/EirGrid/Celtic-Interconnector-Project-Step-3-Offshore-Constraints-Report.pdf [Accessed October 2022].

Ellis, J.R., Cruz-Martínez, A., Rackham, B.D., Rogers, S.I. (2004). The Distribution of Chondrichthyan Fishes Around the British Isles and Implications for Conservation, Journal of Northwest Atlantic Fishery Science, 35, pp. 195-213.

Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N., Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Science Series Technical Report, CEFAS, Lowestoft, 147, pp. 56.

EMODnet (2022). Submerged Prehistoric Archaeology and Landscapes. Available at: https://www.emodnet-humanactivities.eu/view-data.php [Accessed September 2022].

EPA (2013). Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. Available at: Guidance_on_the_Management_of_Contaminated_Land_and_Groundwater_at_EPA_Licensed_Sites.pdf [Accessed September 2022].

EPA (2015). Integrating Climate Change into Strategic Environmental Assessment in Ireland – A Guidance Note

EPA (2021). Ireland's Air Pollutant Emissions 2019 (1990-2030). Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-air-pollutant-emissions-2019-1990-2030.php [Accessed September 2022].

EPA (2022a). Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency, County Wexford Ireland. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf Accessed December 2022.

EPA (2022b). EPA Mapping. Available at: EPA Maps [Accessed September 2022].

EPA (2022c). Irelands Provisional Greenhouse Gas Emissions Report, 1990-2021.

EPA (2022d). Ireland’s Greenhouse Gas Emissions Projections, 2020-2040. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/EPA-Irelands-Greenhouse-Gas-Emissions-Projections-report-2020-2040v2.pdf [Accessed September 2022].

EU Commission (2007). The EU Floods Directive. Available at: https://ec.europa.eu/environment/water/flood_risk/. Accessed 09 December 2022.

EU Commission (2020). Guidance document on wind energy developments and EU nature legislation. Available at: https://ec.europa.eu/environment/nature/natura2000/management/docs/wind_farms_en.pdf Accessed 08 December 2022.

EuroBats (2014). Guidelines for the Consideration of Bats in Wind Farm Projects. - Revision 2014. Publication Series no.6.

EC (2000). Communication from the Commission on the Precautionary Principle., Office for Official Publications of the European Communities, Luxembourg.

Fáilte Ireland (2011). Guidelines on the Treatment of Tourism in an Environmental Impact Statement. Available at: Operational Guidelines | Business Supports | Fáilte Ireland (failteireland.ie) [Accessed September 2022].

Fossitt, J. (2000). A guide to habitats In Ireland. The Heritage Council, Ireland.

Furness, R.W. (2015). Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, Number 164.

Furness, R.W., Wade, H. (2013). Vulnerability of Scottish seabirds to offshore wind turbines. Unpublished report to The Scottish Government, MacArthur Green Ltd, Glasgow.

Gallagher, T., O'Gorman, N.M., Rooney, S.M., Coghlan, B., King, J.J. (2017). National Programme: Habitats Directive and Red Data Book Species Summary Report 2017. Inland Fisheries Ireland, 3044 Lake Drive, Citywest, Dublin 24, Ireland.

Gavin and Doherty Geosolutions (GDG) (2019). Waterford Offshore Wind Farm Site – Geophysical and Geotechnical Interpretation. Document reference: 19042-001-01. Dublin.

GCB (2016). Publicly Available Specification (PAS) 2080. Carbon Management in Infrastructure.

Gerritsen, H.D. and Kelly, E. (2019). Atlas of Commercial Fisheries around Ireland, third edition. Marine Institute, Ireland.

Gibbons, D.W., Reid, J.W.,Chapman, A. (1993). The New Atlas of Breeding Birds in Britain and Ireland.

Gibin, M., Zanzi, A., Hekim, Z. (2021) Fisheries landings & effort: data by c-square. European Commission, Joint Research Centre (JRC) [Dataset] Available at: http://data.europa.eu/89h/00ae6659-ddde-4314-a9da-717bb2e82582 [Accessed September 2022].

Gilbert, G., Stanbury, A., Lewis, L. (2021). Birds of Conservation Concern in Ireland 2020-2026, BirdWatch Ireland.

Government of Ireland (2012). Harnessing Our Ocean Wealth (HOOW) - An Integrated Marine Plan for Ireland.

Government of Ireland (2021). Ireland's Climate Action Plan 2021. Available at: gov.ie - Climate Action Plan 2021 (www.gov.ie) [Accessed September 2022].

GSI (2022). Geological Survey Ireland Spatial Resources. Available at: https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 [Accessed September 2022].

GSI (2018). Scour Potential Evaluation of the Western Irish Sea Mud Belt, pp. 79.

GSI (2021). Groundwater Vulnerability. Available at: https://data.gov.ie/dataset/groundwater-vulnerability-140000-ireland-roi-itm Accessed 09 December 2022.

Hamer, K.C., Phillips, R.A., Hill, J.K., Wanless, S. and Wood, A.G. (2001). Contrasting foraging strategies of gannets Morus bassanus at two North Atlantic colonies: foraging trip duration and foraging area fidelity. Marine Ecology Progess Series,, 224, pp. 283-290.

Hayes J.P. (1997). Temporal variation in activity of bats and the design of echolocation- monitoring studies. Journal of Mammalogy, 78, pp. 514-524.

Highways Agency (2001). Design Manual for Roads and Bridges (DMRB) Section Volume 11, Section 3, Part 6 'Land Use' for the assessment of effects on land use assets.

Highways Agency (2008). Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5, HA 205/08 with respect to overarching assessment principles.

Highways Agency (2021) Design Manual for Roads and Bridges (DMRB), Sustainability & Environment Appraisal, LA 104, Environmental Assessment and Monitoring

Historic England (2015). Historic Environment Good Practice Advice in Planning, Note 3: The Setting of Heritage Assets. Available at: https://www.waterfordmuseum.ie/exhibit/web/Display/article/362/ [Accessed September 2022].

ICES (2022). Available at: https://www.ices.dk/advice/ESD/Pages/Celtic-Seas_State_Benthos.aspx [Accessed September 2022].

ICNIRP (1998). Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHZ).

ICOMOS (1999). International Cultural Tourism Charter. Available at: International Cultural Tourism Charter - International Council on Monuments and Sites (icomos.org) [Accessed September 2022].

ICOMOS (2005). Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005. Available at: Microsoft Word - A- xian05 051021 declaration final.doc (icomos.org) [Accessed September 20222].

ICOMOS (2011). Guidance on Heritage Impact Assessments for Cultural World Heritage Properties. A publication of the International Council on Monuments and Sites. World Heritage Centre.

IEMA (2017). Health in Environmental Impact Assessment: A Primer for a Proportionate Approach. 10.13140/RG.2.2.22254.20801.

IEMA (2020). EIA Guide to Climate Change and Resilience and Adaptation. Available at: https://www.iema.net/download-document/237186

IEMA (2022a) IEMA Guide: Effective scoping for Human Health in Environmental Impact Assessment. [IN PRESS].

IEMA (2022b) IEMA Guide: Determining Significance for Human Health in Environmental Impact Assessment. [IN PRESS].

IEMA (2022c). Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition.

IFC (2013). Good Practice Handbook: Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets. Available at: https://www.ifc.org/wps/wcm/connect/58fb524c-3f82-462b-918f-0ca1af135334/IFC_GoodPracticeHandbook_CumulativeImpactAssessment.pdf?MOD=AJPERES&CVID=kbnYgI5 Accessed: 05/01/2023

INFOMAR (2022). Interactive Seabed Map. Available at: https://www.infomar.ie/maps/interactive-maps/seabed-and-sediment [Accessed September 2022].

INFOMAR (2023). Bathymetry. Available at: https://maps.marine.ie/infomarbathymetry/

IAQM (2014). Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management.

Institute of Archaeologists of Ireland (2006). IAI Code of Conduct for Archaeological Assessment Excavations. Available at: Microsoft Word - IAI Codes of Conduct Archaeological Assessment Excavation [Accessed September 2022].

Institutes of Geology Ireland (IGI) (2013). Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. Available at: IGI guidelines on Environmental Impact Assessment Reports (gsi.ie) [Accessed September 2022].

ICPC (2021). ICPC Recommendations. Available at: ICPC Recommendations (iscpc.org). [Accessed September 2022].

IPH (2021). Health Impact Assessment Guidance: A Manual and Technical Guidance. Standalone Health Impact Assessment and health in environmental assessment. Institute of Public Health. Dublin and Belfast.

Ireland's Marine Atlas (2022). Ireland's Marine Atlas [online]. Available at: Ireland's Marine Atlas [September 2022].

IUCN (2003) Guidelines for Application of IUCN Red List Criteria at Regional Levels: Version 3.0. IUCN Species Survival Commission. IUCN, Gland, Switzerland & Cambridge, UK

IWDG (2022). Minke Whale, Available at: Minke Whale | Irish Whale and Dolphin Group (iwdg.ie) [Accessed September 2022].

JNCC (2018). Monitoring guidance for marine benthic habitats. Available at: data.jncc.gov.uk- Monitoring guidance for marine benthic habitats. Accessed 08 December 2022.

Jones, E.L., McConnell, B.J., Smout, S., Hammond, P.S., Duck, C.D., Morris, C.D., Thompson, D., Russell, D.J.F., Vincent, C., Cronin, M., Sharples, R.J., Matthiopoulos, J. (2015). Patterns of Space Use in Sympatric Marine Colonial Predators Reveal Scales of Spatial Partitioning. Marine Ecology Progress Series, 534, pp. 235–249.

Kelleher, C. & Marnell, F. (2006). Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.

Kiely, O., Lidgard, D.C., McKibben, M., Baines, M.E., Connolly, N. (2000). Grey Seals: Status & Monitoring in the Irish & Celtic Seas. Maritime Ireland/Wales INTERREG report No. 3. Marine Institute, 80 Harcourt St., Dublin.

King, G.L. & Berrow, S.D. (2009) Marine turtles in Irish waters. Special Supplement to the Irish Naturalists' Journal. Vol. 30, Special Zoological Supplement: Marine turtles in Irish waters (2009), pp. 1-30.

King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Landscape Institute and Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. 3rd edition. Routledge. ("GLVIA3"). Lordan, C. and Gerritsen, H. (2009). Marine Institute. Working Document on the Assessment of the "Irish Box" in the context of the Western Waters Regime. Working paper prepared for ICES Advisory Committee.

Lundy, M.G., Aughney, T., Montgomery, W.I., Roche, N., (2011). Landscape conservation for Irish bats & species specific roosting characteristics. Bat Conservation Ireland.

Maritime Ireland (2001). Guide to Best Practice in Seascape Assessment. Maritime Ireland/Wales INTERREG Report, Marine Institute.

MarLIN (2022). Marine biodiversity and conservation – species list. Available at: https://www.marlin.ac.uk/biodiversity_conservation][Accessed September 2022].

Marnell, F., Kelleher, C., Mullen, E. (2022). Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

McGregor, R., King, S., Donovan, C., Caneco, B., Webb, A. (2018). A Stochastic Collision Risk Model for Seabirds in Flight (Report No. HC0010-400-001). Report by Marine Scotland Science.

MI (2019). Addendum to 2006 Guidelines for the Assessment of Dredged material in Irish Waters (Cronin *et al.*) Marine Institute, Galway.

MI (2020). VMA and Catch Reporting for the Inshore Fleet in Ireland. Fisheries Ecosystems Advisory Service. Available at: https://inshoreforums.ie/wp-content/uploads/2021/01/Inshore-VMS-Pilot-Project_Marine-Institute.pdf . Accessed 09/02/23.

MI (2022). Marine Data Centre. Available at: Marine Data Centre | Marine Institute [Accessed September 2022].

Ministry of Agriculture, Fisheries and Food (MAFF) (1988). Agricultural Land Classification of England and Wales: Revised Criteria for grading the quality of Agricultural Land (ALC011). Natural England.

Moorkens, E.A. & Killeen, I.J. (2020) Monitoring Populations of the Freshwater Pearl Mussel, *Margaritifera margaritifera,* Stage 3 and Stage 4 Survey. Irish Wildlife Manuals, No. 122. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Morris, C.D. and Duck, C.D. (2019). Aerial thermal-imaging survey of seals in Ireland, 2017 to 2018. Irish Wildlife Manuals, No. 111 National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

NBDC (2022). Biodiversity Maps: Seabird 2000. Available at: https://maps.biodiversityireland.ie/Map/Marine/Dataset/145 [accessed September 2022].

NECP (2018). Draft National Energy & Climate Plan (NECP) 2021-2030. Availabe at: https://assets.gov.ie/77391/05ae14cb-4c23-46fb-8dfd-ab54c8a17a8c.pdf Accessed 13/02/2023.

NG4 (2016). EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities

NIRAS (2015). Subsea Cable Interactions with the Marine Environment, Renewables Grid Initiative, pp.58.

NMFS (2018). Guidelines for Noise Assessment for Marine Mammals. NOAA Fisheries.

NMS (2018). Wreck Viewer. Available at: https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=89e50518e5f4437abfa6284ff39fd640 [Accessed September 2022].

NMS (2022). Ireland's diverse underwater cultural heritage. Available at: https://www.archaeology.ie/underwater-archaeology [Accessed September 2022].

NPWS (2004) *Margaritifera margaritifera*. Stage 1 and Stage 2 survey guidelines. Irish Wildlife Manuals, No. 12. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

NPWS (2008). The Status of EU Protected Habitats and Species in Ireland: unpublished report. National Parks and Wildlife Service.

NPWS (2011) Conservation Objectives: Hook Head SAC 000764. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012). Marine Natura Impact Statements in Irish Special Areas of Conservation: A working document, National Parks and Wildlife Service, Dublin.

NPWS (2013). Tramore Dunes and Backstrand SAC. Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000671.pdf [Accessed September 2022].

NPWS (2014). Site Synopsis: Hook Head SAC. Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000764.pdf [Accessed September 2022].

NPWS (2015a). Site synopsis Mid-Waterford Coast SPA. Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004193.pdf [Accessed September 2022]

NPWS (2015b). Site synopsis Helvick Head to Ballyquin SPA. Available at: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004192.pdf [Accessed October 2022]

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.

NPWS (2022) Conservation objectives for Mid-Waterford Coast SPA [004193]. First Order Site-specific Conservation Objectives Version 1.0. Department of Housing, Local Government and Heritage.

NRA (2003). Guide to Process and Code of Practice for National Road Project Planning and Acquisition of Property for National Roads.

NRA (2004a). Guidelines for the Crossing of Watercourses during Construction of National Road Schemes. National Roads Authority.

NRA (2004b). Guidelines for the Treatment of Noise and Vibration in National Road Schemes. National Road Authority, Revision 1.

NRA (2005). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes, National Roads Authority.

NRA (2005 – 2011). Environmental Planning and Construction Guidelines Series. National Roads Authority.

NRA (2006). Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes, National Roads Authority.

NRA (2008a). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority.

NRA (2008b). Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. National Roads Authority.

NRA (2009). Guidelines for Assessment of Ecological Impacts of National Roads Schemes. National Roads Authority.

NRA (2011). Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes. National Roads Authority.

NWCPO (2022). Local Authority Waste Facility Register. Available at: National Waste Collection Permit Office Home (nwcpo.ie) [Accessed September 2022].

Oceanwise (2022). Cables and Pipelines purchased through Emapsite. Available at; https://www.oceanwise.eu/ [Accessed September 2022].

OPW (2019). Climate Change Sectoral Adaptation Plan, Flood Risk Management. Climate Change Sectoral Adaptation Plan Prepared under the National Adaptation Framework.

OPW (2022). Managing Flood Risk in Ireland Summary Leaflet. Available at: https://assets.gov.ie/Managing Flood Risk in Ireland. Assessed 09 December 2022.

ORCA Ireland (2019). Available at: www.orcaireland.org. [Accessed September 2022].

OWC (2021). Workability Assessment for Geophysical and Geotechnical Surveys. Offshore Wind Consultants Ltd, United Kingdom.

Padget, O., Stanley, G., Willis, J.K., Fayet, A.L., Bond, S., Maurice, L., Shoji, A., Dean, B., Kirk, H., Juarez-Martinez, I., Freeman, R., Bolton, M., Guilford, T. (2019). Shearwaters know the direction and distance home but fail to encode intervening obstacles after free-ranging foraging trips. PNAS, 116(43), pp. 629–633.

Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, D.A., Bartol, S., Carlson, T.J., Coombs, S., Ellison, W.T., Gentry, R.L., Halvorsen, M.B., Løkkeborg, S., Rogers, P.H., Southall, B.L., Zeddies, D.G., Tavolga, W.N. (2014). Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI.

Pye, K., Blott, S.J., Brown, J. (2017). Advice to Inform Development of Guidance on Marine, Coastal & Estuarine Physical Processes Numerical Modelling Assessments. NRW Report No 208, Natural Resources Wales, Cardiff, pp. 139.

Reid, J. B., Evans, P. G., Northridge, S. P. (2003). Atlas of cetacean distribution in north-west European waters. Joint Nature Conservation Committee.

Rodrigues, Luisa & Bach, Lothar & Dubourg-Savage, Marie-Jo & Karapandža, Branko & Rnjak, Dina & Kervyn, Thierry & Dekker, Jasja & Kepel, Andrzej & Bach, Petra & Collins,, J. & Harbusch,, C. & Park, Kirsty & Micevski, Branko & Minderman, J.. (2015). Guidelines for consideration of bats in wind farm projects Revision 2014.

Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S., Jessopp, M. (2018). Aerial Surveys of Cetaceans and Seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017. DCCAE and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, pp. 297.

Russell, D.J.F., Jones, E.L., Morris, C.D. (2017). Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals. Scottish Marine and Freshwater Science, 8(25), pp. 25.

SCOS (2021). Scientific Advice on Matters Related to the Management of Seal Populations: 2021. Natural Environment Research Council Special Committee on Seas.

SEAI (2010). Strategic Environmental Assessment (SEA) of the OREDP in the Republic of Ireland.

Searle, K., Mobbs, D., Daunt, F., Butler, A. (2019). A Population Viability Analysis Modelling Tool for Seabird Species. Centre for Ecology & Hydrology report for Natural England. Natural England Commissioned Report NECR274.

Smith, G.F., O'Donoghue, P., O'Hora, K., Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council.

SNH (2017). Siting and designing wind farms in the landscape. Version 3.

SNH (2018). Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs

Southall, B., Finneran, J., Reichmuth, C., Nachtigall, P., Ketten, D., Bowles, A., Ellison, W., Nowacek, D., Tyack, P. (2019), Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for residual hearing effects, Aquatic Mammals, 45(2), pp. 125-232.

Stauss, C., Bearhop, S., Bodey, T.W., Garthe, S., Gunn, C., Grecian, W.J., Inger, R., Knight, M.E., Newton, J., Patrick, S.C., Phillips, R.A., Waggitt, J.J., Votier, S.C. (2012). Sex-specific foraging behaviour in northern gannets Morus bassanus: incidence and implications. Marine Ecology Progress Series, 457, pp.151–162.

STECF (2023). Scientific, Technical and Economic Committee for Fisheries (STECF) – Fisheries Dependent Information FDI (STECF-22-10). Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/154294, JRC132080.

The Heritage Council (2010). Proposals for Ireland's Landscapes. An Chomhairle Oidhreachat/ The Heritage Council.

The Heritage Council (2013). Historic Landscape Characterisation in Ireland: Best Practice Guidance. An Chomhairle Oidhreachat/ The Heritage Council.

TII (2014). Traffic and Transport Assessment Guidelines. National Roads Authority. Available at: PE-PDV-02045 (tiipublications.ie) [Accessed September 2022].

TII (2018). Area Based Transport Assessment (ABTA) Guidance Notes. Available at: https://www.tiipublications.ie/library/PE-PDV-02046-01.pdf Accessed 12 December 2022.

Trodd, W. and O'Boyle, S. (2020). WATER QUALITY IN 2020: An Indicators Report. Environmental Protection Agency.

UKFEN (2013) Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments. Guidelines based on outputs from a technical workshop organised by the UK Fisheries Economics Network.

UKHO (2022). Global Wrecks and Obstructions. Available at: https://datahub.admiralty.co.uk/portal/apps/sites/#/marine-data-portal/items/b4fde7a1eea74227a126f126bbfdf8b0 [Accessed September 2022].

Waggitt, J.J., Evans, P.G.H, Andrade, J., Banks, A.N., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C.J., Durinck, J., Felce, T., Fijn, R.C., García-Barón, I., Garthe, S., Geelhoed, S.C.V., Gilles, A., Goodall, M., Haelters, J., Hamilton, S., Hiddink, J.. (2019). Distribution maps of cetacean and seabird populations in the North-East Atlantic. Journal of Applied Ecology. 57. 253-269. 10.1111/1365-2664.13525.

Wall, D., Murray, Cl., O'Brien, J., Kavanagh, L., Wilson, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P., Berrow, S., Ryan, C., O'Brien, M., O'Connor, I. (2013). Atlas of the Distribution and Relative Abundance of Marine Mammals in Irish Offshore Waters: 2005-2011. Irish Whale and Dolphin Group, Merchants Quay, Kilrush, Co. Clare.

Waterford City and County Council (WCC) (2022). River Suir Sustainable Transport Bridge Environmental Impact Assessment Report. Chapter 14 archaeological and cultural heritage. Available at: https://waterfordcouncil.ie/media/projects/public-consultations/sustainable-transport-bridge-EIA/River%20Suir%20Sustainable%20Transport%20Bridge%20Vol%202%20Main%20Text/Vol%202%20Chapter%2014.pdf [Accessed September 2022].

Waterford County Museum (2014). Waterford Geology and Prehistoric Dungarvan. Available at: Waterford Geology - Waterford Geology and Prehistoric Dungarvan - Waterford County Museum (waterfordmuseum.ie) [Accessed September 2022].

Westley, K. and Woodman, P. (2020). Ireland: Submerged Prehistoric Sites and Landscapes. In: Bailey, G., Galanidou, N., Peeters, H., Jöns, H., Mennenga, M. (eds) The Archaeology of Europe's Drowned Landscapes. Coastal Research Library,35. Springer, Cham.

WHO (1999). Guidelines for community noise. Occupational and Environmental Health Team https://apps.who.int/iris/handle/10665/66217

WHO (2021). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. World Health Organization. https://apps.who.int/iris/handle/10665/345329. License: CC BY-NC-SA 3.0 IGOWHO Europe (2009). Night Noise Guidelines for Europe.

WHO Europe (2018). Environmental Noise Guidelines for the European Region. World Health Organization. Regional Office for Europe.

Woodward I., Thaxter, C.B., Owen, E. and Cook, A.S.C.P. (2019). Desk-based revision of seabird foraging ranges used for HRA screening. BTO Research Report No. 724.

Worsfold, T.M., Hall, D.J. & O'Reilly, M. (Ed.). 2010. Guidelines for processing marine macrobenthic invertebrate samples: a Processing Requirements Protocol: Version 1.0, June 2010. Unicomarine Report NMBAQCMbPRP to the NMBAQC Committee. 33pp.

Wyn, G., Brazier, P., Birch, K., Bunker, A., Cooke, A., Jones, M., Lough, N., McMath, A. & Roberts, S. (2000). Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey. Countryside Council for Wales.

Zvelebil, M., Macklin, M.G., Passmore, D.G., Ramsden, P. (1996). "Alluvial archaeology in the Barrow Valley, Southeast Ireland: The" Riverford Culture" revisited.", The Journal of Irish Archaeology, pp. 13-40.

Appendix A
Recorded Wrecks and Losses within the Project AoI

Wrecks within the Project AoI (NMS, 2018, UKHO, 2022).

Wreck ID (NMS/UKHO)	Name	Latitude	Longitude	Date Sunk	Description
11602/W04904	*SS Feltria*	51.96228	-7.31192	05/05/1917	British merchant ship on route from New York to Avonmouth when it was torpedoed and sunk by the German submarine UC-48 in 1917.
W11452/11596	Unknown	51.9525	-7.39917	-	-
W18569/11633	Unknown	51.95013	-7.21533	-	Intact, collapsed, high point and scour at se end. Wreck surveyed by the GSI in 2001 as part of the Irish national seabed survey. Wreck measures 110 m long, 21 m in maximum width and lies in 64m of water. GSI wreck no_217.
11634	Unknown	51.93939	-7.20788	-	Collapsed in centre, bows WSW.
W10814/11594	Unknown	51.95	-7.175	-	-
W11172/74286	Unknown	52.08217	-7.35873	-	Intact
9707	-	52.04767	-7.11177	-	Group of high points with scour.
W09941/9839	*SS Patrick*	52.15033	-6.9175	1880	A British paddle steamer which ran aground and was wrecked in 1880.
79862	*Coral Strand*	52.16483	-6.90267	-	A modern fishing trawler which ran aground in Waterford Harbour in 2013.
W05169/UKHO9713	*HMS Seahorse*	52.131692	-7.167475	1816	This 350-ton British transport ship was built in 1784. She was enroute from Ramsgate to Cork with 5 companies of the 2nd or 59th regiment and soldiers' wives and children (394 in total). She was in convoy with the Boadicea and Lord Melville, foundered in Tramore bay in 1816.

Recorded Shipwreck Losses within the Project AoI (NMS, 2018, UKHO, 2022).

Wreck ID (NMS/UKHO)	Name	Latitude	Longitude	Date Sunk
W03294	*SS Castlehill*	51.95978	-7.3218	02/05/1941
W09947	*MFV Pere Charles*	52.03145	-7.2851	10/01/2007
W10801	Unknown	51.91583	-7.43055	-
W10803	Unknown	51.9225	-7.45722	-
W10809	Unknown	51.93862	-7.45333	-
W11624	Unknown	51.93939	-7.20788	-
W10811	Unknown	51.94695	-7.18528	-
W10819	Unknown	51.96028	-7.18612	-
W10820	Unknown	51.96417	-7.41695	-
W10821	Unknown	51.965	-7.25222	-
W09562	Unknown	51.99948	-7.1231	29/08/1917
69722	-	52 1.886 N	7 17.106 W	-
W10607	Unknown	52.00362	-7.39138	-
W10815	Unknown	51.95138	-7.36555	-

Wreck ID (NMS/UKHO)	Name	Latitude	Longitude	Date Sunk
W10813	Unknown	51.94972	-7.32445	-
W10818	Unknown	51.95722	-7.29055	-
W11173	Unknown	52.03145	-7.2851	-
W04931	*George Milburn*	52.124	-6.9807	12/07/1917
W10608	Unknown	52.02638	-7.40695	-
W10609	Unknown	52.05	-7.11667	-
W10610	Unknown	52.08917	-7.03888	-
W11161	Unknown	52.15803	-7.13836	-
W11482	Unknown	52.04746	-7.11072	-
W11634	Unknown 'Portally Reef' (possibly UKHO 9709)	52.0905	-7.03833	-
W09389/UKHO9724	*MFV Amaryllis*	52.047512	-7.240017	11/05/1992

North Celtic Sea Wind Limited,
c/o Energia Renewables,
Mill House,
Ashtown Gate,
Navan Road,
Dublin,
D15 H70K

energia
Renewables

IRELAND'S GREENEST ENERGY SUPPLIER