



# Bremore Ireland Port Maritime Usage Licence Application for Site Investigation Works Assessment of Impacts on Maritime Usage



Client	<b>Bremore Ireland Port</b>
Document Ref.	22032-REP-004-01
Project Title	Bremore Ireland Port Maritime Usage Licence
Date	23/07/2024



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Document Reference: 22032-REP-004-01

Client: Bremore Ireland Port

Ultimate Client: Bremore Ireland Port

Confidentiality: Non Confidential

#### REVISION HISTORY

Rev	Date	Reason for Issue	Originator	Checker	Reviewer	Approver
[00]	09/05/2024	Draft for Client Review				
01	23/07/2024	Final report				

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# TABLE OF CONTENTS

Chapter	Page
<b>1 Introduction</b>	<b>13</b>
1.1 Overview	13
1.2 Aim of this Report	15
1.3 Methodology	15
1.4 Structure of the Report	16
<b>2 Description of the Proposed Site Investigation Activities</b>	<b>17</b>
2.1 Licence Area	17
2.2 Site Investigation Activities	20
2.3 Survey Schedule	29
<b>3 Need and Alternatives</b>	<b>30</b>
<b>4 Consideration of Directives</b>	<b>31</b>
4.1 EIA Directive Requirements	31
4.1.1 Approach to EIA Screening	32
4.1.2 Screening for Mandatory EIA	33
4.1.3 Conclusion of the EIA Screening	34
4.2 Water Framework Directive	35
4.3 Marine Strategy Framework Directive (MSFD)	35
<b>5 Planning and Development</b>	<b>37</b>
5.1 The National Marine Planning Framework (2021)	37
<b>6 Assessment of Impacts</b>	<b>47</b>
6.1 Overview	47
6.2 Land and Soils	49
6.3 Water	50
6.3.1 Introduction	50
6.3.2 Receiving Environment	50
6.3.3 Potential effects	50
6.3.4 Assessment of Potential Effects	51
6.4 Biodiversity	52
6.4.1 Marine Benthos	52
6.4.2 Natura 2000 Sites	57
6.4.3 Marine Mammals	62
6.4.4 Birds	63
6.4.5 Fish	64
6.5 Commercial Fisheries and Aquaculture	72
6.5.1 Introduction	72
6.5.2 Receiving Environment	73
6.5.3 Potential Effects	82
6.5.4 Assessment of Potential Effects	82
6.6 Air Quality	83
6.7 Noise and Vibration	83
6.7.1 Assessment of Potential Effects	83



6.8	Landscape and Seascape	84
6.8.1	Environmental Setting	84
6.8.2	Assessment of Potential Effects	84
6.9	Marine Traffic	84
6.9.1	Introduction	84
6.9.2	Receiving Environment	85
6.9.3	Potential Effects	91
6.9.4	Assessment of Potential Effects	91
6.10	Archaeological & Cultural Heritage	91
6.10.1	Introduction	91
6.10.2	Receiving Environment	91
6.10.3	Potential Effects	93
6.10.4	Assessment of Potential Effects	93
6.11	Population & Human Health	93
6.11.1	Population	93
6.11.2	Tourism	93
6.11.3	Assessment of Potential Effects	94
6.12	Major Accidents & Disasters	94
6.13	Climate	94
6.14	Waste	95
6.15	Material Assets	95
6.15.1	Introduction	95
6.15.2	Receiving Environment	95
6.15.3	Potential Effects	97
6.15.4	Assessment of Potential Effects	97
6.16	Interactions	97
6.17	Other Proposed Developments	99
<b>7</b>	<b>Summary of Mitigation Measures Proposed</b>	<b>103</b>
<b>8</b>	<b>References</b>	<b>111</b>
A.1	Site Investigation Activities	116
A.1.1	Geophysical Survey	116
A.1.2	Seabed Imagery	122
A.1.3	Direct Sampling Site Investigation Activities	123
A.1.4	METOCEAN SITE INVESTIGATIONS	132
A.1.5	ECOLOGICAL SITE INVESTIGATIONS	135
A.1.6	WATER QUALITY MONITORING	138
A.2	SURVEY VESSELS/PLATFORMS	139



## LIST OF TABLES

Table 2-1: MUL Area Coordinates	19
Table 2-2 Proposed programme of Site Investigations	23
Table 2-3 Typical Time Required for and footprint of Site Investigation Activities	27
Table 4-1 Marine Strategy Framework Directive GES Descriptors	35
Table 5-1 Table outlining consistency of this Licence Application with relevant policies	39
Table 6-1: Relevant sections and sub-sections in other reports submitted in support of the Application.	47
Table 6-2: EPA River Quality Survey (EPA, 2023)	50
Table 6-3 Habitat classification and description	55
Table 6-4: Application area overlap with commercial fish species distribution areas.	64
Table 6-5: Migratory Fish Species	70
Table 6-6 Shellfish Species recorded at the Gormanstown and Skerries HABs Inshore Shellfish Production Areas	82
Table 7-1 Summary of the proposed mitigation measures for the Bremore Ireland Port Site Investigation Activities	104

## LIST OF FIGURES

Figure 1-1 Bremore Ireland Port Maritime Usage Licence Area (solid red boundary) and the Proposed Development Area (dashed red boundary)	14
Figure 2-1 Bremore Ireland Port MUL Application Area with boundary points	18
Figure 2-2 Indicative Site Investigation Locations within the Maritime Usage Licence Area	21
Figure 2-3 Indicative Site Investigation Locations within the Potential Development Area	22
Figure 6-1 Predicted Benthic Habitats in Licence Area	54
Figure 6-2: SAC Annex I Habitats in the vicinity of the Licence Area	58
Figure 6-3: SAC Annex II Mobile Species in the vicinity of the Licence Area	59
Figure 6-4: SPAs in the vicinity of the Licence Area and the North West Irish Sea cSPA	60
Figure 6-5: SPAs in the vicinity of the Licence Area	61
Figure 6-6: Cod Spawning & Nursery (Ireland's Marine Atlas, 2021a)	65
Figure 6-7: Haddock Spawning & Nursery (Ireland's Marine Atlas, 2021a)	66
Figure 6-8: Herring Nursery Ground (Ireland's Marine Atlas, 2021a)	67
Figure 6-9: Whiting Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)	68
Figure 6-10 Mackerel and Horse Mackerel Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)	69
Figure 6-11 Beam Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)	74
Figure 6-12 Bottom Otter Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)	75
Figure 6-13 Dredge Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)	76
Figure 6-14 Pelagic Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)	77
Figure 6-15 Seine Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)	78
Figure 6-16 <i>Nephrops norvegicus</i> Functional Unit 15 and the Licence Application Area (Ireland's Marine Atlas, 2021)	79
Figure 6-17 HABs Inshore Shellfish Production Areas and SWD Shellfish Waters in the vicinity of the Licence Application Area	81



Figure 6-18 All Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)	86
Figure 6-19 Tanker Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)	87
Figure 6-20 Passenger Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)	88
Figure 6-21 Fishing Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)	89
Figure 6-22 Cargo Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)	90
Figure 6-23 National Monuments Service Wrecks and INFOMAR shipwreck database in the vicinity of the Licence Area	92
Figure 6-24 Material Assets – subsea cables	96
Figure 6-25 Dumping at sea in the vicinity of the Licence Area (EPA, 2022b)	98
Figure 6-26 Other Proposed Wind Farm Project Foreshore Licence Application Areas within the vicinity of the Licence Application Area	100
Figure 6-27 Location of non-OWF projects and plans within the Cumulative Effects Spatial Scope	101
Figure 8-1: Example of a Block Push Seabed CPT System (Fugro Seacalf)	127
Figure 8-2: Example of a Crane Deployed Vibrocore System	129
Figure 8-3: Single Van Veen Grab (OSIL)	130
Figure 8-4: Double Van Veen Grab Sampler (OSIL)	130
Figure 8-5: Hamon Grab (CMS – Geotech Ltd)	131
Figure 8-6: Day Grab (KC Denmark A/S)	132



## List of Abbreviations

AA	Appropriate Assessment
ADCP	Acoustic Doppler Current Profiler
AIMU	Assessment of Impacts on Maritime Usage
AIS	Automatic Identification System
API	American Petroleum Institute
BH	Borehole
BIM	Bord Iascaigh Mhara
BIPDAC	Bremore Ireland Port Designated Activity Company
BSF	Below Seafloor
CPOD	Cetacean Passive Acoustic Network
CO	Conservation Objective
CPT	Cone Penetration Test
DAFM	Department of Agriculture, Food, and the Marine
DAHG	Department of Arts, Heritage and the Gaeltacht
DCCAE	Department of Communications, Climate Action and Environment
DEHLG	Department of Environment, Heritage and Local Government
DHLGH	Department of Housing, Local Government and Heritage
DTTAS	Department of Transport, Tourism and Sport
EC	European Commission
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMODnet	The European Marine Observation and Data Network
EPA	Environmental Protection Agency
EPS	European Protected Species
EU	European Union
FCS	Favourable Conservation Status
FLO	Fisheries Liaison Officer
GDG	Gavin and Doherty Geosolutions Ltd.
GSI	Geological Survey Ireland
HABs	Harmful Algal Blooms
IBTSWG	International Bottom Trawl Survey Working Group
ICES	International Council for the Exploration of the Sea
IGS	International Groundfish Survey
IMO	International Maritime Organization
ISO	International Organization for Standardization
ITM	Irish Transverse Mercator
JNCC	Joint Nature Conservation Committee
LiDAR	Light Detection and Ranging
LSE	Likely Significant Effects
MAP	Maritime Area Planning Act 2021
MARPOL	The International Convention for the Prevention of Pollution from Ships
MBES	Multibeam echosounder
MI	Marine Institute
MMO	Marine Mammal Observer



MUL	Maritime Usage Licence
NIGS	Northern Ireland Groundfish Survey
NIS	Natura Impact Statement
NM	Nautical Mile
NMS	National Monuments Database
NPWS	National Parks and Wildlife Service
PTS	Permanent Threshold Shift
QI	Qualifying Interests
SAC	Special Areas of Conservation
SCA	Seascape Character Area
SCI	Special Conservation Interest
SI	Site Investigation
SISAA	Supporting Information for Screening for Appropriate Assessment
SPA	Special Protection Areas
SPL	Sound Pressure Level
SSS	Side Scan Sonar
SWCGS	Scottish West Coast Groundfish Survey
SWD	Shellfish Waters Directive
TTS	Temporary Threshold Shift
UK	United Kingdom
UXO	Unexploded Ordnance
VC	Vibrocore
VMS	Vessel Electronic Monitoring System
WFD	Water Framework Directive
WGS	World Geodetic System



## Glossary of Terms

Acoustic Doppler Current Profiler (ADCP)	An Acoustic Doppler Current Profiler is a hydroacoustic current meter similar to a sonar, used to measure water current velocities over a depth range using the Doppler effect of sound waves scattered back from particles within the water column.
Appropriate Assessment (AA)	An Appropriate Assessment (AA) is an assessment of the potential adverse effects of a plan or project (in combination with other plans or projects) on Special Areas of Conservation and Special Protection Areas. These Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are protected by both National and European Law.
Aquaculture Sites	Aquaculture sites include shellfish, finfish and seaweed production areas as monitored for licensing purposes.
Benthic Ecology	Benthic ecology is the study of organisms that make up bottom communities (sediments, seagrass communities and rock outcrops) in lakes, streams, estuaries and oceans, to determine environmental health and conduct environmental appraisals.
Boreholes	A borehole is a narrow shaft bored in the ground, either vertically or horizontally.
Coastal Lagoons	Lagoons are expanses of coastal salt water, of varying salinity, which are wholly or partially separated from the sea by sand banks or shingle, or less frequently, by rocks.
Cone Penetration Test (CPT)	The cone penetration or cone penetrometer test (CPT) is a method used to determine the geotechnical engineering properties of soils and delineating soil stratigraphy.
Exclusive Economic Zone	Marine area from the territorial seas boundary seaward to a distance of 200 miles or otherwise as agreed under international statute.
Designated Shellfish Waters	Designated Shellfish Waters under the European Union Shellfish Waters Directive are sites designed to protect the aquatic habitat of bivalve and gastropod molluscs, including oysters, mussels, cockles, scallops and clams.
Dredge Fishing	A fishing dredge, also known as a scallop dredge or oyster dredge, is type of fishing gear which is towed along the bottom of the sea by a fishing boat in order to collect a targeted bottom-dwelling species.
Drift Lines	Drift lines occur on sandy or shingle substrate at the upper part of the strand, around the high tide mark. Water-borne material including organic matter is deposited on the shore and provides nutrients and a seed source for vegetation.
Ecology	Ecology is a branch of biology concerning the spatial and temporal patterns of the distribution and abundance of organisms, including the causes and consequences.
Exclusive Economic Zone	Marine area from the territorial seas boundary seaward to a distance of 200 miles or otherwise as agreed under international statute.
Estuaries	Estuaries are coastal inlets with a significant freshwater influence. They are diverse, dynamic habitats that help maintain the health of coastal ecosystems. They are a significant resource for bird and mammal species for feeding, breeding, and resting, and depending on their geomorphology and hydrology support a mosaic of other habitats, including Annex I habitats such as mudflats.



Fish Nursery Grounds	Nursery grounds are habitats that enhance the growth and survival of juvenile fish.
Fish Spawning Grounds	Spawning grounds are areas where fish congregate to lay and fertilise their eggs.
Geophysical Surveys	Geophysical surveys are ground-based physical sensing techniques that produce a detail image or map of an area. Ground-based surveys may include: Seismic surveys - vibrations are recorded with geophones to provide information about the properties of rocks.
Geotechnical investigation and evaluation	Geotechnical investigation and evaluation include methods to acquire and evaluate subsurface information, including drilling and sampling, laboratory testing, cone penetration testing, and pressure meter testing.
Grab Samples	A grab sample is a sample of sediment taken from the seabed.
Habitats Directive	Adopted in 1992, the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.
Irish Transverse Mercator (ITM)	Irish Transverse Mercator (ITM) is the geographic coordinate system for Ireland. It was implemented jointly by the Ordnance Survey Ireland (OSi) and the Ordnance Survey of Northern Ireland (OSNI) in 2001. The name is derived from the Transverse Mercator projection it uses and the fact that it is optimised for the island of Ireland. ITM95 (EPSG:2157) is used to map the project area for the Licence Map.
LiDAR	LiDAR is a method for measuring distances by illuminating the target with laser light and measuring the reflection with a sensor. Differences in laser return times and wavelengths can then be used to make digital 3-D representations of the target. It has terrestrial, airborne, and mobile applications.
Magnetometer	A magnetometer is a device that measures magnetism—the direction, strength, or relative change of a magnetic field at a particular location.
Maritime Area Planning Act	Legislation reforming consenting within Ireland's marine area, including introducing both an offshore specific consenting regime and extending the powers of the State to enable the State to operate a consenting regime across its entire EEZ and agreed continental shelf.
Maritime Usage Licence Area	Within this report: The areas within the outer limit of the State's continental shelf and high water mark for which a Maritime Usage Licence Application is submitted to MARA for a licence under the Maritime Area Planning Act 2021.
MARPOL	MARPOL is the main international convention aimed at the prevention of pollution from ships caused by operational or accidental causes. It was adopted at the International Maritime Organization (IMO) in 1973. The Protocol of 1978 was adopted in response to a number of tanker accidents in 1976–1977.
Metoccean	Metoccean conditions refer to the combined wind, wave, and climate conditions as found on a certain location. They are most often presented as statistics, including seasonal variations, scatter tables, wind roses and probability of exceedance.



Minister	In this report, Minister means the Minister for Housing, Local Government and Heritage
Mudflats	Tidal mudflat habitat is comprised of the intertidal section of the coastline where muds dominate.
Multibeam Echosounder	An echosounder uses sound waves to measure water depth. A transducer mounted under a vessel emits a pulse which travels through the water to the seafloor and bounces back to a receiver. The time it takes for the signal to return is measured, and because the speed of sound through water is known, the water depth under the boat is measured. This is the basic principle of hydrography and seafloor mapping. A multibeam echosounder (MBES) measures multiple echoes at a time.
Natura Impact Statement	A Natura Impact Statement (NIS) is the statement prepared following Appropriate Assessment (AA) of Natura 2000 sites as required under the EU Habitats Directive which presents information on the assessment and the process of collating data on a project and its potential significant impacts on Natura 2000 site(s).
Pollution Event	A 'pollution incident' includes a leak, spill or escape of a substance, or circumstances in which this is likely to occur.
Pot Fishing	Pots and traps are used in commercial fishing to catch crustaceans such as lobster, crab, and shrimp.
Preliminary Campaign	Site Investigation surveys early in the project development programme designed to give an overview of the receiving environment with the aim of developing a first stage ground model. For this Application it refers to the first geotechnical campaign.
Receiving Environment	The receiving environment is the environment upon which a proposed activity might have effects.
Reefs	Reefs are marine features with hard substrate available for colonisation by plants and animals. In Irish waters they range from the intertidal to depths of 4,500m and more than 400km from the coast.
Side Scan Sonar	Side-scan uses a sonar device that emits conical or fan-shaped pulses down toward the seafloor across a wide-angle perpendicular to the path of the sensor through the water, which may be towed from a surface vessel or submarine or mounted on the ship's hull.
Special Areas of Conservation	These are prime wildlife conservation areas considered to be important on a European as well as national level. The EU Habitats Directive lists certain habitats and species that must be protected within SACs.
Special Protection Areas	Ireland is required under the terms of the EU Birds Directive (2009/147/EC) to designate Special Protection Areas (SPAs) for the protection of: Listed rare and vulnerable species; regularly occurring migratory species and wetlands, especially those of international importance.
Sub-Bottom Profiler	A sub-bottom profiler is a type of sonar system that produces a 2-dimensional stratigraphic cross section by using acoustic energy to image sub-surface features in an aquatic environment.
Sea Cliffs	A sea cliff is a steep or vertical slope located on the coast, the base of which is in either the intertidal or subtidal zone. Hard cliffs, composed of hard rock such as basalt, are at least 5m high, while soft cliffs, composed of softer substrates such as shale or boulder clay, are at least 3m high.
Universal Transverse Mercator	The UTM (Universal Transverse Mercator) coordinate system divides the world into sixty north-south zones, each 6 degrees of longitude wide. UTM



	zones are numbered consecutively beginning with Zone 1 and progress eastward to Zone 19. UTM 29N (EPSG:32629) is used to map the project area.
Vibrocore	Vibrocoreing is a sediment sampling methodology for retrieving continuous, undisturbed cores. Vibrocorers can work in a variety of water depths and can retrieve core samples at different lengths depending on sediment lithology and project objectives.
Water Courses	Natural or artificial channels through which water flows.
Wave Buoy	Wave buoys are used to measure the movement of the water surface as a wave train. The wave train is analysed to determine wave characteristics such as the significant wave height and period, and wave direction.
World Geodetic System	The World Geodetic System (WGS) is a standard for use in cartography, geodesy, and satellite navigation including GPS. WGS84 is a geocentric reference ellipsoid and a geodetic datum, in that it defines the centre of mass of the earth as its origin, and the direction of the earth's axis as the minor axis of the reference ellipsoid. WGS84 (EPSG:4326) is used to map the project area.



# 1 INTRODUCTION

## 1.1 OVERVIEW

Bremore Ireland Port Designated Activity Company (BIPDAC) proposes to investigate the feasibility of developing port infrastructure at Bremore, off the coast of County Dublin and County Meath.

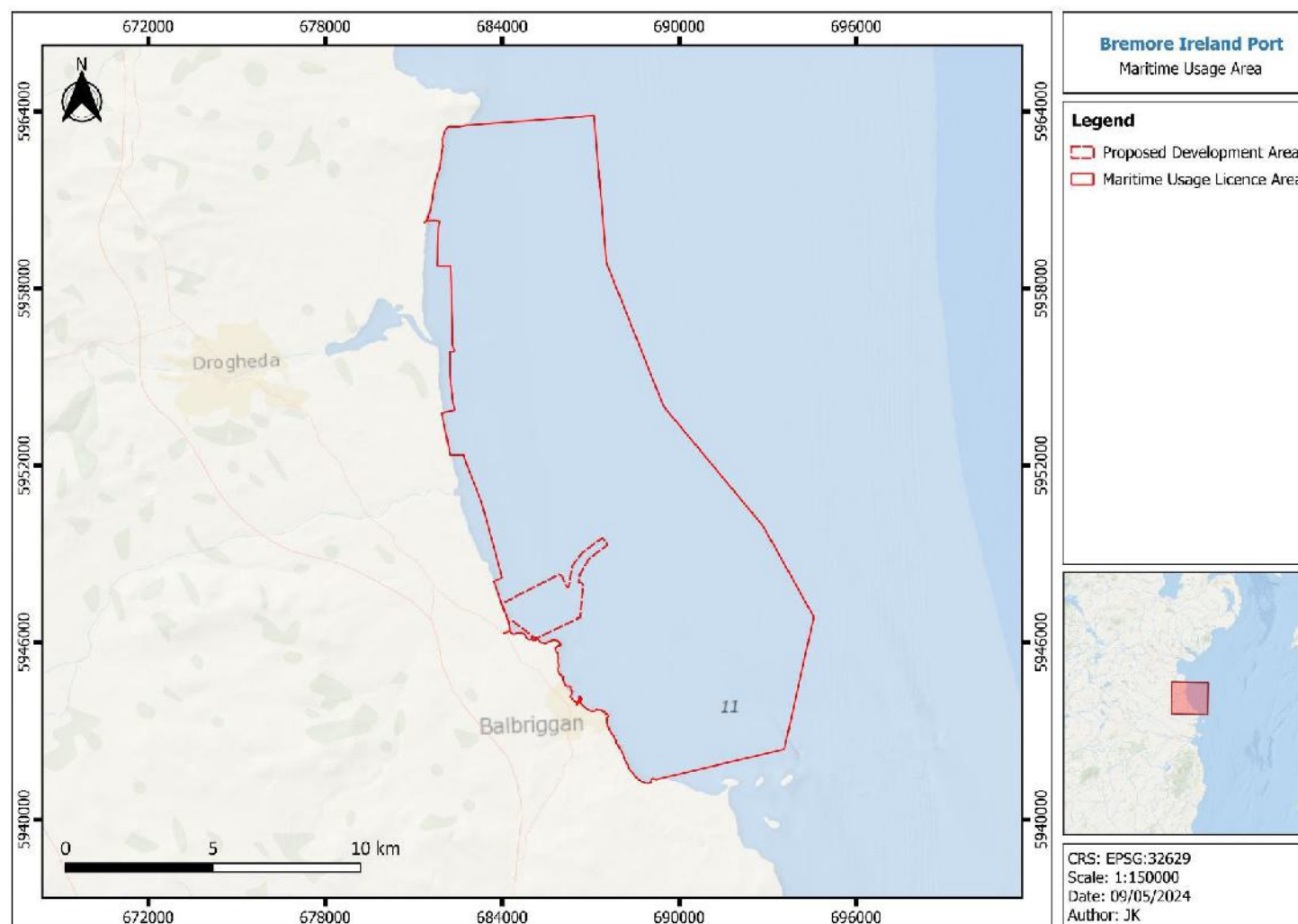
BIPDAC has prepared this report in support of an application for a Maritime Usage Licence under the Maritime Area Planning Act (2021) to undertake site investigation activities to determine the suitability of the site for the development of new deep-water, multi-modal energy port, supporting the construction and maintenance of offshore wind farms in the Irish and Celtic Seas. This development is crucial for Ireland to meet its 2030 decarbonisation targets and to manage the expected increase in maritime freight demand and port capacity requirements up to 2050. Additionally, the project will bring economic and social benefits to local coastal communities, fostering job creation and sustainable development. The project encapsulates Ireland's commitment to sustainable development and positions Bremore Port as a cornerstone of the nation's green and economic future.

BIPDAC intends to undertake a site investigation survey campaign in the Maritime Usage Licence Application Area (Figure 1-1) to inform the location and design of the proposed port infrastructure. The site investigation (SI) works will include marine geophysical, geotechnical, environmental, metocean and archaeological surveys.

The Maritime Usage Licence (MUL) area (outlined in solid red line) includes the Potential Development Area (dashed red line) and the wider Dundalk Bay sediment cell, to ensure site investigation activities gather a sufficiently robust spatial coverage of marine geophysical, geotechnical, environmental, metocean and archaeological datasets.

The total MUL area is 159.48 km<sup>2</sup>, and the Potential Development Area is 4.21 km<sup>2</sup>.





**Figure 1-1 Bremore Ireland Port Maritime Usage Licence Area (solid red boundary) and the Proposed Development Area (dashed red boundary)**



## **1.2 AIM OF THIS REPORT**

This report is part of the Maritime Usage Licence (MUL) application to the Maritime Area Regulatory Authority (MARA) and aims to provide information documenting the current state of the environment in the vicinity of the proposed site investigation activities and consideration of the potential effects from the proposed activities on the receiving environment.

This report also aims to determine whether any of the proposed SI activities fall within a class of projects listed in Part 2 of Schedule 5 of the Planning Regulations, as amended.

## **1.3 METHODOLOGY**

This report summarises (Section 2) and details (Programme of Works Appendix A) the proposed site investigation activities. The report considers the need for the proposed activities (Section 3), the Environmental Impact Assessment (EIA) Directive, the Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD) (Section 4). The EIA Screening exercise undertaken highlights how the survey design and proposed mitigation measures will be implemented to prevent or minimise impacts on the environment. Planning and development considerations and a statement of consistency with the National Marine Planning Framework (NMPF) are included in Section 5. The current state of the environment in the vicinity of the proposed site investigation activities is described to help identify the effects, if any, on the environment (Section 6).

While the undertaking of this evaluation of effects is not a statutory requirement, the report has been produced to consider the potential effects of the proposed site investigation activities on environmental aspects such as population and human health, biodiversity (marine benthos, marine mammals, birds, fish and Natura 2000 sites), water, air & climate, socio-economic activities (commercial fisheries, aquaculture, marine traffic, tourism & recreation, material assets and other proposed developments), archaeology and cultural heritage, landscape and seascape and major accidents and disasters. Where relevant to the proposed activities, these are addressed in this report.

This report has been prepared in accordance with the following guidance:

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports, from the Environmental Protection Agency (EPA) (May, 2022)
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, from the Department of Housing, Planning, Community and Local Government (August 2018)
- OPR Practice Note PN02 Environmental Impact Assessment Screening, from the Office of the Planning Regulator (June 2021)



- Environmental Impact Assessment of Projects, Guidance on Screening (Directive 2011/92/EU as amended by 2014/52/EU), from the European Commission (2017)
- Applicant Technical Guidance Note for Obtaining a Licence to Carry Out Specified Maritime Usages in the Maritime Area under the Maritime Area Planning Act 2021, from MARA (2023)

This report has been prepared by [REDACTED] (BSc. Hons Marine Sciences, MMO) and checked by [REDACTED] (BSc. Hons Geological Science, MSc. Geochemistry). [REDACTED] is a Marine Ecologist with experience in marine, terrestrial and freshwater ecology, and is a trained MMO and marine ornithologist. Her current work includes ecological/environmental consulting, marine licence application preparation, report writing and environmental mapping. [REDACTED] is a Senior Environmental Scientist with extensive experience as an environmental consultant, undertaking various multi-disciplinary projects within consulting engineering.

This report has been reviewed and approved by [REDACTED]. [REDACTED] is a Marine Ecologist with coastal engineering expertise and extensive experience of offshore benthic survey and Marine Protected Area monitoring who has undertaken multiple environmental assessments under the Habitats and EIA Directives within consulting engineering and as a statutory adviser to the UK government and its devolved administrations with the Joint Nature Conservation Committee.

## **1.4 STRUCTURE OF THE REPORT**

This report is structured into the following chapters, which describe or comprise the following elements:

- Chapter 1 (this chapter): Introduction to the report.
- Chapter 2: Describes the proposed site investigation activities.
- Chapter 3: Need and Alternatives.
- Chapter 4: Consideration of Directives that includes the Environmental Impact Assessment Screening exercise and reports on its conclusion.
- Chapter 5: Planning and development.
- Chapter 6: Assessment of Impacts.
- Chapter 7: Summarises the proposed mitigation measures.
- Chapter 8: Presents the conclusion from this report.



## **2 DESCRIPTION OF THE PROPOSED SITE INVESTIGATION ACTIVITIES**

This document has been produced in support of a MUL Application, which seeks consent to conduct site investigation survey activities to inform development of port infrastructure at Bremore. The MUL application is a consent to conduct site investigation activities and is not a Maritime Area Consent (MAC) application for port development consent, which will be subject to the Maritime Area Planning Act 2021 (MAPA) and the Planning and Development Act, 2000-2021.

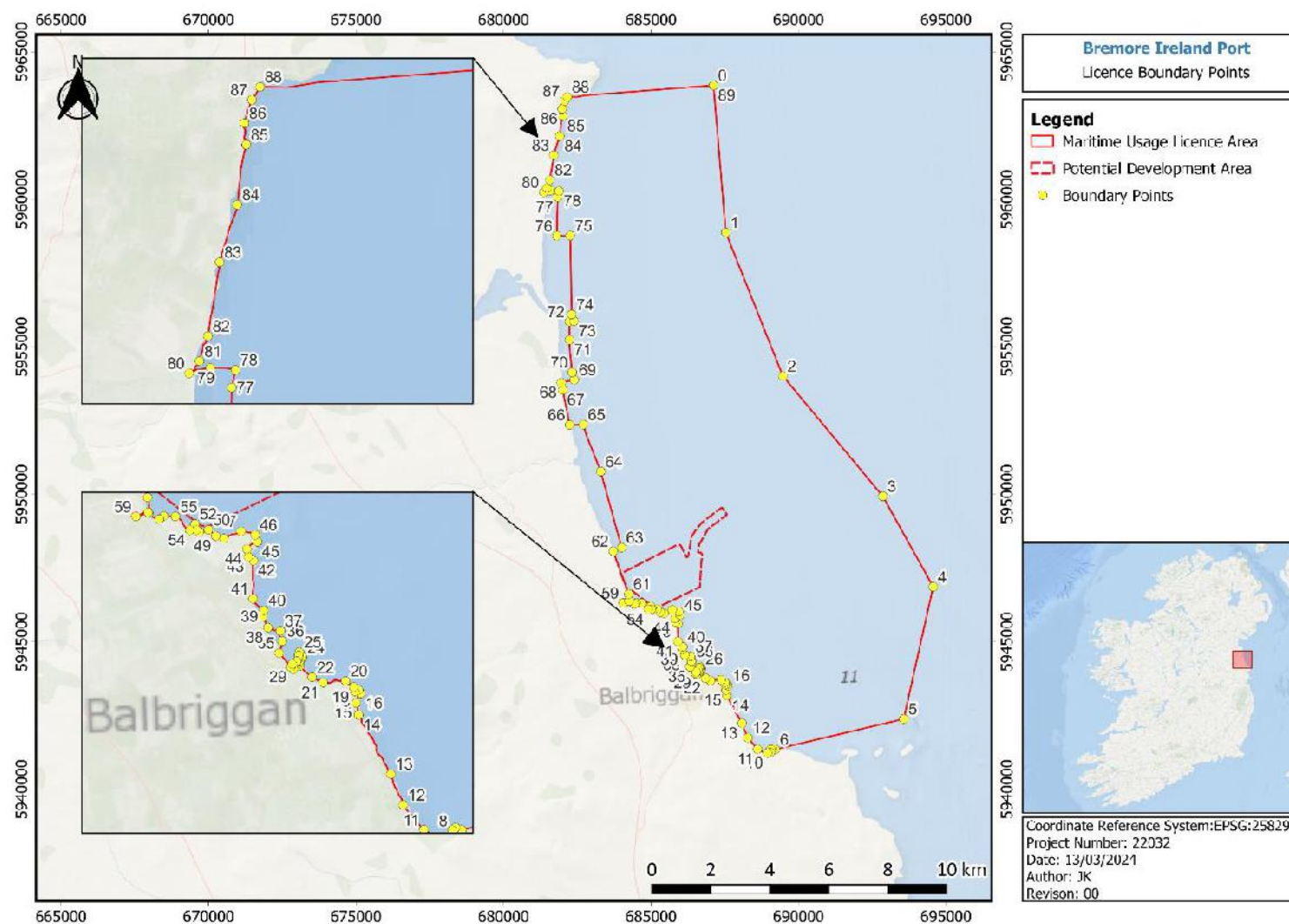
If the MUL area site investigation activities, together with desktop studies and stakeholder engagement, indicates the feasibility of developing a port facility, the project will be progressed at that point in accordance with the National Marine Planning Framework and relevant legislation through the Maritime Area Planning Act 2021 (MAPA).

Please note, the majority of the proposed survey activities will be conducted within the Proposed Development Area. Within the wider MUL area, the survey activities will mainly consist of metocean device deployment, ecological surveys and grab sampling for sediment classification.

### **2.1 LICENCE AREA**

The MUL area, where the site investigation survey activities will occur, covers a total area of 159.48 km<sup>2</sup> (15,948 ha) and includes the Proposed Development Area (4.21 km<sup>2</sup> (421.2 ha)) – see Figure 1-1. In Figure 2-1, the site boundary points of the MUL area are shown followed with the co-ordinates of the licence area in Table 2-1.





**Figure 2-1 Bremore Ireland Port MUL Application Area with boundary points**



**Table 2-1: MUL Area Coordinates**

ID	Latitude (degrees decimal minutes)	Longitude (degrees decimal minutes)	ID	Latitude (degrees decimal minutes)	Longitude (degrees decimal minutes)
0	53°47.380'N	6°9.560'W	45	53°37.735'N	6°11.241'W
1	53°44.684'N	6°9.361'W	46	53°37.794'N	6°11.271'W
2	53°42.024'N	6°7.784'W	47	53°37.831'N	6°11.473'W
3	53°39.753'N	6°4.862'W	48	53°37.776'N	6°11.723'W
4	53°38.060'N	6°3.425'W	49	53°37.798'N	6°11.837'W
5	53°35.669'N	6°4.499'W	50	53°37.855'N	6°11.938'W
6	53°35.209'N	6°8.476'W	51	53°37.839'N	6°12.068'W
7	53°35.230'N	6°8.565'W	52	53°37.909'N	6°12.128'W
8	53°35.211'N	6°8.616'W	53	53°37.856'N	6°12.112'W
9	53°35.158'N	6°8.637'W	54	53°37.857'N	6°12.206'W
10	53°35.148'N	6°8.717'W	55	53°37.979'N	6°12.405'W
11	53°35.225'N	6°9.021'W	56	53°37.985'N	6°12.574'W
12	53°35.442'N	6°9.303'W	57	53°37.962'N	6°12.636'W
13	53°35.710'N	6°9.463'W	58	53°38.017'N	6°12.785'W
14	53°36.225'N	6°9.891'W	59	53°37.992'N	6°12.971'W
15	53°36.327'N	6°9.918'W	60	53°38.023'N	6°12.792'W
16	53°36.409'N	6°9.848'W	61	53°38.150'N	6°12.791'W
17	53°36.438'N	6°9.878'W	62	53°38.947'N	6°13.213'W
18	53°36.428'N	6°9.934'W	63	53°39.007'N	6°12.951'W
19	53°36.464'N	6°9.946'W	64	53°40.411'N	6°13.502'W
20	53°36.520'N	6°10.058'W	65	53°41.280'N	6°13.985'W
21	53°36.512'N	6°10.378'W	66	53°41.283'N	6°14.406'W
22	53°36.562'N	6°10.535'W	67	53°41.927'N	6°14.577'W
23	53°36.664'N	6°10.705'W	68	53°42.061'N	6°14.609'W
24	53°36.735'N	6°10.657'W	69	53°42.104'N	6°14.210'W
25	53°36.780'N	6°10.704'W	70	53°42.241'N	6°14.259'W
26	53°36.736'N	6°10.664'W	71	53°42.837'N	6°14.309'W
27	53°36.682'N	6°10.712'W	72	53°43.170'N	6°14.290'W
28	53°36.636'N	6°10.800'W	73	53°43.176'N	6°14.147'W
29	53°36.656'N	6°10.833'W	74	53°43.299'N	6°14.204'W
30	53°36.704'N	6°10.705'W	75	53°44.739'N	6°14.161'W
31	53°36.711'N	6°10.735'W	76	53°44.745'N	6°14.569'W
32	53°36.754'N	6°10.715'W	77	53°45.454'N	6°14.494'W
33	53°36.704'N	6°10.744'W	78	53°45.561'N	6°14.449'W
34	53°36.680'N	6°10.811'W	79	53°45.578'N	6°14.708'W
35	53°36.779'N	6°10.994'W	80	53°45.552'N	6°14.926'W
36	53°36.881'N	6°10.944'W	81	53°45.622'N	6°14.815'W
37	53°36.968'N	6°10.964'W	82	53°45.773'N	6°14.720'W
38	53°37.001'N	6°11.141'W	83	53°46.220'N	6°14.569'W



39	53°37.097'N	6°11.210'W	84	53°46.566'N	6°14.363'W
40	53°37.149'N	6°11.190'W	85	53°46.929'N	6°14.248'W
41	53°37.251'N	6°11.336'W	86	53°47.061'N	6°14.258'W
42	53°37.575'N	6°11.310'W	87	53°47.201'N	6°14.172'W
43	53°37.610'N	6°11.379'W	88	53°47.277'N	6°14.085'W
44	53°37.677'N	6°11.398'W	89	53°47.380'N	6°9.560'W

## 2.2 SITE INVESTIGATION ACTIVITIES

The objective of the proposed Bremore Ireland Port survey campaign is to determine environmental conditions, the ecological baseline, sediment dynamics and seafloor and subsurface geological characteristics within the MUL area.

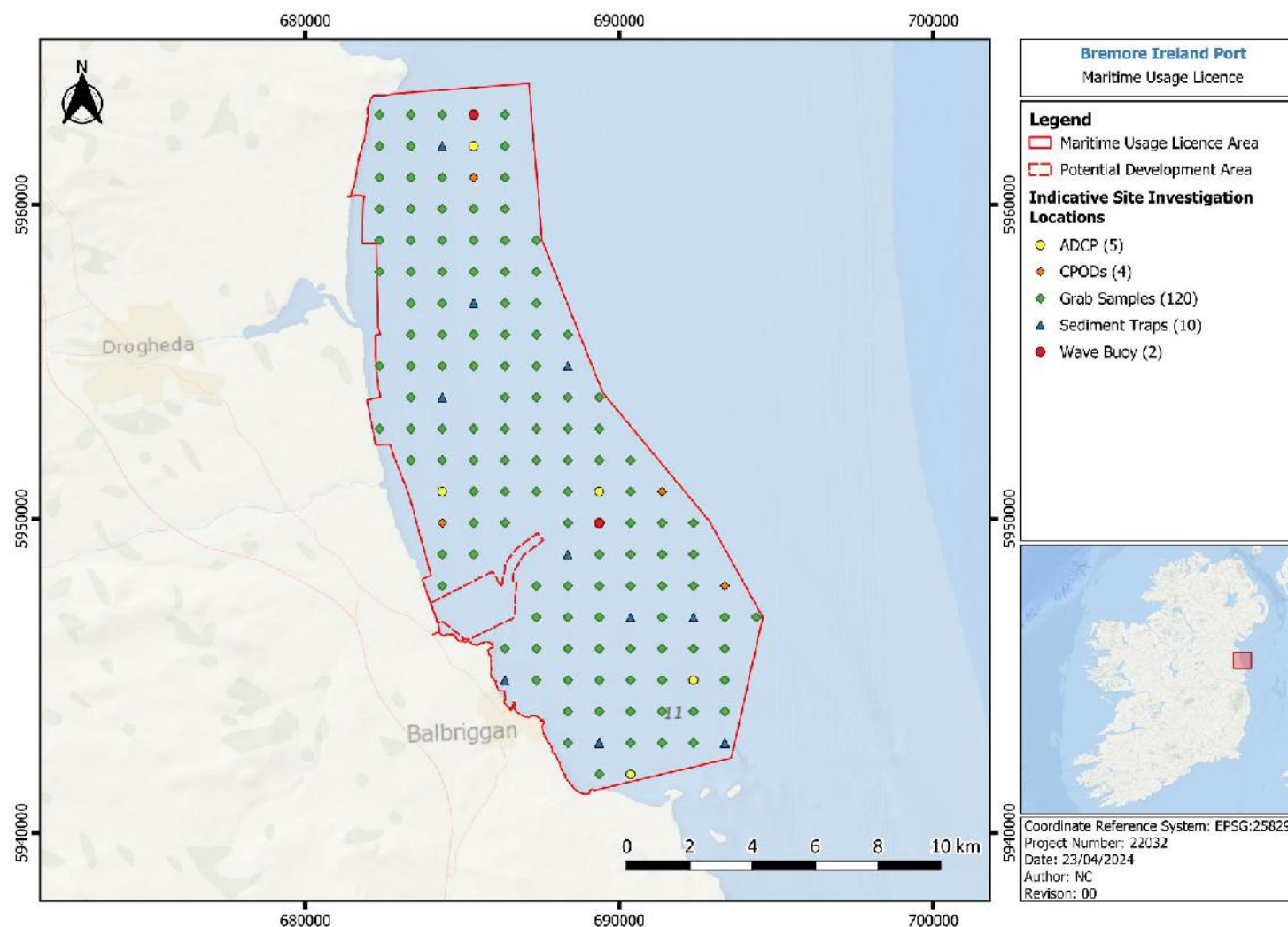
The proposed programme of SI to be undertaken within the licence area is summarised in Table 2-2 below and discussed in more detail in Appendix A. The typical time required and footprint of SI Activities is provided in Table 2-3.

Two types of SI will be undertaken; remote sensing activities which typically do not contact the seabed, and direct sampling activities which do. All SI activities will be undertaken within the MUL Area co-ordinates shown in Table 2-1. Indicative locations of seafloor contacting Site Investigation activities within the Maritime Usage Licence Area and Potential Development Areas are shown in Figure 2-2 and Figure 2-3.

The exact technical specifications of the equipment to be used will not be known until the survey contract has been awarded. However, a description of the typical equipment and survey parameters to be used is described in the Appendix A.

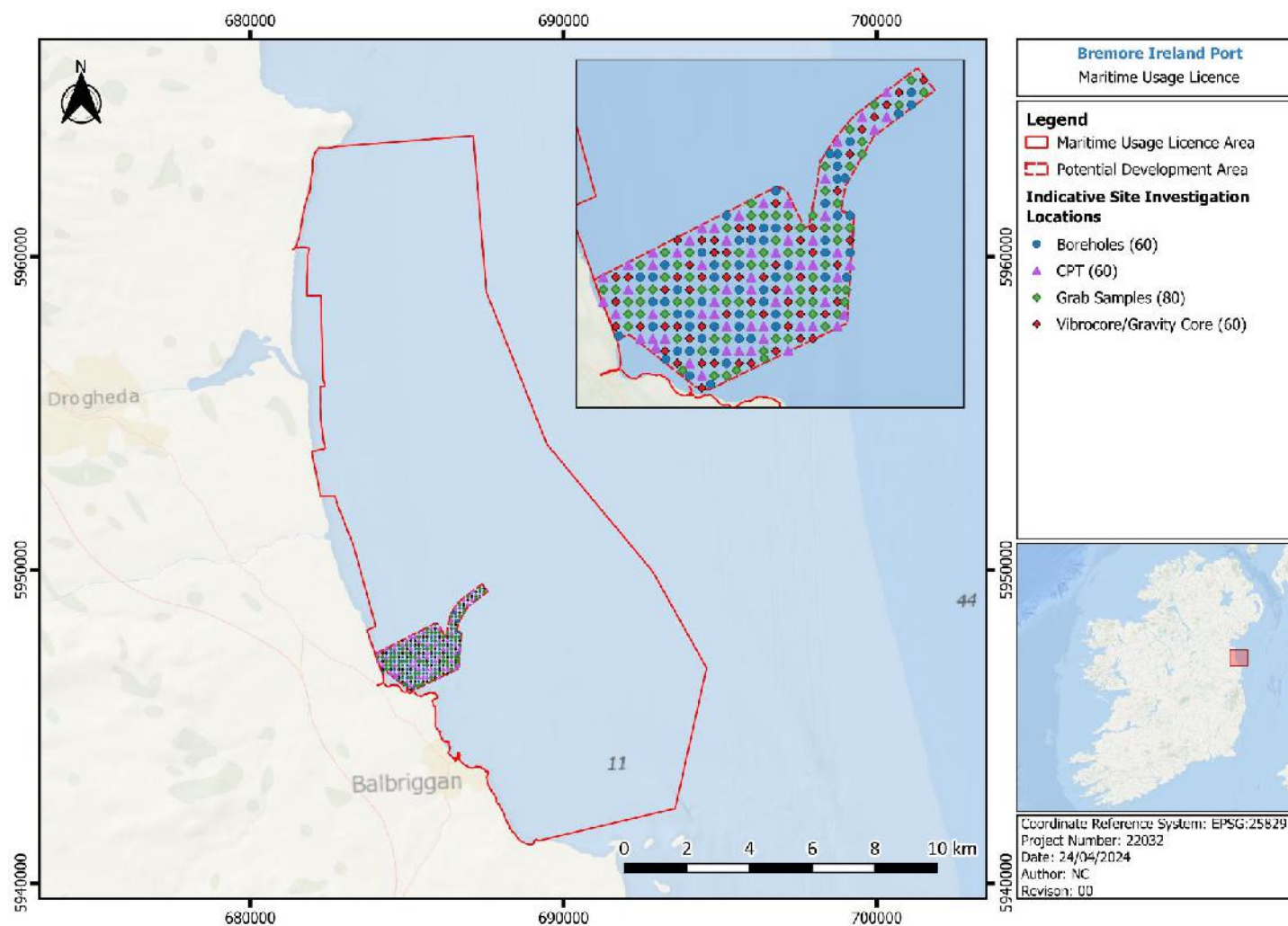
All efforts will be made to follow survey recommendations outlined in the Guidance on Marine Baseline Ecological Assessments & Monitoring Activities for Offshore Renewable Energy Projects Part 1 and 2 (DCCAE, 2018).





**Figure 2-2 Indicative Site Investigation Locations within the Maritime Usage Licence Area**





**Figure 2-3 Indicative Site Investigation Locations within the Potential Development Area**



**Table 2-2 Proposed programme of Site Investigations**

Survey	Methods	Purpose	Sampling Effort
<b>Hydrographical and Geophysical</b>	Multibeam Echosounder (MBES)	MBES is a system for collecting detailed topographical data of the seabed. Typical equipment includes the Kongsberg EM3002D multi-beam system with mounting system including AML SV Smart Probe, Kongsberg EM 2040 or similar. For these surveys the equipment will operate at a typical central frequency of 200 - 400kHz (700kHz optional) with sound pressure levels in the range of 200-228dB re1μPa @1m.	MBES may be undertaken across the Licence Application Area to a suitable percentage coverage.
	Side Scan Sonar (SSS)	SSS surveys are used to determine sediment characteristics and seabed features. The EdgeTech 4200 may be taken as an indicate example of an SSS device and for these surveys will have a potential operating frequency range of approximately 230/540kHz in the offshore area and 540/850kHz in the shallower nearshore area with sound pressure levels of 228dB re1μPa @1m.	SSS may be undertaken across the Licence Application Area to a suitable percentage coverage.
	Magnetometer	A magnetometer is used to identify magnetic anomalies and hazard mapping for metal obstructions, shipwrecks and unexploded ordnance on the surface and in the shallow sub-surface. The Geometrics G-882 can be taken as an indicative equipment example, it is a passive device (i.e. it does not emit any sound waves into the marine environment).	Magnetometer survey may be undertaken across the Licence Application Area to a suitable percentage coverage.



Survey	Methods	Purpose	Sampling Effort
	Sub-bottom Profiling (SBP)	SBP is used to develop an image of the subsurface, identifying different strata encountered in the shallow sediments. The Innomar SES-2000 Medium is an indicative example of a parametric system with a primary and secondary frequency range of 85-115kHz and 2-22kHz, respectively, and sound pressure levels of up to 247 dB (typically operated at <200dB) re1μPa @ 1m, which would be used in both nearshore and offshore areas. The Applied Acoustics AA301 is an indicative example of a boomer, with sound pressure levels in the range of 208-215dB re1μPa @ 1m which would be used in the nearshore shallower area. The applied Acoustics Duraspark 400 is an indicative example of a sparker system used in sub-bottom profiling, with sound pressures in the range of 204-216dB re1μPa @1m.	SBP may be undertaken across the Licence Application Area to a suitable percentage coverage.
<b>Geotechnical</b>	Boreholes	Boreholes will typically be a maximum of 40 m deep. All drilling equipment used will follow the ISO and API technical specifications for drilling equipment.  Marine rotary drilling is a technique used to bore holes into the seabed. The drilling process involves rotating a drill bit attached to a drill string and applying downward pressure to cut through the rock formations. Geotechnical sampling tools, including push and piston samples, can then be deployed into the ground to recover intact material. The typical frequencies emitted from rotary drilling are between 0.001-0.120kHz and a recorded sound pressure of approximately 145dB re1μPa @1m.	Up to 60 no. boreholes will be required within the Proposed Development Area within the Licence Application Area.
	Cone Penetration Tests (CPT)	CPTs are a method for testing in situ soil parameters. CPTs can be performed as either Seabed CPTs or downhole in boreholes.	Up to 60 no. CPTs will be required covering both the preliminary and interim campaign within the Proposed Development Area within the Licence Application Area.



Survey	Methods	Purpose	Sampling Effort
			The spacing interval will be determined by the variability and level of understanding of the shallow geology.
	Vibrocore / Gravity Corer	Vibrocore and Gravity Corer are methods of collecting un-consolidated seabed samples.	Up to 60 no. sample locations will be required for either vibrocore or gravity sampling with a target depth of 6m BSF within the Proposed Development Area within the Licence Application Area.
<b>Metocean &amp; geomorphology</b>	Acoustic Doppler Current Profiler (ADCP)	This equipment is installed on the seabed and anchored with a suitable mooring structure. It is generally a short-term deployment used to gather seasonal data (e.g. winter storm data) however may be deployed for longer.	Up to 5 ADCPs may be used to examine wave and current conditions in the Licence Application Area.
	Wave Buoy	Wave rider buoys may be deployed to measure wave heights and direction to feed into the detailed design of the project within the Licence Application area. They will be moored to the seabed by a suitably sized mooring structure.	Up to 2 Waverider buoys may be deployed within the Licence Application area.
	Sediment traps	Sediment traps are containers that are used to collect particles falling toward the sea floor. Particle size and accumulation rates will be used to inform sediment transport modelling.	Up to 10 nr. sediment traps may be placed in in the Licence Application area for an approximate duration of 60 days.
<b>Ecology</b>	Bird and Marine Mammal Survey	Identify bird and marine mammal species distribution and behaviour within the Licence Application Area.	Bird and marine mammal surveys may be undertaken across the Licence Application Area



Survey	Methods	Purpose	Sampling Effort
	Fisheries Survey	Identify fish species distribution and fishing activity within the Licence Application Area. Exact details of monitoring required will be determined through engagement with the relevant authorities such as SFPA, the Marine Institute and through local knowledge where appropriate.	Fisheries surveys may be undertaken across the Licence Application Area
	Benthic Ecology (subtidal benthic survey, intertidal habitat walkover survey)	<p>This survey is designed to identify the expected benthic communities and habitats at the site.</p> <p>In the intertidal area features of conservation importance will be identified by means of intertidal habitat mapping with core/quadrat sampling and hard substrate quadrat sampling where appropriate. This may consist of the intertidal Phase I walkover survey of the area with identification of the main habitats present (in the form of biotope mapping).</p> <p>Subtidal sample locations may be subject to drop down video in advance of grab sampling.</p> <p>Samples of water may be taken at the same time for analysis.</p>	There will be up to 200 no. subtidal grab sampling locations within the Licence Application Area. Multiple samples/replicates may be taken at each location.
	Marine Mammal Static Acoustic Monitoring (CPODs/Soundtraps)	Marine mammal acoustic monitoring using CPODs deployed on the seabed. SoundTrap hydrophones may be deployed alongside the CPODs for periods throughout the monitoring campaign.	Either 4 permanent sites will be selected, or the 4 sites will be relocated every 3 months during battery change. The CPOD locations are subject to archaeological survey results.
<b>Archaeological</b>	Underwater Archaeology	Identification and assessment of metallic and other targets recorded during the marine geophysical surveys.	Underwater Archaeology survey may be undertaken across the Licence Application Area



**Table 2-3 Typical Time Required for and footprint of Site Investigation Activities**

Activity	Typical Time Period Required for Activity	Total Number of SI Locations	Total Time for Site Investigations	Footprint Affected per SI	Footprint Affected per SI (km <sup>2</sup> )	Total Footprint per SI (km <sup>2</sup> )	Area Directly Affected as % of Total Licence Area
Hydrographical and Geophysical	4-8 weeks (weather dependent)	N/A	4-8 weeks. The survey area and in particular the potential cable routes will be refined prior to undertaking the geophysical survey to minimise the time on site.	N/A	N/A	N/A	N/A
Borehole	24 - 36 hours in any one location	60	Up to 225 days in total hours for actual boreholes across all campaigns. Boreholes will be split between campaigns with a preliminary campaign typically taking up to 10 weeks and an interim campaign typically taking up to 20 weeks.	8 m <sup>2</sup>	0.000008	0.00048	0.0003009782%
CPT	30 minutes - 3 hours in any one location	60	Maximum 40 days of actual SI time over all campaigns but is part of same campaign as Boreholes so approximately 10 weeks for a preliminary campaign and 20 weeks for an interim campaign. Some locations will be co-located with borehole locations.	8m <sup>2</sup>	0.000008	0.00048	0.0003009782%
Gravity Corer/Vibrocore	45 minutes - 2 hours in any one location	60	Maximum 24 days of actual SI time but is part of same campaign as Boreholes so approximately 10 weeks for preliminary campaign and 20 weeks for the interim campaign	1m <sup>2</sup>	0.000001	0.00006	0.0000376223%
Benthic Grab Sampling	Up to 2 hours in any one location	200	Maximum 30 days in actual SI hours however 6 to 8 weeks for the campaign to allow for SI Prep (drop down camera or ROV) and transit between locations	1m <sup>2</sup>	0.000001	0.0002	0.0001254076%



Activity	Typical Time Period Required for Activity	Total Number of SI Locations	Total Time for Site Investigations	Footprint Affected per SI	Footprint Affected per SI (km <sup>2</sup> )	Total Footprint per SI (km <sup>2</sup> )	Area Directly Affected as % of Total Licence Area
ADCP	4 weeks - 12 months in any one location	5	(1 - 12 months). Actual deployment will include 1 day to deploy and 1 day to retrieve.	1m <sup>2</sup>	0.000001	0.000005	0.0000031352%
Wave Buoys	Throughout site investigation campaign	2	(12 - 24 months). Actual deployment will include 1 day to deploy and 1 day to retrieve	1m <sup>2</sup>	0.000001	0.000002	0.0000012541%



## **2.3 SURVEY SCHEDULE**

The intention is to begin survey activities as soon as feasible following license award, with a staged programme of investigations, capitalising on suitable weather windows over the licence duration. This phased approach will progress the overall development towards detailed design stage. The exact mobilisation dates will not be known until the process of procuring a contractor is complete.

Timing of the site investigation activities is dependent on many factors including weather, tidal flows, availability of vessels and the grant of a licence. The granting of a licence will have a direct effect on the timing of site investigation activities.



### 3 NEED AND ALTERNATIVES

The need for the proposed site investigation activities as described in Section 2 is to determine environmental conditions, the seafloor and subsurface geological characteristics within the Licence Area. The project design and required environmental assessments cannot be progressed without these data.

The alternative to collecting site and project specific data is to use existing, available data for project design and to inform environment assessments. Existing, available data have been reviewed and are being used to inform the project, however these are not available in the spatial or temporal resolution required for project design and environmental assessment purposes.



## 4 CONSIDERATION OF DIRECTIVES

This section considers the implication of the proposed site investigation activities with regard to the following directives:

- Environmental Impact Assessment (EIA) Directive
- Water Framework Directive (WFD)
- Marine Strategy Framework Directive (MSFD).

### 4.1 EIA DIRECTIVE REQUIREMENTS

Article 2(1) of the EIA Directive provides:

“Member States shall adopt all measures necessary to ensure that, before development consent is given, projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to a requirement for development consent and an assessment with regard to their effects on the environment. Those projects are defined in Article 4.”

Article 4(1) requires that “...projects listed in Annex I shall be made subject to an assessment...”. EIA is therefore mandatory for the project types listed in Annex I. Article 4(2) requires that Member States must determine for Annex II project types whether EIA is required, through:

- a) a case-by-case assessment, or
- b) thresholds or criteria set by the member State.

The MAP Act (2021) transposes the Article 4 requirement through Part 1 Section 4 as follows:

“1.4 Effect or further effect, as the case may be, is given to by this Act to an act specified in the Table to this section, adopted by an institution of the European Union or, where appropriate, to part of such an act:

7. Environmental Impact Assessment Directive.”

As is the case under EU law, under national law the requirement to carry out EIA or screening for EIA only arises in relation to projects which come within the scope of one or more classes of project listed in Parts 1 or 2 of Schedule 5.

EIA or screening for EIA is not required where a proposed development does not come within any of the classes of project listed in Schedule 5, interpreted broadly, irrespective of the size or location of the proposed development or whether it is considered likely to have a significant effect on the environment.

Part 1 of Schedule 5 of the Planning and Development Regulations 2001, as amended (Planning Regulations) lists the project types for which EIA is mandatory, transposing Annex I of the EIA Directive.



Part 2 lists project types for which EIA is mandatory if a specified threshold is exceeded. For all other project types listed in Part 2, corresponding to Annex II, which do not exceed a threshold or for which no threshold is set, a screening analysis and determination are required on a case-by-case basis. An EIA is also required for projects which do not exceed the threshold, but where the Minister determines that the proposed project will be likely to have significant effects on the environment.

#### **4.1.1 APPROACH TO EIA SCREENING**

The Office of the Planning Regulator issued a practice note, OPR Practice Note PN02, on EIA Screening for development proposals (Office of the Planning Regulator, 2021). While the aim of the Practice Note is to provide guidance for compliance with the planning legislation, it provides useful guidance for EIA Screening for other consent regimes.

The Practice Note recommends a step-by-step approach to EIA Screening, as follows:

Step 1: Understanding the proposal

The first step comprises the following tests:

- a) Is the proposed development a project as per the EIA Directive?

If not, then the proposed development is not subject of EIA Directive, no screening is required, and no EIA is required.

- b) Is the project listed in Schedule 5 Part 1 or does it meet or exceed the thresholds in Part 2 of the Planning and Development Regulations, SI 600 of 2001, as amended?

If it does, no screening is required and EIA is mandatory.

- c) Is the project sub threshold?

If it is, then the project must proceed to Step 2, as preliminary examination is required.

Step 2: Preliminary Examination & Conclusion

This step consists of a preliminary examination of, at least, the nature, size, or location of the development, considering:

- Nature of the development including production of wastes and pollutants
- Size of the development
- Location of the development including proximity to ecologically sensitive sites and the potential to affect other environmental sensitivities in the area.

Step 2 will have one of three outcomes:

- a) There is no real likelihood of a significant effect on the environment and no further action is required. The reasons for this conclusion will be recorded.
- b) There is significant doubt as to the effects on the environment; the project must proceed to Step 3, as a formal screening determination is required.



- c) There is a real likelihood of a significant effect on the environment and an EIA is required.

### Step 3: Formal Screening Determination

In this step, a Screening exercise must be carried out in order to determine if the proposal is likely to have significant effects on the environment. In making the determination, the planning authority must have regard to Schedule 7 criteria, Schedule 7A information, results of other relevant EU assessments, the location of sensitive ecological sites, or heritage or conservation designations. Mitigation measures may be considered.

The Screening Determination must record the outcome of the Screening exercise and state the main reasons and considerations, with reference to the relevant criteria listed in Schedule 7 of the Regulations and mitigation if relevant.

## 4.1.2 SCREENING FOR MANDATORY EIA

### Part 1 of Schedule 5

All of the project types in Part 1 have been considered in the preparation of this report. The proposed site investigation activities do not constitute a project type or class listed in Part 1 of Schedule 5 of the Regulations.

### Part 2 of Schedule 5

All of the project types in Part 2 have been considered in the preparation of this report. The following class listed in Part 2 of Schedule 5 is the only class that is considered to be relevant to the proposed surveys, and is therefore given more detailed consideration below:

“Class 2 Extractive Industry

2 (e) With the exception of drilling for investigating the stability of the soil, deep drilling, consisting of—

(iv) any other deep drilling, except where, in considering whether or not an environmental impact assessment will be carried out.”

The proposed site investigation activities include geotechnical surveys comprising the drilling of up to 60 no. boreholes. The boreholes that will be undertaken at the landfall locations will be shallow in nature (c. 15 –80m deep) to investigate the stability of the soils and to determine the most suitable construction method for the proposed port facility.

The drilling proposed under this application is shallow in nature and its purpose is to investigate composition of the soil to establish the stability of the soil and is excluded from Class 2(e). As deep drilling for investigating the stability of the soil is excluded from Class 2(e), the proposed site investigation activities are not of a class listed in Part 2 of Schedule 5 of the Regulations and, therefore, the proposed site investigation activities are exempt as per the EIA Directive.



#### **4.1.3 CONCLUSION OF THE EIA SCREENING**

In answering Step 1, question (a): Is the proposed development a project as per the EIA Directive? as per OPR Practice Note 02, the answer is 'No', and the conclusion is that the proposed site investigation activities are not subject of the EIA Directive, no Screening is required, and no EIA is required.



## 4.2 WATER FRAMEWORK DIRECTIVE

Council Directive 2000/60/EC (the Water Framework Directive [WFD]) on establishing a framework for community action in the field of water policy was adopted by all member states in October 2000. Since 2000, the WFD has been the main law for water protection in Europe. It applies to inland, transitional and coastal surface waters as well as groundwater. It ensures an integrated approach to water management, respecting the integrity of whole ecosystems, including by regulating individual pollutants and setting corresponding regulatory standards. It is based on a river basin district approach to make sure that neighbouring countries cooperate to manage the rivers and other bodies of water they share.

The key objectives of the WFD are set out in Article 4. It requires Member States to use their River Basin Management Plans (RBMPs) and Programmes of Measures (PoMs) to protect and, where necessary, restore water bodies to reach good status, and to prevent deterioration. Good status means both good chemical and good ecological status.

Section 6.3 within the Assessment of Impacts outlines water quality, providing a brief outline of the WFD status, pollution status and condition (i.e. satisfactory, unsatisfactory). The section describes the status of the receiving environment's water quality, the potential effects and an assessment of those potential effects for the Licence Area.

## 4.3 MARINE STRATEGY FRAMEWORK DIRECTIVE (MSFD)

In 2008, the EU adopted the Marine Strategy Framework Directive (MSFD) to maintain healthy, productive and resilient marine ecosystems while securing a more sustainable use of marine resources. The MSFD Directive requires Member States to develop national marine strategies in order to achieve, or maintain where it exists, 'good environmental status'. Such status should have been achieved by 2020.

The marine strategies comprise regular assessments of the marine environment, setting objectives and targets, establishing monitoring programmes and putting in place measures to improve the state of marine waters. All these actions must be done in close coordination with neighbouring countries at regional sea level (European Commission, 2020).

Section 6 Assessment of Impacts describes the marine environment and undertakes an analysis of the likely effects of the proposed site investigation activities on 'good environmental status (GES)'. These are shown in Table 4-1 with reference to sections where they are assessed.

**Table 4-1 Marine Strategy Framework Directive GES Descriptors**

	GES Descriptors	Details	Section references
1	Biodiversity	The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.	Section 6.4



	GES Descriptors	Details	Section references
2	Non-indigenous species	Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.	Section 6.4
3	Populations of commercial species	Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.	Section 6.5
4	Food web structure	All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.	Section 6.5.3
5	Eutrophication	Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters	Section 6.4 & 6.3
6	Sea floor integrity	Sea floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.	Section 6.4.1
7	Alterations to hydrography	Permanent alteration of hydrographical conditions does not adversely affect marine.	Section 6.3
8	Contaminants	Contaminants are at a level not giving rise to pollution effects.	Section 6.11
9	Sea-food contaminants	Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.	Section 6.5
10	Marine litter	Properties and quantities of marine litter do not cause harm to the coastal and marine environment.	Section 6.13
11	Energy and noise	Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.	Section 6.12 & 6.4.3



## 5 PLANNING AND DEVELOPMENT

This section has been prepared to demonstrate that the SI works which are proposed to be carried out in the Licence Application Area are consistent with Ireland's National Marine Planning Framework, European Commission's guidance on port development and other supporting policies and guidance.

### 5.1 THE NATIONAL MARINE PLANNING FRAMEWORK (2021)

The NMPF "is a national plan for Ireland's seas, setting out, over a 20-year horizon, how Ireland will use, protect, and enjoy its seas. The NMPF sits at the top of the hierarchy of plans and sectoral policies for the marine area."

The NMPF establishes a vision for the future development of the marine planning system towards 2040. It will play an important role in supporting both the short-term recovery and the longer-term planning for Ireland's maritime area, to have a lasting effect on Ireland's most significant natural resource.

The NMPF is Ireland's first comprehensive marine spatial planning framework, as required under Directive 2014/89/EU of the European Parliament and of the Council of July 23<sup>rd</sup>, 2014, establishing a framework for maritime spatial planning, known as the Maritime Spatial Planning (MSP) Directive. Member States establishing and implementing MSP must consider economic, social and environmental aspects to support the sustainable development and growth of the maritime sector.

The NMPF is also a parallel document to the National Planning Framework (NPF), which guides strategic terrestrial planning and development, and it is important that each is consistent with the other, as well as regional and local plans.

Some of the high-level objectives laid out in the NMPF in relation to Port Development and Offshore Renewable Energy (ORE) include:

- Safeguard the operation of ports as key actors in the economic wellbeing of the State through the provision of safe and sustainable maritime transport;
- Sustainable development of the ports sector and full realisation of the National Ports Policy with a view to providing adequate capacity to meet present and future demand, and to adapt to the consequences of climate change;
- Ensure that the strategic development requirements of Tier 1 and Tier 2 Ports, ports of regional significance, and smaller harbours are appropriately addressed in regional and local marine planning policy to support the development of ORE in Ireland;
- To make Ireland a leader in climate action through reaching ORE targets;
- To increase the sustainable ORE use of our extensive marine resource;
- To support Ireland's decarbonisation journey through increased use of ORE; and
- To provide enhanced security of supply.



This application relates to permission to carry out site investigation surveys which will inform the design of the Bremore Ireland Port facility, which will support Ireland in achieving 2030 decarbonisation targets through supporting the construction and later operation and maintenance of offshore wind farms in the Irish Sea, while also bringing economic and social benefits to local coastal communities and to the wider Dublin and Meath areas.

The National Marine Planning Framework includes a number of policies in relation to Ports and Offshore Renewable Energy more specifically, Chapter 13 of the NMPF sets out a number of policies in relation to ORE, some of which developers must comply with, and others which are aimed at the various regulatory authorities that operate in Ireland's maritime area. Chapter 18 of the NMPF applies to Ports, Harbours and Shipping and includes a number of policies in relation to port development and operation. These policies are discussed below to further demonstrate how this application is consistent with the NMPF.

The other ORE Policies contained in the NMPF are not deemed to be directly applicable to this MUL Application. Those deemed non-applicable include Ports, Harbours and Shipping Policy 5, Ports, Harbours and Shipping Policy 6, Ports, Harbours and Shipping Policy 7, Ports, Harbours and Shipping Policy 9, ORE Policy 3, ORE Test projects (ORE Policy 5), ports (ORE Policy 7), proposals for ORE (ORE Policy 8), offshore wind farm permission (ORE Policy 9), policy makers (ORE Policy 10) and proposals related to the provision of emerging technologies (ORE Policy 11).

We believe that the above, together with Table 5-1, demonstrates that this application is consistent with both the high-level objectives of the NMPF, and those Port Development and ORE Policies that are considered relevant to the proposed activities under this licence application.



**Table 5-1 Table outlining consistency of this Licence Application with relevant policies**

Policy	Description	Discussion	Conclusion
Ports, Harbours and Shipping Policy 1	<p>To provide for shipping activity and freedom of navigation the following factors will be taken into account when reaching decisions regarding development and use:</p> <ul style="list-style-type: none"> <li>• The extent to which the locational decision interferes with existing or planned routes used by shipping, access to ports and harbours and navigational safety. This includes commercial anchorages and approaches to ports as well as key littoral and offshore routes;</li> <li>• A mandatory Navigation Risk Assessment;</li> <li>• Where interference is likely: whether reasonable alternatives can be identified; and</li> <li>• Where there are no reasonable alternatives: whether mitigation through measures adopted in accordance with the principles and procedures established by the International Maritime Organisation can be achieved at no significant cost to the shipping or ports sector</li> </ul>	<p>This application is for site investigations only and the results will be used to inform the detailed design and precise location of the Bremore deep-water multi-modal energy port development.</p>	<p>The site investigation works proposed are consistent and compliant with Ports, Harbours and Shipping Policy 1, assuming the policy is applicable to developers.</p>
Ports, Harbours and Shipping Policy 2	<p>Proposals that may have a significant impact upon current activity and future opportunity for expansion of port and harbour activities should demonstrate that they will, in order of preference:</p> <p>a) avoid,</p> <p>b) minimise, or</p>	<p>This is an application for site investigation survey activities only, however, the design of the new Bremore Port Development (i.e. the “future development”) is intended to avoid significant adverse impacts, and, where adverse impacts cannot be avoided, the design will minimise and mitigate these impacts</p>	<p>The site investigation works proposed are consistent and compliant with Ports, Harbours and Shipping Policy 2, which indicated that the application should be supported.</p>



Policy	Description	Discussion	Conclusion
	<p>c) mitigate significant adverse impacts, and</p> <p>d) if it is not possible to mitigate significant adverse impacts on current activity and future opportunity for expansion of port and harbour activities, proposals should set out the reasons for proceeding</p>		
Ports, Harbours and Shipping Policy 3	Proposals that may have significant impact upon current activity and future opportunity for expansion of port and harbour activities must demonstrate consideration of the National Ports Policy, the National Planning Framework, and relevant provisions related to the TEN-T network	Please see the response to Ports, Harbours and Shipping Policy 2	The site investigation works proposed are consistent and compliant with Ports, Harbours and Shipping Policy 3, which indicated that the application should be supported.
Ports, Harbours and Shipping Policy 4	<p>Proposals within ports limits, beside or in the vicinity of ports, and / or that impact upon the main routes of significance to a port, must demonstrate within applications that they have:</p> <ul style="list-style-type: none"> <li>• been informed by consultation at pre-application stage or earlier with the relevant port authority;</li> <li>• have carried out a navigational risk assessment including an analysis of maritime traffic in the area; and</li> <li>• have consulted Department of Transport, MSO and Commissioners of Irish Lights. Applicants must continue to engage parties identified in pre-application processes as appropriate during the decision-making process.</li> </ul>	<p>This application is for site investigations only and the results will be used to inform the detailed design and precise location of the Bremore deep-water multi-modal energy port development. A Navigation Risk Assessment will be provided as part of the EIA for the port development once the full extent of the new port design is known. It will be submitted to An Bord Pleanála as part of an application for planning permission under the Strategic Infrastructure Development provisions of the Planning and Development Act 2000, as amended at the appropriate time.</p> <p>The Department of Transport are aware of the application for site investigations and of the future plans for development. A Stakeholder Management Plan is currently being developed. Under that plan Irish Rail intends to undertake engagement with both the MSO and the Commissioners of Irish Lights in the coming weeks and months as well as engagement with a broad range of stakeholders.</p>	The site investigation works proposed are consistent and compliant with Ports, Harbours and Shipping Policy 4, which indicated that the application should be supported



Policy	Description	Discussion	Conclusion
Ports, Harbours and Shipping Policy 5	Proposals for capital dredging will be supported where it is necessary to safeguard national port capacity and Ireland's international connectivity, and where required compliance assessments associated with authorisations have been carried out and incorporated into subsequent competent authority decision(s).	N/A	This application is for site investigation survey activities only. Therefore, this policy does not apply to this application
Ports, Harbours and Shipping Policy 6	In areas of authorised dredging activity, including those subject to navigational dredging, proposals for other activities will not be supported unless they are compatible with the dredging activity.	N/A	This application is for site investigation survey activities only. Therefore, this policy does not apply to this application
Ports, Harbours and Shipping Policy 7	<p>Proposals for maintenance dredging activity will be supported where:</p> <ul style="list-style-type: none"> <li>• relevant decisions by competent authorities incorporate the outcome of statutory environmental assessment processes, as well as necessary compliance assessments associated with authorisations, including in relation to the planning process;</li> <li>• there will be no significant adverse impact on marine activities or uses or the maritime area. Any potential adverse impact will be, in order of preference, avoided, minimised or mitigated;</li> <li>• dredged waste is managed in accordance with internationally agreed hierarchy of waste management options for sea disposal;</li> <li>• if disposing of dredged material at sea, existing registered disposal sites are used, in preference to new disposal sites; and</li> </ul>	N/A	This application is for site investigation survey activities only. Therefore, this policy does not apply to this application.



Policy	Description	Discussion	Conclusion
	<ul style="list-style-type: none"> <li>where they contribute to the policies and objectives of this NMPF</li> </ul>		
Ports, Harbours and Shipping Policy 8	<p>Proposals that cause significant adverse impacts on licensed disposal areas should not be supported. Proposals that cannot avoid such impact must, in order of preference:</p> <ul style="list-style-type: none"> <li>a) minimise,</li> <li>b) mitigate, or</li> <li>c) if it is not possible to mitigate the significant adverse impacts, proposals must set out the reasons for proceeding.</li> </ul>	This application is for site investigation survey activities only. There is a dump permit No. S0015-03 located in the northern area of the MUL. The SI proposed in this area is restricted to sediment grab samples. These are considered minimal in potential impact.	The site investigation survey activities proposed are consistent and compliant with Ports, Harbours and Shipping Policy 8, which indicates that the application should be supported.
Ports, Harbours and Shipping Policy 9	Proposals for the management of dredged material must demonstrate that they have been assessed against the waste hierarchy (see Glossary).	N/A	This application is for site investigation survey activities only. Therefore, this policy does not apply to this application.
Ports, Harbours and Shipping Policy 10	<p>Proposals identifying new dredge disposal sites which are subject to best practice and guidance from previous studies should be supported where:</p> <ul style="list-style-type: none"> <li>competent authority decisions incorporate necessary compliance assessments associated with authorisations; and</li> <li>they contribute to the policies and objectives of this NMPF.</li> </ul> <p>Proposals must include an adequate characterisation study, be assessed against the waste hierarchy and must be informed by consultation with all relevant stakeholders.</p>	N/A	This application is for site investigation survey activities only. Therefore, this policy does not apply to this application.



Policy	Description	Discussion	Conclusion
ORE Policy 1	<p>Proposals that assist the State in meeting the Government's offshore renewable energy targets, including the target of achieving 5 GW of capacity in offshore wind by 2030 and proposals that maximise the long-term shift from use of fossil fuels to renewable electricity energy, in line with decarbonisation targets, should be supported.</p> <p>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.</p>	<p>The site investigation works being applied for in the proposed Application Area are being carried out with a view to supporting and informing the development of the Bremore Ireland Port which will facilitate the construction and subsequent operations and maintenance off offshore wind development in the Irish Sea. This facility will ensure that the staging port used for construction is based in Ireland maximising the value of offshore wind to Ireland and reducing the Levelised Cost of Energy for offshore wind and therefore reducing the cost of offshore wind subsidies for the consumer.</p>	<p>The site investigation survey activities proposed are consistent and compliant with ORE Policy 1, which indicates the application should be supported.</p>
ORE Policy 2	<p>Proposals must be consistent with national policy, including the OREDP and its successor. Relevant Projects designated pursuant to the Transition Protocol and those projects that can objectively enable delivery on the Government's 2030 targets will be prioritised for assessment under the new consenting regime.</p> <p>Into the future, areas designated for offshore energy development, under the Designated Marine Area Plan process set out in the Maritime Area Planning Bill, will underpin a plan-led approach to consenting</p>	<p>As previously outlined, this application is for site investigation survey activities to inform the design of a port facility to support offshore wind development. The survey work will be used to inform the detailed design and precise location of a multi-modal energy port development that could assist the delivery of the Government's 2030 targets, aligning with National Policy outlined in the PfG (2020) and CAPs (2019 and 2021), among others.</p>	<p>The site investigation works proposed are consistent and compliant with ORE Policy 2, which indicates the application should be supported.</p>
ORE Policy 3	<p>Any non-ORE proposals that are in or could affect sites held under a permission or that are subject to an ongoing permitting or consenting process for renewable energy generation (wind, wave or tidal) should demonstrate that they will in order of preference:</p>	N/A	<p>This proposed site investigation survey activities do not overlap with any ORE proposals. Therefore, this policy does not apply to this application.</p>



Policy	Description	Discussion	Conclusion
	<p>a) avoid,</p> <p>b) minimise,</p> <p>c) mitigate adverse impacts, or</p> <p>d) if it is not possible to mitigate significant adverse impacts, proposals should set out the reasons for proceeding.</p> <p>Applicants for non-ORE proposals in or affecting ORE sites should engage ORE developers in consultation during the pre-application processes as appropriate.</p>		
ORE Policy 4	Decisions on ORE developments should be informed by consideration of space required for other activities of national importance described in the NMPF.	N/A	This policy does not apply to this application.
ORE Policy 5	<p>Proposals for activity that may adversely impact ORE test projects by virtue of being within or adjacent to ORE test sites, or between site and landfall of ORE test projects that may adversely impact ORE test site projects, should demonstrate that they will in order of preference:</p> <p>a) avoid,</p> <p>b) minimise,</p> <p>c) mitigate adverse impacts</p>	N/A	The proposed investigation area is not within or adjacent to any ORE test site. ORE Policy 5 is not applicable to this application.
ORE Policy 6	Proposals for infrastructure enabling local use of excess energy generated from emerging marine technologies (wave, tidal, floating wind) should be supported.	The proposed site investigation survey activities do not relate to a wave, tidal or floating wind project.	ORE Policy 6 is not applicable to this application.
ORE Policy 7	Where potential for ports to contribute to ORE is identified, plans and policies related to this port	This application is for site investigations only, however the results will be used to inform the detailed design	The site investigation survey activities proposed are



Policy	Description	Discussion	Conclusion
	must encourage development in such a way as to facilitate ORE and related supply chain activity.	and precise location of the Bremore port development which will facilitate the construction and subsequent operations and maintenance of offshore wind development in the Irish Sea. This facility will ensure that the staging port used for construction is based in Ireland maximising the value of the offshore wind to Ireland and reducing the Levelised Cost of Energy for offshore wind and therefore reducing the cost of offshore wind subsidies for the consumer	consistent and compliant with ORE Policy 7, which indicates the application should be supported.
ORE Policy 8	Proposals for ORE must demonstrate consideration of existing cables passing through or adjacent to areas for development, making sure ability to repair and carry out cable-related remedial work is not significantly compromised. This consideration should be included as part of statutory environmental assessments where such assessments are required.	N/A	This application is for site investigation survey activities only. This policy does not apply to this application.
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. Where a development consent is applied for in an area already subject to permission, proposals must include a visualisation assessment to inform design and layout. Visualisation assessments should demonstrate consultation with communities that may be able to view the proposal, in addition to any other ORE development, which had received consent to proceed at a given site at the time the consent application is made, with the aim of minimising impact. Visualisation assessments will be informed by specific emerging guidelines (detailed in the actions set out in Annexes to this	N/A	This application is for site investigation survey activities only. This policy does not apply to this application.



Policy	Description	Discussion	Conclusion
	NMPF). Prior to specific guidelines being available, policy and best practice relating to visualisation assessment should be used. This consideration must be included as part of statutory environmental assessments where such assessment is required.		
ORE Policy 10	Opportunities for land-based, coastal infrastructure that is critical to and supports development of ORE should be prioritised in plans and policies, where possible.	N/A	ORE Policy 10 relates to planners and policymakers and is not applicable to this application.
ORE Policy 11	Where appropriate, proposals that enable the provision of emerging renewable energy technologies and associated supply chains will be supported.	This application is for site investigations only; however, the results will be used to inform the detailed design and precise location of the Bremore deep-water multi-modal energy port development which will facilitate the construction and subsequent operations and maintenance of offshore wind development in the Irish Sea. This facility will ensure that the staging port used for construction is based in Ireland maximising the value of the offshore wind to Ireland and reducing the Levelised Cost of Energy for offshore wind and therefore reducing the cost of offshore wind subsidies for the consumer	This application is for site investigation survey activities that will inform the detailed design and location of the proposed multi-modal energy port to support ORE and associated supply chains. Therefore, this application is consistent and compliant with ORE Policy 11.



## 6 ASSESSMENT OF IMPACTS

### 6.1 OVERVIEW

The following documents, also submitted in support of this MUL Application, provide a description of the known receiving environment for the application area, identify the potential environmental impacts of the proposed site investigation activities, and assess the possible effects of these impacts on the receiving environment:

- Supporting Information for Screening of Appropriate Assessment (SISAA)
- Natura Impact Statement (NIS)
- Risk Assessment for Annex IV Species (RAAIVS)

Table 6-1 sets out, for each of the documents listed above, the specific sections and sub-sections where relevant information for this AIMU can be found.

**Table 6-1: Relevant sections and sub-sections in other reports submitted in support of the Application.**

Report	Section/Subsection	Content Description
Supporting Information for Screening of Appropriate Assessment (SISAA)	Section 3. Potential Environmental Impacts 3.2 Marine Ornithology (disturbance, indirect effects and injury resulting from pollution and litter) 3.3 Annex I Benthic Habitats (Direct physical disturbance and smothering/scour from increased suspended sediment concentration) 3.4 Annex II Species (Marine Mammals, Annex II Anadromous Fishes, and other Annex II Species)	Describes potential environmental impacts and effects from the proposed site investigation activities on the receiving environment
	Section 4. Screening for Appropriate Assessment 4.1 Zone of Influence of the Site Investigation Activities 4.2 Pre-Screening of Natura 2000 Sites using the Source-Pathway-Receptor Model	Describes the Zone of Influence (Zol) and the Natura 2000 sites considered relevant to the site investigation activities, i.e. the Special Protected Areas and their Special Conservation Interests and the Special Areas of Conservation, designated Annex I Habitats and designated Annex II Species considered relevant to be included for Appropriate Assessment Stage 1 Screening (and subsequent Stage



Report	Section/Subsection	Content Description
		2 Appropriate Assessment where necessary)
	Section 4.3. Screening Assessment of Likely Significant Effects (LSE)	Considers the potential and assesses the likelihood of significant effects from the proposed site investigation activities on the integrity of relevant Natura 2000 sites and their Conservation Objectives (COs)
	Section 4.4 In-Combination Screening for Cumulative Effects	Defines a Cumulative Effects Spatial Scope and a Cumulative Effects Temporal Scope. Describes other known or proposed plans and projects in the vicinity of the site investigation activities, including proposed wind farm and export cable route activities known at the time of submission of the Application documentation, and their interactions with the proposed site investigation activities. Assesses the likelihood of cumulative effects, from the proposed site investigation activities with the described plans, and projects on the integrity relevant Natura 2000 sites and their Conservation Objectives.
	Section 6. Screening Statement Outcome	Details the conclusions of the AA Stage 1 Screening and identifies the Natura 2000 sites screened in for a Stage 2 AA
Natura Impact Statement (NIS)	Section 4. Impact Assessment	Assesses the likelihood of significant effects from the proposed site investigation activities on the integrity of relevant Natura 2000 sites and their Conservation Objectives (COs) Proposes measures necessary to avoid, reduce or offset any identified negative effects
	Section 4.7 In-combination Effects	Describes other plans and projects in the Zone of Influence of the proposed site investigation activities, and assesses the likelihood of in-combination significant effects, from the proposed site investigation activities with the described plans and projects, on the integrity relevant Natura 2000 sites and their Conservation Objectives
	Section 5 AA Conclusion	Presents the conclusion of the Stage 2 AA described in the sections above
Risk Assessment for Annex IV Species (RAAIVS)	Section 3. Annex IV Species In the Vicinity of the MUL Area	Describes the European Protected Species (Annex IV species) which may be found on site
	Section 4. Potential Impacts 4.1 Disturbance from Vibration and Underwater Noise Associated with Surveys	Describes potential environmental impacts from the proposed site investigation activities on Annex IV species



Report	Section/Subsection	Content Description
	4.2 Injury due to Collision 4.3 Pollution Event	
	Section 5.2 Impact Assessment	Assesses the impacts identified above on Annex IV species in the absence of any mitigation measures
	Section 6. Protection measures to prevent harm to Annex IV species	Proposes measures necessary to avoid, reduce or offset any identified negative effects

Sections 6.2 to 6.17 of this report consider potential impacts from the proposed site investigation survey activities on the following:

- 6.2) Land and Soils
- 6.3) Water
- 6.4) Biodiversity – marine benthos, Natura 2000 Sites, marine mammals, birds and fish ecology
- 6.5) Commercial Fisheries and aquaculture
- 6.6) Air Quality
- 6.7) Noise & Vibration
- 6.8) Landscape and Seascape
- 6.9) Marine Traffic
- 6.10) Archaeology and Cultural Heritage
- 6.11) Population and Human Health including tourism and recreation
- 6.12) Major Accidents and Disasters
- 6.13) Climate
- 6.14) Waste
- 6.15) Material Assets
- 6.16) Interactions
- 6.17) Other Proposed Developments.

## 6.2 LAND AND SOILS

The proposed site investigation survey activities are all within the marine environment; there is no potential impact on land and soils.



## 6.3 WATER

### 6.3.1 INTRODUCTION

The Environmental Protection Agency (EPA) provides information from river surveys on Water Framework Directive (WFD) status, pollution status and condition of hydrometric areas and river catchments around Ireland's coastline. For each river site, Q values are assigned based on the proportion of pollution sensitive to tolerant macroinvertebrates, with these being identified as the young stages of insects mainly but also including snails, worms and shrimp etc (EPA, 2023). Table 6-2 below illustrates the general Q value and water quality condition breakdown.

**Table 6-2: EPA River Quality Survey (EPA, 2023)**

Q Value	WFD Status	Pollution Status	Condition
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory

### 6.3.2 RECEIVING ENVIRONMENT

The Northwestern Irish Sea coastal waterbody, which overlaps with the proposed SI survey area of the licence application area, was given a status of 'good' following WFD status monitoring between 2016-2021.

The main pressure to affect rivers, transitional and coastal waterbodies in the area has been identified as agriculture, with hydro-morphological pressures (i.e. drainage schemes and in river structures, which may affect siltation rates within river systems), urban wastewater, diffuse urban, domestic wastewater also contributing (EPA, 2018).

The main operational coastal water monitoring stations can be found at Rogerstown, Rush, Skerries, Balbriggan Harbour, Balbriggan, and Boyne (EPA, 2023). Bremore is located directly north of the Skerries coastal water monitoring station and within close proximity to the Balbriggan area stations.

### 6.3.3 POTENTIAL EFFECTS

The potential effects to the water environment are described as follows:

#### **Deterioration in marine water quality due to re-suspension of sediments.**



Sediment disturbance arising from intrusive survey activities, may disturb the seabed and have the potential to result in a reduction of water clarity and the potential re-suspension of nutrients and contaminants.

#### **Change in water quality from accidental spills.**

Accidental spills of hazardous materials during SI activities have the potential to negatively impact Marine Water Quality in the licence and the surrounding area. By adhering to MARPOL and planning legislation, the occurrence of spills throughout the construction, operation and decommissioning of the project will be avoided.

### **6.3.4 ASSESSMENT OF POTENTIAL EFFECTS**

The proposed site investigation survey activities will mainly be undertaken at sea. These will result in a temporary increase in vessels using the area, which could theoretically increase the risk of accidents and resultant fuel spills. All vessels carry fuel during the survey activities. Lubricants are also present onboard. Any other potentially harmful substances are at very limited amounts stored in purpose made storage containers or facilities and adequately secured. There is no production of any substances involved and no bulk transportation of oil or chemical substances.

Collection and disposal of waste (refuse) produced as a result of the onboard activities will form part of any Health and Safety and/or Environmental Management Plan. However, an insignificantly small volume of the flush and cutting is expected to be released into the environment.

The released material will result in a temporary localised increase in turbidity and a small mound of the seabed comprising of the cuttings. All drilling fluids will be managed in compliance with the strictest environmental requirements and best practices.

Drilling of boreholes will use water or inert drill muds, with the drilling flush and drill cuttings being largely returned to the vessel and re-used and returned to shore for disposal. Collection and disposal of waste (refuse) produced as a result of the onboard activities will form part of any Health and Safety and/or Environmental Management Plan. However, a very small volume of the flush and cutting is expected to be released into the environment. The released material will result in a temporary localised increase in turbidity and a small mound of the seabed comprising of the cuttings. All drilling fluids will be managed in compliance with the appropriate environmental requirements and best practices.

Biodegradable polymer mix will be used throughout drilling operations where possible. Chemical material used will be from the List of Notified Chemicals (approved chemicals) and discharged into the marine environment under the Offshore Chemical Notification Scheme. The flush and cuttings will not result in any deterioration of sediment or water quality; therefore no likely significant effects (LSE) are expected as a result.

There will be no planned release of potentially harmful substances from the survey vessels. Strict maritime regulations, normal vessel operating standards and precautions, compliant with all International Maritime Law and National Maritime Legislation, will ensure the risk of a release is low and no significant effects are predicted.



In addition, all vessels used, shall, as required by law, be MARPOL compliant and fully certified by the Maritime Safety Office. Therefore, it is considered not likely that there would be any occurrence of a pollution event, accidental or otherwise, that could directly or indirectly affect the environment.

Any chemical material used will be from the List of Notified Chemicals (approved chemicals) and discharged into the marine environment under the Offshore Chemical Notification Scheme.

Therefore, it is considered not likely that there would be any occurrence of a pollution event, accidental or otherwise, that could directly or indirectly affect the environment.

In compliance with the Water Framework Directive (WFD) objectives, the proposed site investigation activities are not anticipated to result in a deterioration in a designated water body (or protected area) and will not jeopardise the attainment of good status (or the potential to achieve good ecological and chemical status).

## **6.4 BIODIVERSITY**

### **6.4.1 MARINE BENTHOS**

#### **6.4.1.1 INTRODUCTION**

Benthic and epibenthic macrofaunal invertebrates are a useful group to study in marine species assemblage mapping and environmental monitoring studies. Many macrofaunal species are sedentary, and their natural distributions typically show good relationships with habitat type and depth. Their responses to environmental change can therefore be more easily measured than more mobile species (e.g. pelagic fish). They are an integral part of marine food webs and can be an important source of food for certain commercially exploited fish and invertebrates. More practically, benthic macrofaunal invertebrates are well described taxonomically (e.g. by WoRMS - World Register of Marine Species) and can be readily sampled by grabs, corers and underwater imagery systems.

Macrofaunal invertebrate communities which occur within a particular habitat type and environmental conditions (e.g. depth, wave/tide energy) can be assigned to hierarchical habitat classification systems (e.g. European Nature Information System (EUNIS) Classification) and as biotopes, which can encompass both biotic and abiotic elements.

Survey-derived habitat classification and biotope data can be used with other geospatial information such as sediment and bathymetry data to create habitat and biotope maps, such as EUSeaMap (2021), which is a broad-scale map of physical habitats covering European marine basins, including Ireland's seabed.

For subtidal surveys seabed imagery will be used in advance of grab sampling to identify areas of protected habitat. If protected habitats are identified, the area will not be subject to physical sampling and imagery will be used as an alternative.

With respect to intertidal surveys, these will be undertaken within daylight hours and sensitive species within the survey area will be identified, recorded and avoided during sampling.

Samples taken within the intertidal area will be small and by their nature will be taken from soft sediments only. In addition, only a small number of samples will be taken (4-5 samples) along the



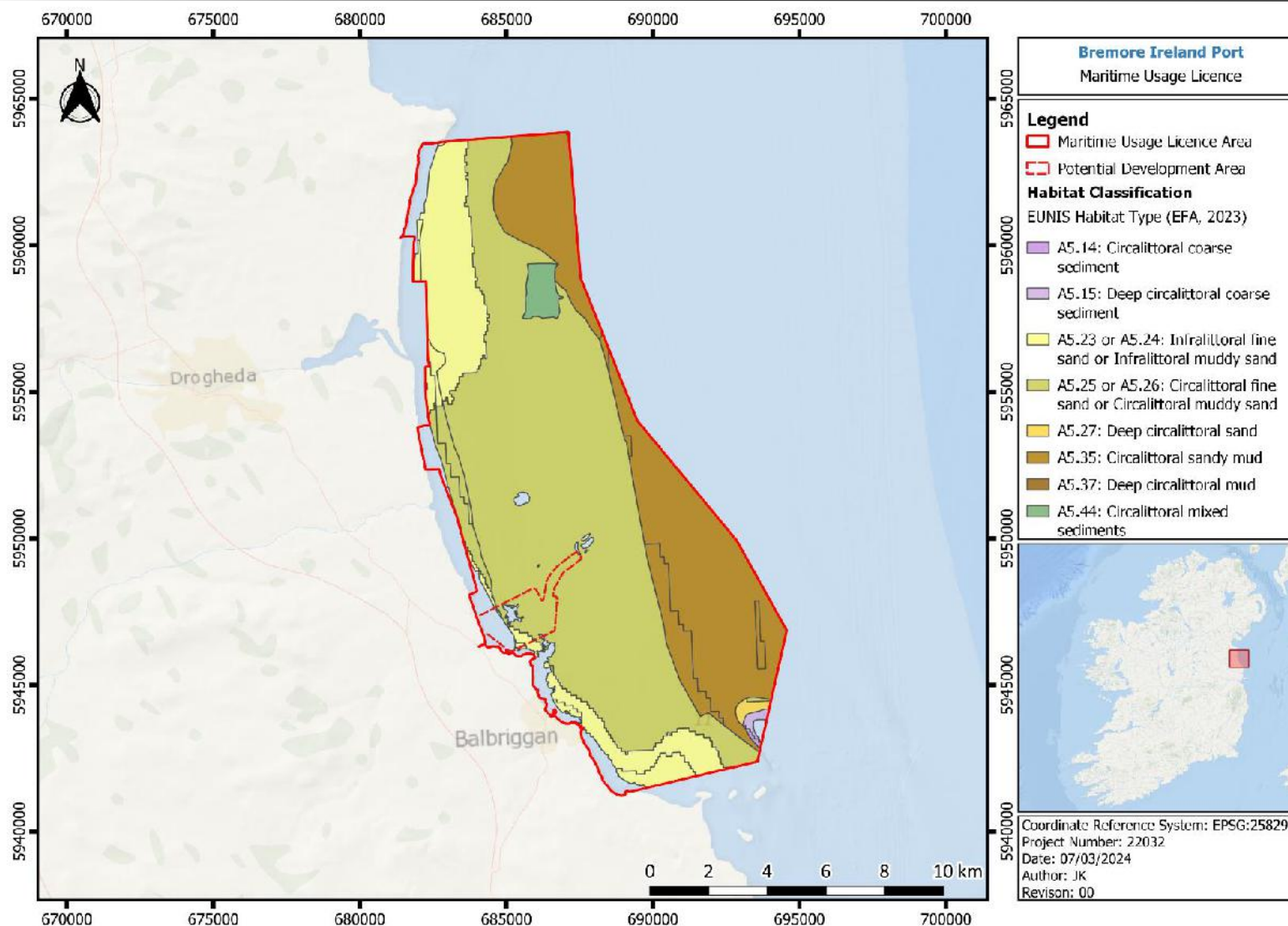
intertidal area from low water mark to high water mark. The total area affected will be very small in comparison to the overall intertidal area and given the nature of the sediment and its location will be very temporary in effect (likely filled in by the rising tide).

#### **6.4.1.2 RECEIVING MARINE BENTHIC HABITATS**

Water depths across the Licence Application Area range from 0 m to c. 26 m. Within the MUL, EUSeaMap (2021) predicts that the benthic habitats present are predominantly comprised of fine sands and muds (Figure 6-1). A small area of the south-eastern corner of the MUL is predicted to contain coarse sediments and rock.

Note EUSeaMap (2021) coverage does not include shallower, intertidal habitats.





**Figure 6-1 Predicted Benthic Habitats in Licence Area**



Summary descriptions of the habitat types predicted to be present in the area are provided below.

**Table 6-3 Habitat classification and description**

Habitat Classification	Details
A5.25 – Circalittoral fine sand	Clean fine sands with less than 5% silt/clay in deeper water, either on the open coast or in tide-swept channels of marine inlets in depths of over 15-20 m. The habitat may also extend offshore and is characterised by a wide range of echinoderms (in some areas including the sea urchin <i>Echinocyamus pusillus</i> ), polychaetes and bivalves. This habitat is generally more stable than shallower, infralittoral sands and consequently supports a more diverse community.
A5.26 – Circalittoral muddy sand	Circalittoral non-cohesive muddy sands with the silt content of the substratum typically ranging from 5% to 20%. This habitat is generally found in water depths of over 15-20 m and supports animal-dominated communities characterised by a wide variety of polychaetes, bivalves such as <i>Abra alba</i> and <i>Nucula nitidosa</i> , and echinoderms such as <i>Amphiura</i> spp. and <i>Ophiura</i> spp., and <i>Astropecten irregularis</i> . These circalittoral habitats tend to be more stable than their infralittoral counterparts and as such support a richer infaunal community.
A5.23: Infralittoral fine sand	These are clean sands which occur in shallow water, either on the open coast or in tide-swept channels of marine inlets. The habitat typically lacks a significant seaweed component and is characterised by robust fauna, particularly amphipods ( <i>Bathyporeia</i> ) and robust polychaetes including <i>Nephtys cirrosa</i> and <i>Lanice conchilega</i> .
A5.24: Infralittoral muddy sand	This is a non-cohesive muddy sand (with 5% to 20% silt/clay) in the infralittoral zone, extending from the extreme lower shore down to more stable circalittoral zone at about 15-20 m. The habitat supports a variety of animal-dominated communities, particularly polychaetes ( <i>Magelona mirabilis</i> , <i>Spiophanes bombyx</i> and <i>Chaetozone setosa</i> ), bivalves ( <i>Fabulina fibula</i> and <i>Chamelea gallina</i> ) and the urchin <i>Echinocardium cordatum</i> .
A5.14: Circalittoral coarse sediment	Tide-swept circalittoral coarse sands, gravel and shingle generally in depths of over 15-20m. This habitat may be found in tidal channels of marine inlets, along exposed coasts and offshore. This habitat, as with shallower coarse sediments, may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. Certain species of sea cucumber (e.g. <i>Neopentadactyla</i> ) may also be prevalent in these areas along with the lancelet <i>Branchiostoma lanceolatum</i> .
A5.27 – Deep Circalittoral sand	Offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. Very little data is available on these habitats however they are likely to be more stable than their shallower counterparts and characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms.
A5.35 – Circalittoral sandy mud	Circalittoral, cohesive sandy mud, typically with over 20% silt/clay, generally in water depths of over 10 m, with weak or very weak tidal streams. This habitat is generally found in deeper areas of bays and marine inlets or offshore from less wave exposed coasts. Sea pens such as <i>Virgularia mirabilis</i> and brittlestars such as <i>Amphiura</i> spp. are particularly characteristic of this habitat whilst infaunal species include the tube



Habitat Classification	Details
	building polychaetes <i>Lagis koreni</i> and <i>Owenia fusiformis</i> , and deposit feeding bivalves such as <i>Mysella bidentata</i> and <i>Abra</i> spp.
A5.37 – Deep Circalittoral mud	Atlantic sublittoral muds, occurring below moderate depths of 15-20 m, either on the open coast or in marine inlets such as sealochs.
A4.27: Faunal communities on deep moderate energy circalittoral rock	These communities populate hard substrata with low hydrodynamics and strong sedimentation (See A4.2 for more details on the habitat).
High energy circalittoral seabed	<p>General Description ‘Circalittoral rock and other hard substrata’:</p> <p>Circalittoral rock and other hard substrata are characterised by animal dominated communities (a departure from the algae dominated communities in the infralittoral zone). The circalittoral zone can itself be split into two sub-zones: upper circalittoral (foliose red algae present but not dominant) and lower circalittoral (foliose red algae absent). The depth at which the circalittoral zone begins is directly dependent on the intensity of light reaching the seabed; in highly turbid conditions, the circalittoral zone may begin just below the water level at mean low water springs (MLWS). The biotopes identified in the field can be broadly assigned to one of three energy level categories; high, moderate, and low energy circalittoral rock (used to define the habitat complex level). The character of the fauna varies and is affected mainly by wave action, tidal stream strength, salinity, turbidity, the degree of scouring and rock topography. It is typical for the community not to be dominated by single species, as is common in shore and infralittoral habitats, but rather comprise of mosaic species. This, coupled with the range of influencing factors, makes circalittoral rock a difficult area to satisfactorily classify; particular care should therefore be taken in matching species and habitat data to the classification.</p>
High, moderate and low energy infralittoral seabed	<p>General Description ‘Infralittoral Rock’:</p> <p>Infralittoral rock includes habitats of bedrock, boulders and cobbles which occur in the shallow subtidal zone and typically support seaweed communities. The upper limit is marked by the top of the kelp zone whilst the lower limit is marked by the lower limit of kelp growth or the lower limit of dense seaweed growth. Infralittoral rock typically has an upper zone of dense kelp (forest) and a lower zone of sparse kelp (park), both with an understory of seaweeds. In exposed conditions the kelp is <i>Laminaria hyperborea</i> whilst in the more sheltered habitats it is usually <i>Laminaria saccharina</i>; other kelp species may dominate under certain conditions. On the extreme lower shore and in the very shallow subtidal (sublittoral fringe) there is usually a narrow band of dabberlocks <i>Alaria esculenta</i> (exposed coasts) or kelps <i>Laminaria digitata</i> (moderately exposed) or <i>L. saccharina</i> (very sheltered). Areas of mixed ground, lacking stable rock, may lack kelps but support seaweed communities. In estuaries and other turbid-water areas, the shallow subtidal may be dominated by animal communities, with only poorly developed seaweed.</p>

### 6.4.1.3 POTENTIAL EFFECTS

Benthic habitats and associated macrofaunal invertebrate communities may be subject to the following impacts due to the proposed site investigation survey activities:



- Habitat disturbance and smothering during all intrusive site investigation activities
- Increased suspension of solids in the water column
- Vibration from geo-technical equipment
- Sediment penetration and some substratum loss
- Habitat loss.

#### **6.4.1.4 ASSESSMENT OF POTENTIAL EFFECTS**

The effect of the proposed site investigation activities on the seabed will be localised and temporary in nature. The area is subject to wave and tidal currents and is highly geomorphologically dynamic, with mobile bedforms changing with the tide. Any sediment disturbed by geotechnical survey activity is expected to be dispersed by the prevailing tides with far lower disturbance caused to benthic communities than by typical storm events.

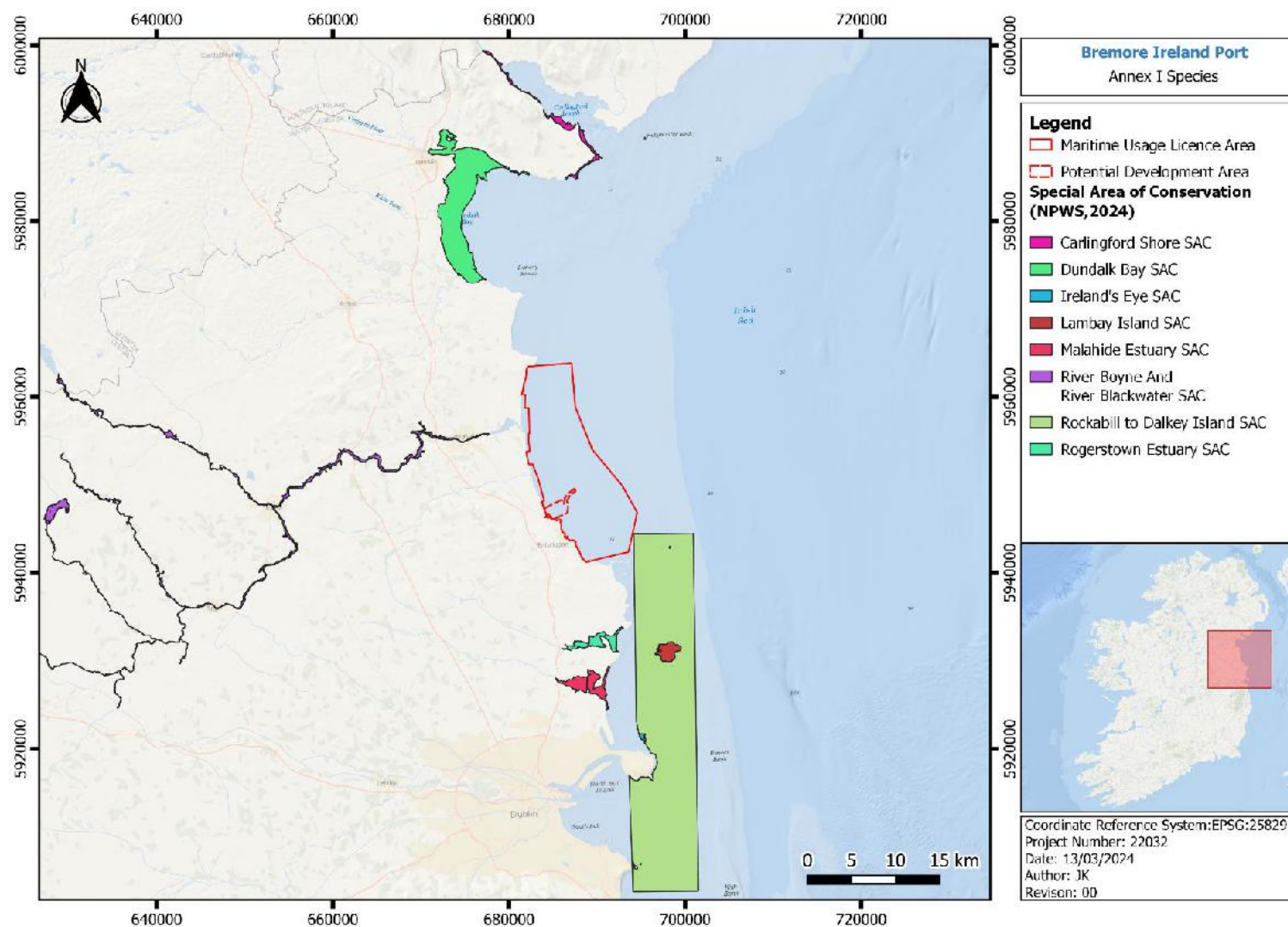
Therefore, no significant negative effects on benthic ecology are expected to be caused by the proposed survey activities.

#### **6.4.2 NATURA 2000 SITES**

The SISAA and NIS submitted as part of this MUL application have considered potential impacts from the proposed site investigation activities on Natura 2000 sites and identified appropriate mitigation measures. The NIS concluded that, with the implementation of the mitigation measures specified therein and summarised in Section 7 below, the proposed site investigation survey activities, alone or in combination with other activities and developments, would not cause an adverse effect on the integrity of any Natura 2000 site.

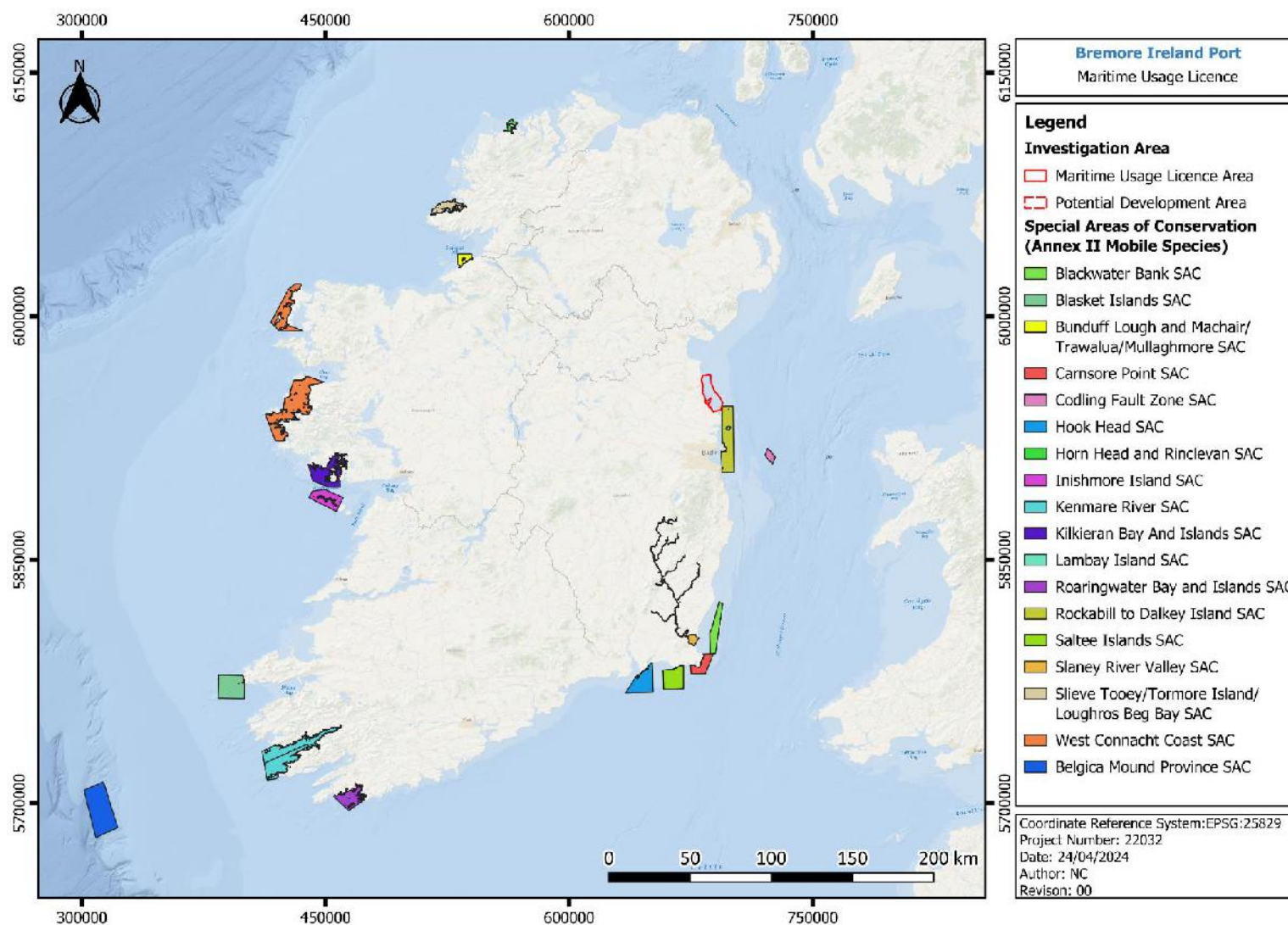
The marine Special Areas of Conservation for Annex I Habitats and Annex II mobile species, and Special Protection Areas (including the North-West Irish Sea candidate SPA) in the vicinity of the licence area can be seen in Figure 6-2, Figure 6-3 and Figure 6-4.





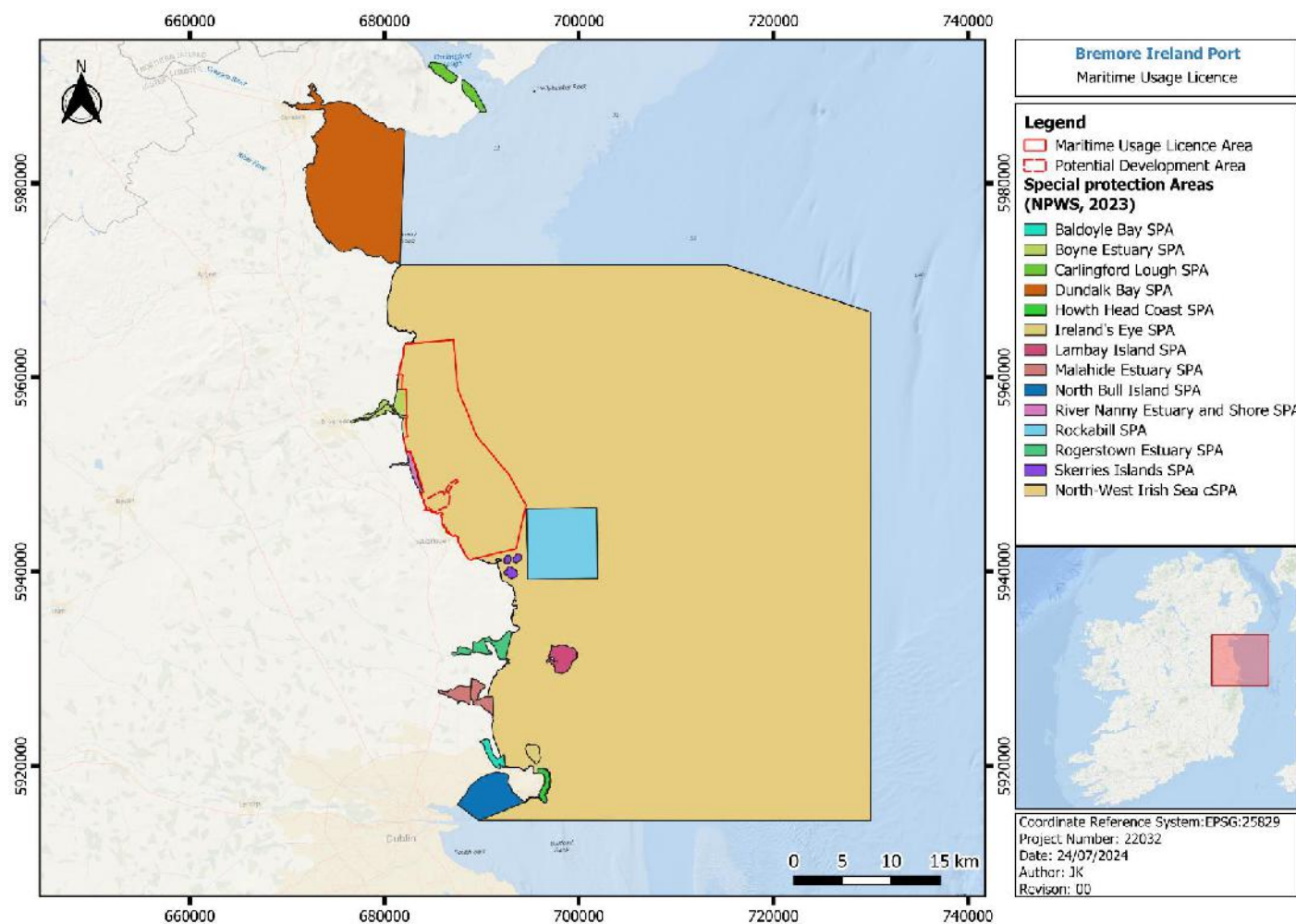
**Figure 6-2: SAC Annex I Habitats in the vicinity of the Licence Area**





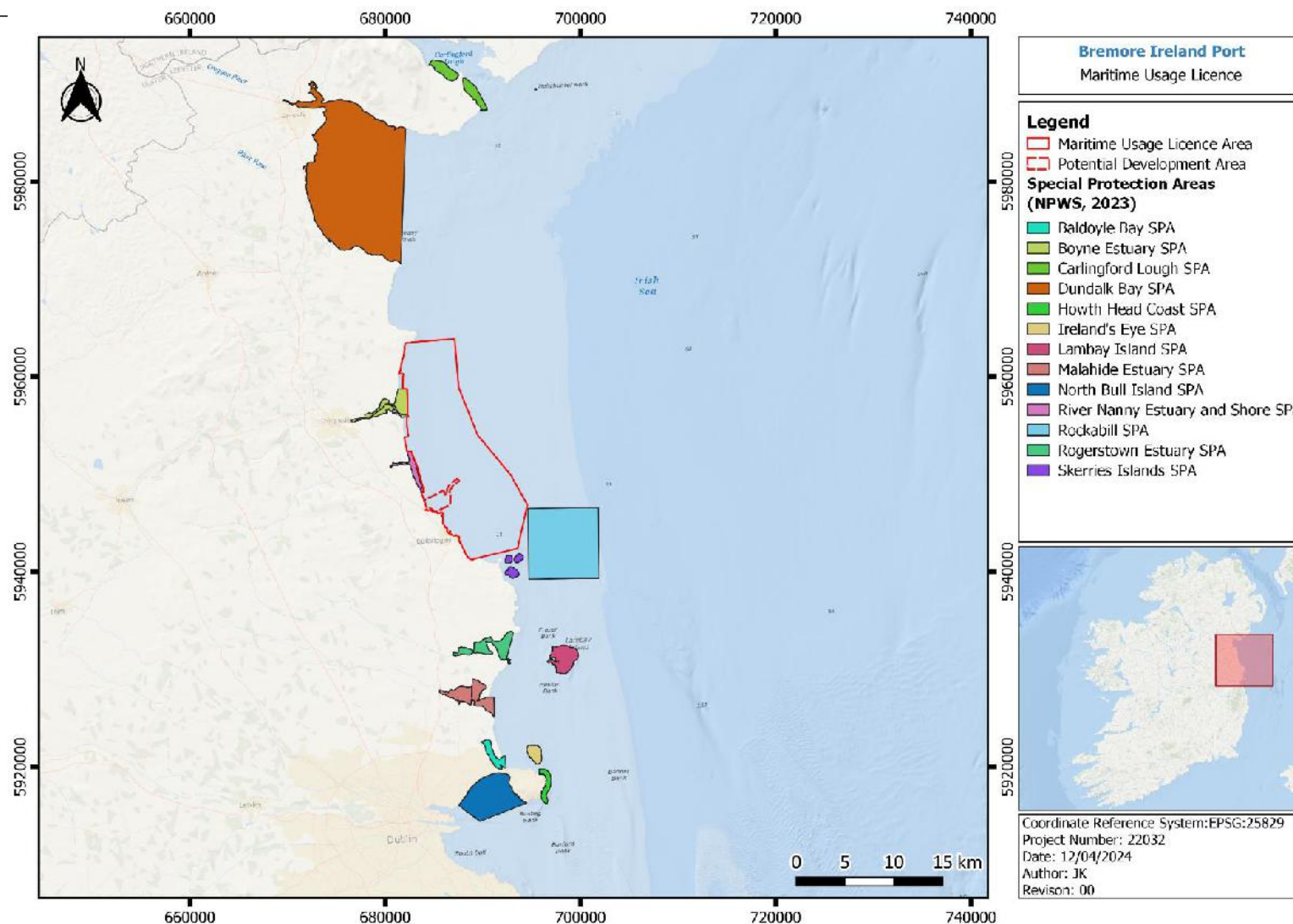
**Figure 6-3: SAC Annex II Mobile Species in the vicinity of the Licence Area**





**Figure 6-4: SPAs in the vicinity of the Licence Area and the North West Irish Sea cSPA**





**Figure 6-5: SPAs in the vicinity of the Licence Area**



### 6.4.3 MARINE MAMMALS

#### 6.4.3.1 RECEIVING ENVIRONMENT

A review of existing data sources regarding marine mammals was carried out in the SISAA and RAAIVS reports, both submitted in support of this licence application.

SACs in the vicinity of the licence area designated to protect marine mammal species, including harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), otter (*Lutra lutra*), grey seal (*Halichoerus grypus*), and harbour seal (*Phoca vitulina*), can be seen in Figure 6-3.

Annex IV species recorded in the area include harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), Risso's dolphin (*Grampus griseus*), common dolphin (*Delphinus delphis*), killer whale (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*) and leatherback turtle (*Dermochelys coriacea*), otter (*Lutra lutra*).

#### 6.4.3.2 POTENTIAL EFFECTS

The following potential impacts have been identified for the site investigation survey activities proposed under this application:

- Disturbance from vibration and underwater noise associated with the proposed works
- Injury due to collision (vessels)
- Pollution event

#### 6.4.3.3 ASSESSMENT OF POTENTIAL EFFECTS

The SISAA concluded that no likely significant effects are foreseen on marine mammal species which constitute a Qualifying Interest for any of the SACs considered. The SISAA concluded that significant effects are likely on marine mammal species which constitute a Qualifying Interest for SACs considered. Potential disturbance due to underwater noise associated with surveys may affect the QIs and Annex II species harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), grey seal (*Halichoerus grypus*), and common (harbour) seal (*Phoca vitulina*). In addition, likely significant effects from underwater noise could cause a potential disturbance to sea otters (*Lutra lutra*). Details of mitigation measures proposed in the NIS are provided in Section 7.

A detailed impact assessment was carried out in the RAAIVS which concluded that other marine mammal and leatherback turtle species, whose range overlaps the Licence Area, will not be significantly affected by the site investigation activities proposed.

Therefore, it is concluded that the proposed site investigation survey activities will not result in any significant effects on marine mammals.



Please note, should Bremore Ireland Port identify that a temporal overlap is likely between these proposed site investigation activities and those projects identified in the SISAA as having the potential to cause in-combination effects to marine mammals, BIPDAC will engage with those projects to ensure that activities are sufficiently distanced to ensure that adverse effects on marine mammals are mitigated for.

#### **6.4.4 BIRDS**

##### **6.4.4.1 INTRODUCTION**

Ireland is host to several nationally and internationally important bird species which inhabit areas including coastal sea cliffs, estuaries and offshore islands. Coastal habitats provide important breeding sites and foraging grounds for many species of seabirds, several of which are protected under national and European legislation.

At least 45 species of seabird (including divers and grebes) have been recorded during at-sea surveys in Irish waters, of which 23 species regularly breed around Ireland (Pollock et al., 2008, Mackey et al., 2004). In addition, a further 59 species of waterfowl and wader regularly occur at coastal sites such as estuaries around Ireland including 5 grebe species, 2 heron species, 26 species of wildfowl and 26 wader species (Crowe, 2005). Some of these species are migratory and are present only during migration periods in spring and autumn; others come to Ireland to breed or to spend the winter, while some are resident all year round (Lewis et al., 2019; Jessop et al., 2018).

##### **6.4.4.2 RECEIVING ENVIRONMENT**

A review of existing ornithological information relevant to the area and proposed site investigation activities seabirds is described in the SISAA report submitted in support of this Licence Application. SPAs in the vicinity of the Licence Area can be seen in Figure 6-4 and Figure 6-5.

##### **6.4.4.3 POTENTIAL EFFECTS**

The following potential impacts have been identified for the site investigation survey activities proposed under this application:

- Disturbance from vibration and underwater noise associated with the proposed works
- Injury due to collision (vessels)
- Pollution event
- Indirect effect on foraging and roosting habitats



#### **6.4.4.4 ASSESSMENT OF POTENTIAL EFFECTS**

Significant effects on all designated bird species features of Natura 2000 sites due to underwater noise emitted by the proposed site investigation activities are considered unlikely. However, the possibility of likely indirect significant effects on foraging and roosting habitats from site investigation activities on the Special Conservation Interests (SCIs) for the North-West Irish Sea cSPA could not be excluded and have been assessed in the NIS. The NIS concluded that, with the implementation of the mitigation measures specified therein and summarised in Section 7 below, the proposed site investigation activities, alone or in combination with other activities and developments, would not cause an adverse effect on the integrity of the cSPA.

#### **6.4.5 FISH**

##### **6.4.5.1 INTRODUCTION**

Commercially important fish species, including their spawning and nursery grounds, and migratory fish are considered within this section.

##### **6.4.5.2 RECEIVING ENVIRONMENT**

The licence area overlaps with the spawning and/or nursery grounds of several commercially important species of fish (Ireland Marine Atlas, 2021).

Cod use the area as a spawning and nursery ground, as do Haddock and Whiting. Mackerel and Herring use the area as a nursery ground. The extent of the overlap with the mapped spawning and nursery grounds are shown in



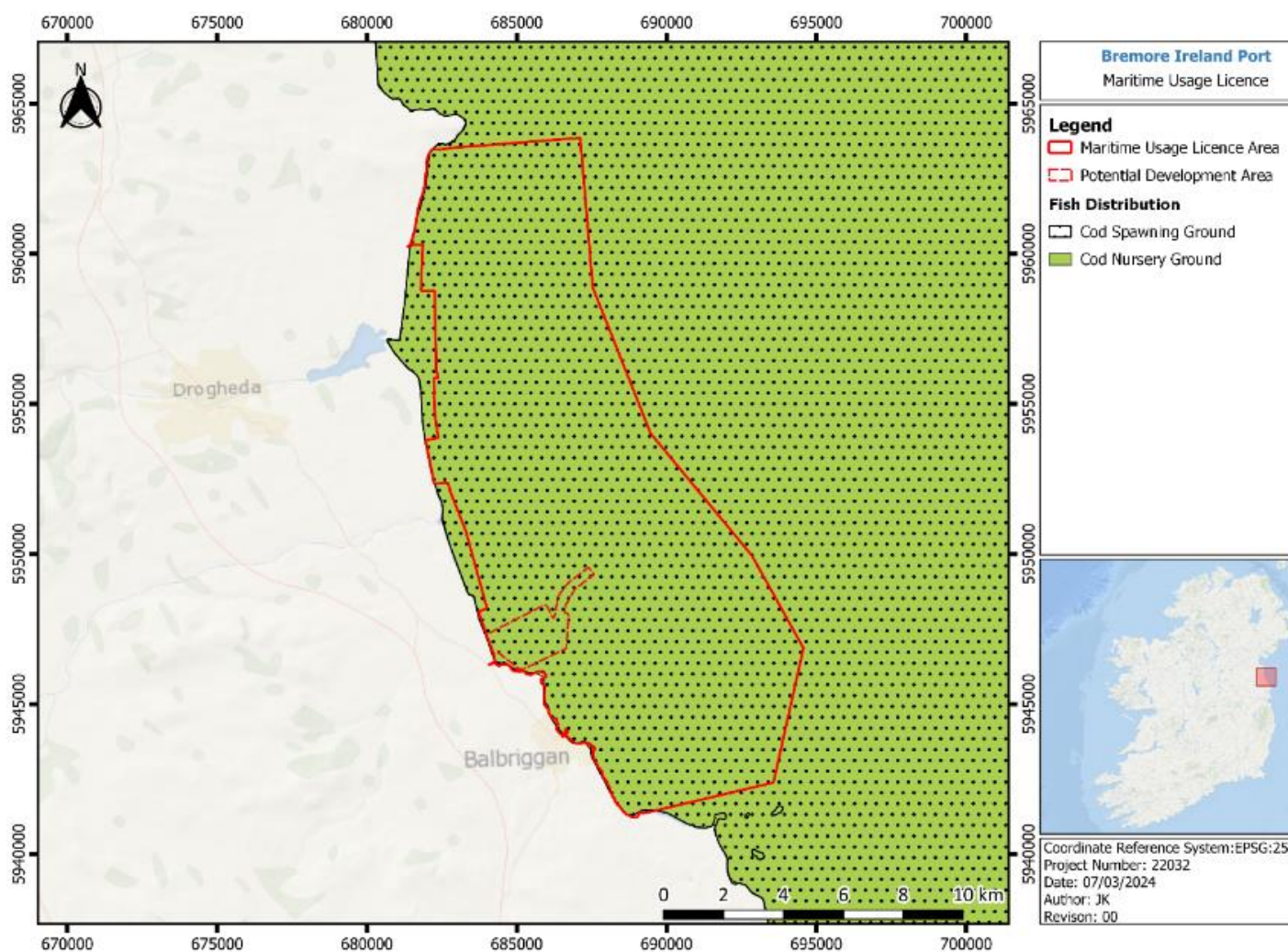
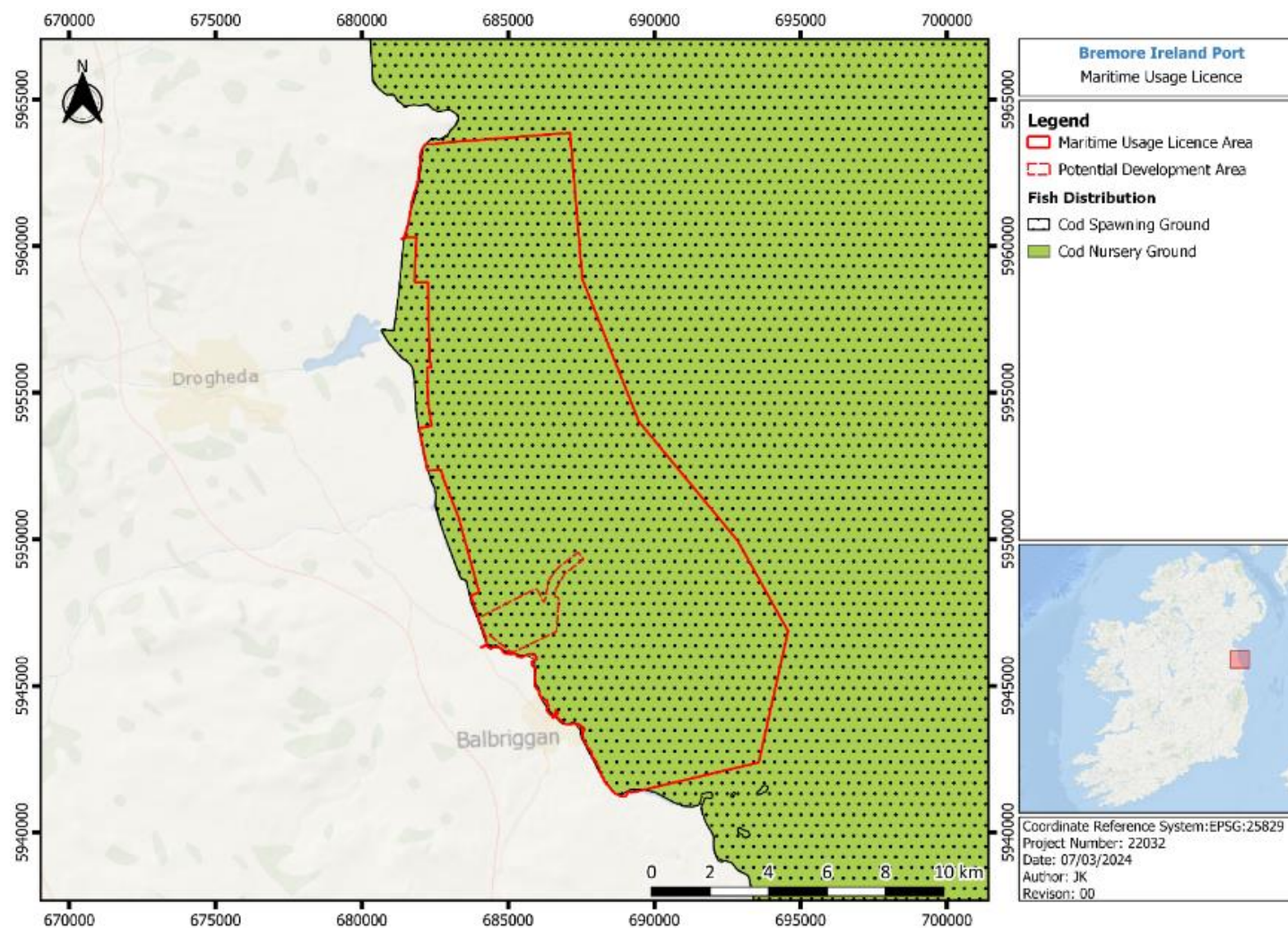


Figure 6-6 to Figure 6-10 and summarised in Figure 6-4.

**Table 6-4: Application area overlap with commercial fish species distribution areas.**

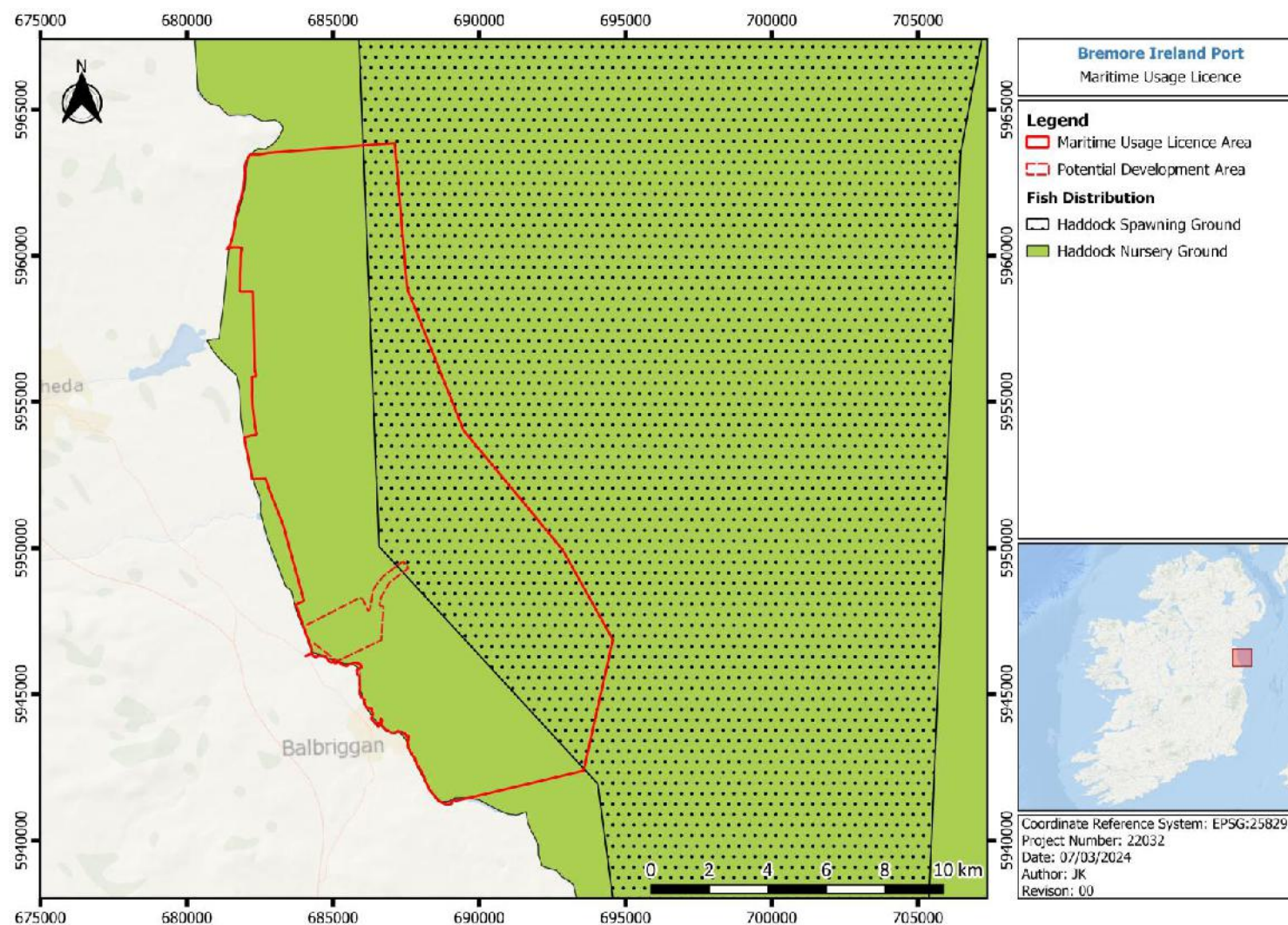
Species	Nursery Area	Spawning Area
Cod	✓	✓
Haddock	✓	✓
Herring	✓	X
Whiting	✓	✓
Mackerel	✓	X
Horse Mackerel	✓	X





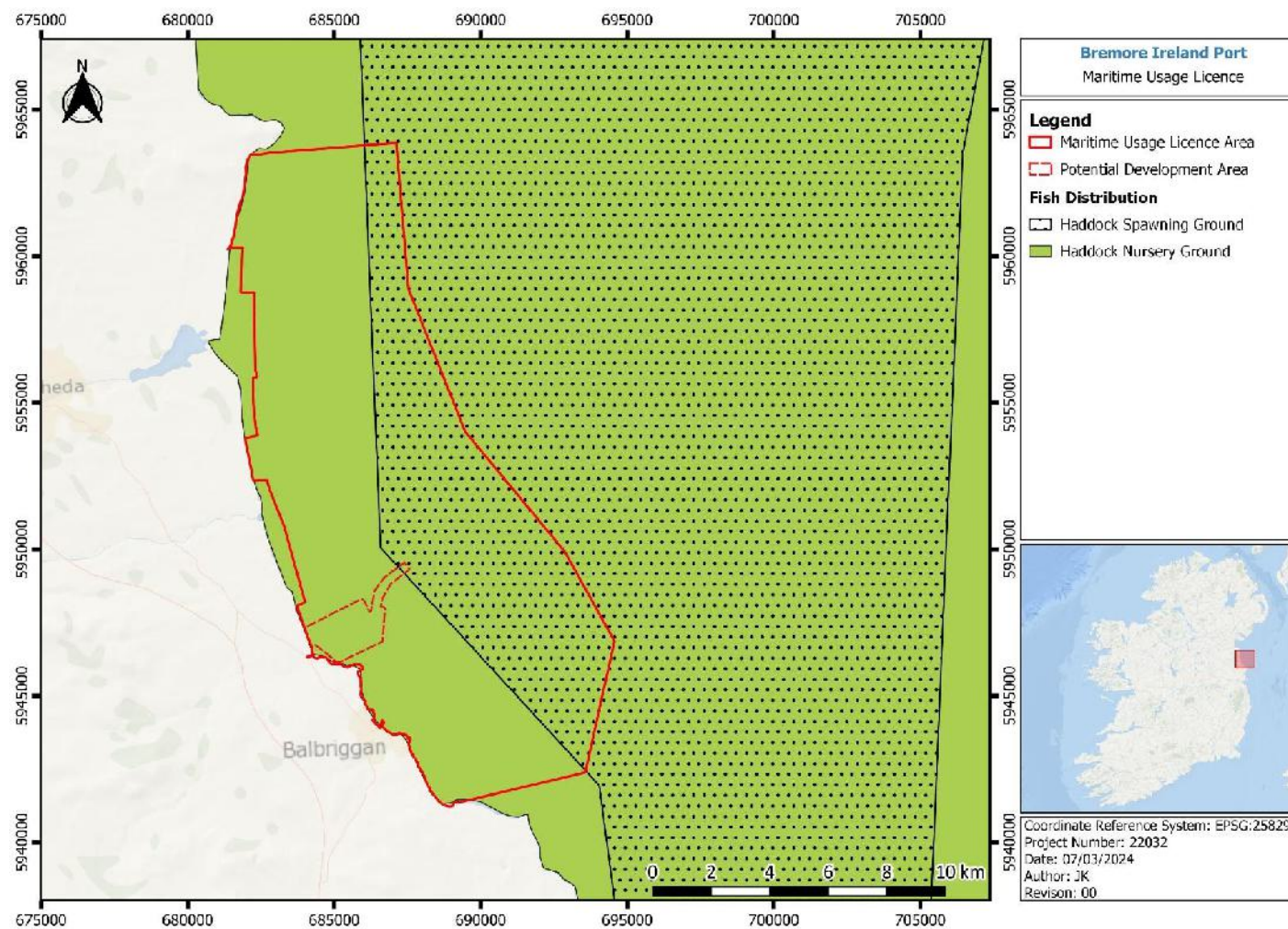
**Figure 6-6: Cod Spawning & Nursery (Ireland's Marine Atlas, 2021a)**





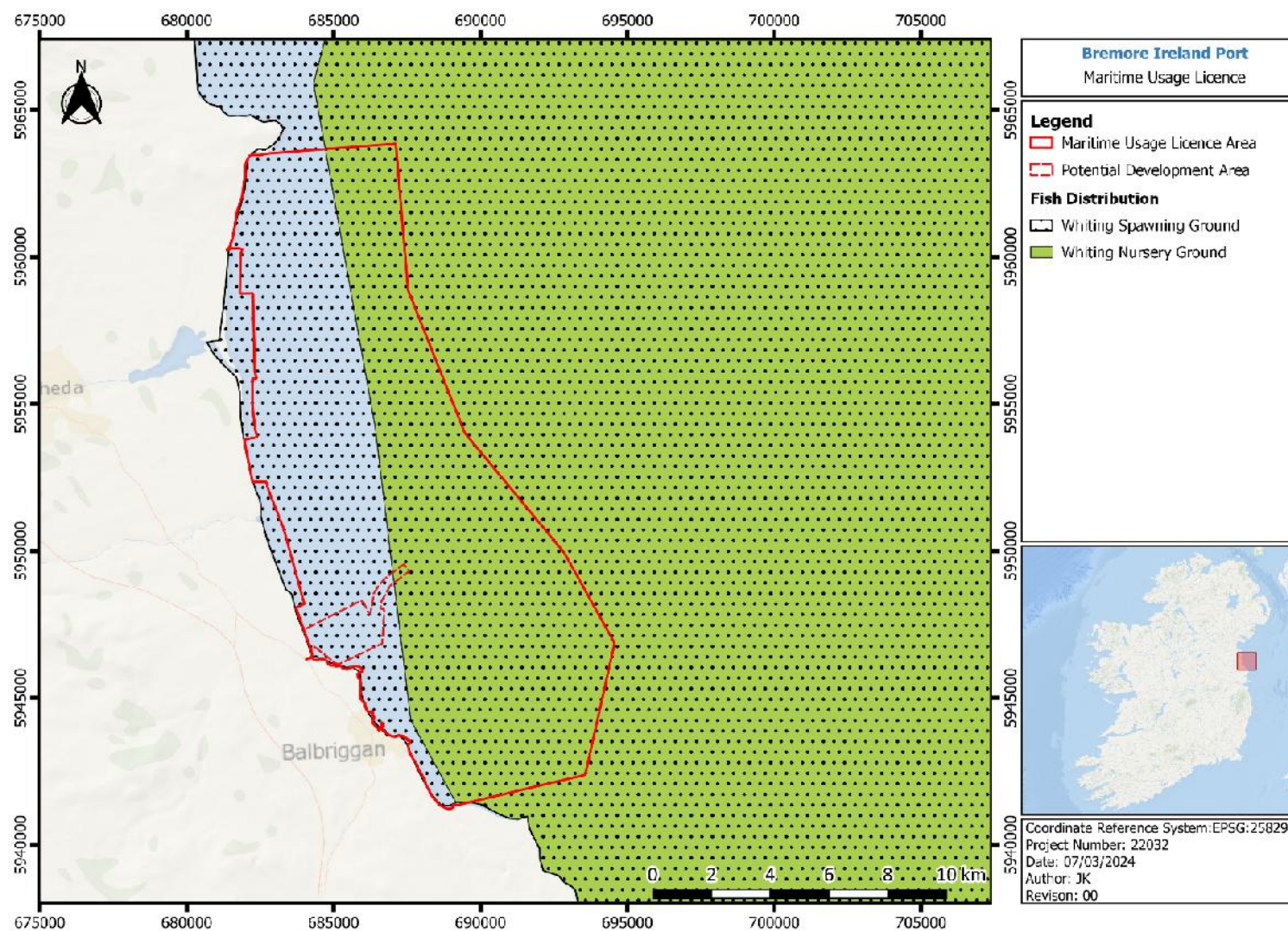
**Figure 6-7: Haddock Spawning & Nursery (Ireland's Marine Atlas, 2021a)**





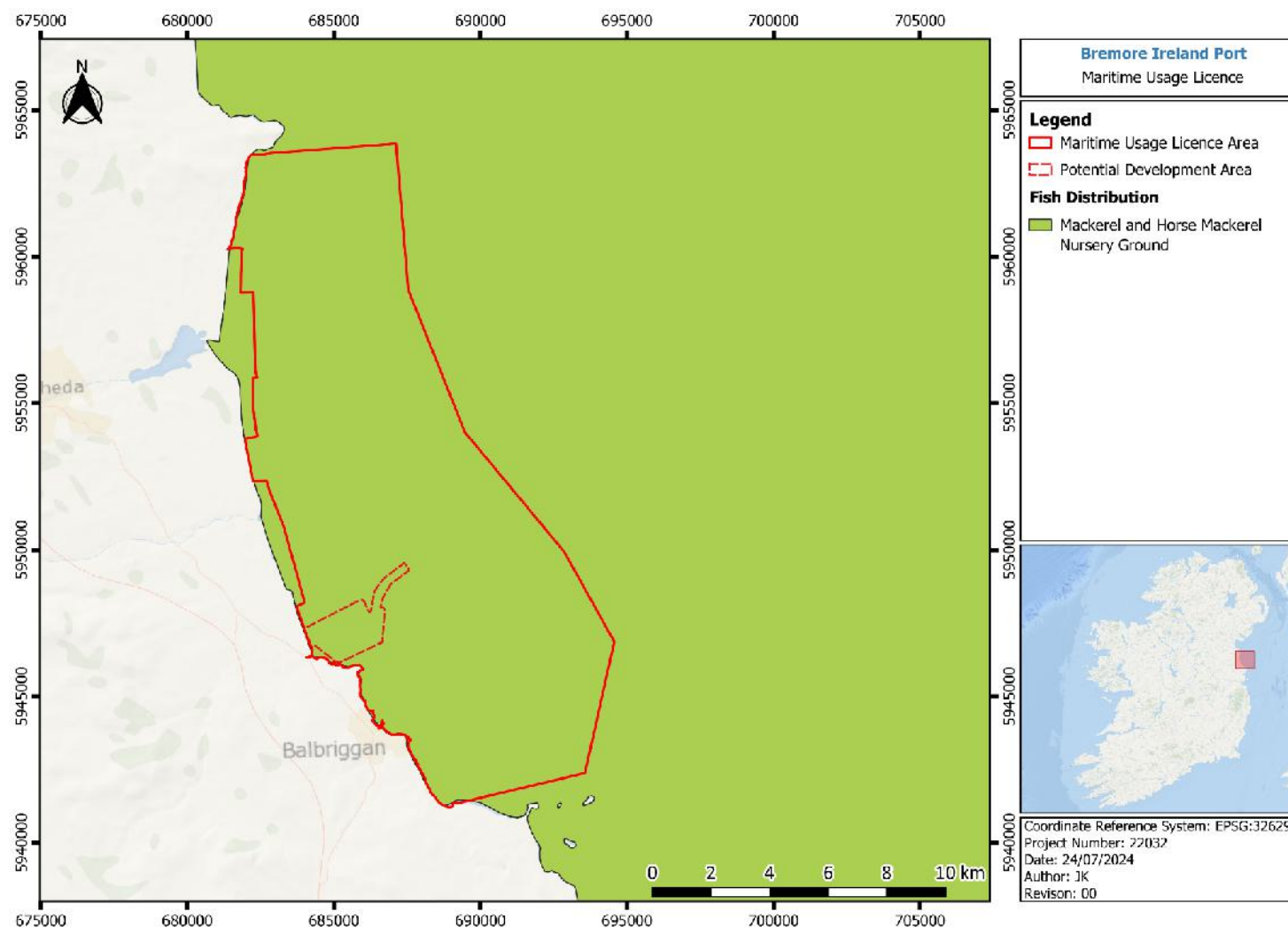
**Figure 6-8: Herring Nursery Ground (Ireland's Marine Atlas, 2021a)**





**Figure 6-9: Whiting Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)**





**Figure 6-10 Mackerel and Horse Mackerel Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)**



Migratory Fish Species are described in Table 6-5.

**Table 6-5: Migratory Fish Species**

Species	Description
Atlantic salmon ( <i>Salmo salar</i> )	The Atlantic salmon is native to Ireland, commercially important fish and its geographic range includes the North Atlantic Ocean and in rivers around the Atlantic coasts of Europe and eastern North America. The Atlantic salmon is one of the most widespread fish in Ireland and is found in most rivers and in marine waters.
Brown trout ( <i>Salmo trutta</i> )	The brown trout is native to Ireland, and its native geographic range includes Europe and parts of northern Africa. Brown trout have been widely introduced to other temperate parts of the world and are the most widespread fish in Ireland, found in practically every stream, river and lake in the country.
River lamprey ( <i>Lampetra fluviatilis</i> )	The river lamprey is native to Ireland, and it is distributed throughout Europe. Like all lampreys, they lack gill covers or paired fins and have an oral sucker disc instead of a mouth with jaws.
Sea lamprey ( <i>Petromyzon marinus</i> )	The sea lamprey is native to Ireland, and its geographic range includes the Atlantic coastal waters of Europe and North America and their inflowing rivers. Like all lampreys, sea lamprey lack gill covers or paired fins and have an oral sucker disc instead of a mouth with jaws. Adult sea lamprey are about a metre in length and have a dark, mottled colour, with rows of curved teeth in their suckers, which gives them a striking appearance.
Twaite shad ( <i>Alosa fallax</i> )	The twaite shad is native to Ireland and occurs in coastal waters and estuaries in the Southeast. Their geographic range includes the coastal waters and inflowing rivers of the Atlantic coast of Europe and the Mediterranean Sea.
Allis shad ( <i>Alosa alosa</i> )	The allis shad is native to Ireland and occur in very low numbers in coastal waters and estuaries in the Southeast. Their geographic range includes the coastal waters and inflowing rivers of the Atlantic coast of Europe and the Mediterranean Sea. There are no recent records of spawning populations in Ireland; therefore, allis shad caught in Irish waters probably originated from European populations.
European eel ( <i>Anguilla anguilla</i> )	The European eel is native to the North Atlantic Ocean and to the river systems of Ireland, Europe and parts of northern Africa. The European eel is a catadromous fish, which means that it hatches in the ocean but migrates to rivers to spend most of its adult life in freshwater before migrating back to the ocean to spawn.
Basking Sharks ( <i>Cetorhinus maximus</i> )	Basking sharks are a filter-feeding fish species which can grow up to 12m in length and is the largest fish in the North Atlantic and the second largest in the world. In Ireland, as of October 2022, basking shark were afforded official protection status under Section 23(3) of the Wildlife Act 1976. This makes it an offence to hunt, injure or wilfully interfere or destroy the breeding or resting places of protected animals. Basking sharks are usually present in Irish waters in the summer months and studies of migratory patterns indicate an extensive migration from deep water to coastal waters in April with migrations northwards due to increasing sea surface temperature until August.



#### **6.4.5.3 POTENTIAL EFFECTS**

Potential impacts on commercially important fish species and migratory fish include exposure to underwater noise, sediment disturbance and substratum loss, smothering and increased levels of suspended solids in water column which may create a barrier of migration.

#### **6.4.5.4 ASSESSMENT OF POTENTIAL EFFECTS**

The SISAA submitted as part of this Application has considered potential impacts from the proposed site investigation activities on Annex II fish species, specifically Atlantic salmon, Sea lamprey, River lamprey and Twaite shad, with particular focus on the impacts of noise from the proposed geophysical and geotechnical surveys. Atlantic Salmon, while capable of hearing noise in the lower frequency range below 380 Hz, is also not sensitive to sound pressure (Hawkins & Johnstone, 1978). Twaite shad have a swim bladder that connects to the inner ear structures, extending the upper end of their hearing threshold, allowing shad to detect sounds at frequencies >300 kHz (Popper et al., 2004, Teague and Clough, 2011). They are therefore considered sensitive to underwater noise. Sea and river lamprey, which are both anadromous fish species, are not considered to be hearing specialists and are not sensitive to sound pressure (Popper et al., 2003; 2004).

However, as adults, metamorphosed Sea and River Lamprey are parasitic, hematophagous (external) feeders that can parasitize upon an extensively broad range of fish, elasmobranchs, cephalopods, and marine mammals, in particular, Atlantic Salmon and adult Shad are their preferred host (OSPAR, 2009), which means their distribution is largely dictated by their host. Parasitic Lamprey do not display homing behaviour, relying on their host to return to a freshwater course to spawn. Therefore, it is considered that any impact from the site investigation activities that affects their hosts, Atlantic Salmon and adult shad species (twaites and allis), may also have significant effects on Sea and River Lamprey by reducing the host availability to complete their life cycle. The examination of Sea and River Lamprey includes examination of impacts to their annexed hosts.

There is potential to cause effects on the spawning and nursery grounds of commercial fish and shellfish species. The appointed FLO will therefore engage with the relevant authorities and local fishing community to ensure appropriate mitigation is in place and that clear and comprehensive notification/communication is provided prior to any works.



## 6.5 COMMERCIAL FISHERIES AND AQUACULTURE

### 6.5.1 INTRODUCTION

#### 6.5.1.1 COMMERCIAL FISHERIES

The availability of information on fishery activity specifically related to fishing grounds and areas in Irish waters is dependent on the target species, fishing gear and the size of the vessels engaged in the fisheries. Broadly speaking good quality data are available for fish species which are managed via a quota system and are fished by larger vessels; conversely less data is available from smaller vessels targeting non-quota species.

Vessels >12 m are legally obliged to transmit VMS (Vessel Electronic Monitoring System) data and (with some exceptions) to submit logbooks of their catches; this information is collated by the Marine Institute (MI) to produce the Atlas of Commercial Fisheries which maps fishery activity. The data are filtered and processed by the MI to screen out non-fishing activity which is done on the basis of vessel speed upper and lower parameters in combination with industry knowledge. The data is of low certainty for some fisheries due to the difficulties in relating vessel position at a given time with logbook records for individual species, also data from all fisheries other than otter trawling are considered indicative and not quantitative due to uncertainties around effort.

Vessels <10 m are not required to transmit VMS data or to record their catches in logbooks. Information from this sector is derived from sales notes, the Bord Iascaigh Mhara (BIM) Inshore Sentinel Vessel Programme, the MI Observer Programme and industry knowledge. This classification of vessel accounts for the majority of pot-fishing inshore fleet targeting crab, lobster, shrimp and whelks. Vessels <10 m may also target finfish with gillnets, jiggers and longlines. Vessels 10-12 m are not required to transmit VMS data but must maintain logbooks, in which positional data are recorded only at the ICES (International Council for the Exploration of the Sea) Statistical Rectangle scale.

The Working Group on Nephrops Surveys (WGNEPS) is the international coordination group for *Nephrops norvegicus* (Dublin Bay Prawn) underwater television and trawl surveys within the ICES region. Nephrops spend a great deal of time in their burrows and their emergence behaviour is influenced by many factors including time of year, light intensity, and tidal strength. Underwater television surveys to monitor the abundance of Nephrops populations was pioneered in Scotland in early 1990s. Since then, regular surveys have been conducted for many of the main Nephrops fisheries around Britain and Ireland. The technique has also been used in Danish, Greek, Italian and Spanish waters. Since 2009, ICES has been using UWTV surveys as the main basis for assessment and to generate catch options for many of the Nephrops stocks in ICES areas IV, VI and VII.

The Irish Groundfish Survey (IGFS) is an annual fisheries-independent trawl survey carried out by the MI in Irish waters to contribute to the assessment of commercial fish stocks and to feed data into the ICES stock assessments which in turn determine the size and allocation of European quotas. These data along with commercial catch data are published in the Irish Stock Book and are also available in mapping formats in Ireland's Marine Atlas. The IGFS does not survey the Irish Sea or the far north of the island, these data gaps are filled by the UK – Northern Ireland Groundfish Survey (NIGFS) and the



UK – Scottish West Coast Groundfish Survey (SCOWCGFS). All of these surveys are coordinated by the ICES International Bottom Trawl Survey Working Group (IBTSWG).

#### **6.5.1.2 AQUACULTURE AND SHELLFISH**

The Department of Agriculture, Food and the Marine (DAFM) has responsibility for the regulation of aquaculture. Under Section 6 of the Fisheries (Amendment) Act, 1997 (as amended), it is illegal to engage in aquaculture without an appropriate Aquaculture Licence. Aquaculture includes the culture or farming of fish, aquatic invertebrates, aquatic plants, or any aquatic form of food suitable for the nutrition of fish.

#### **6.5.2 RECEIVING ENVIRONMENT**

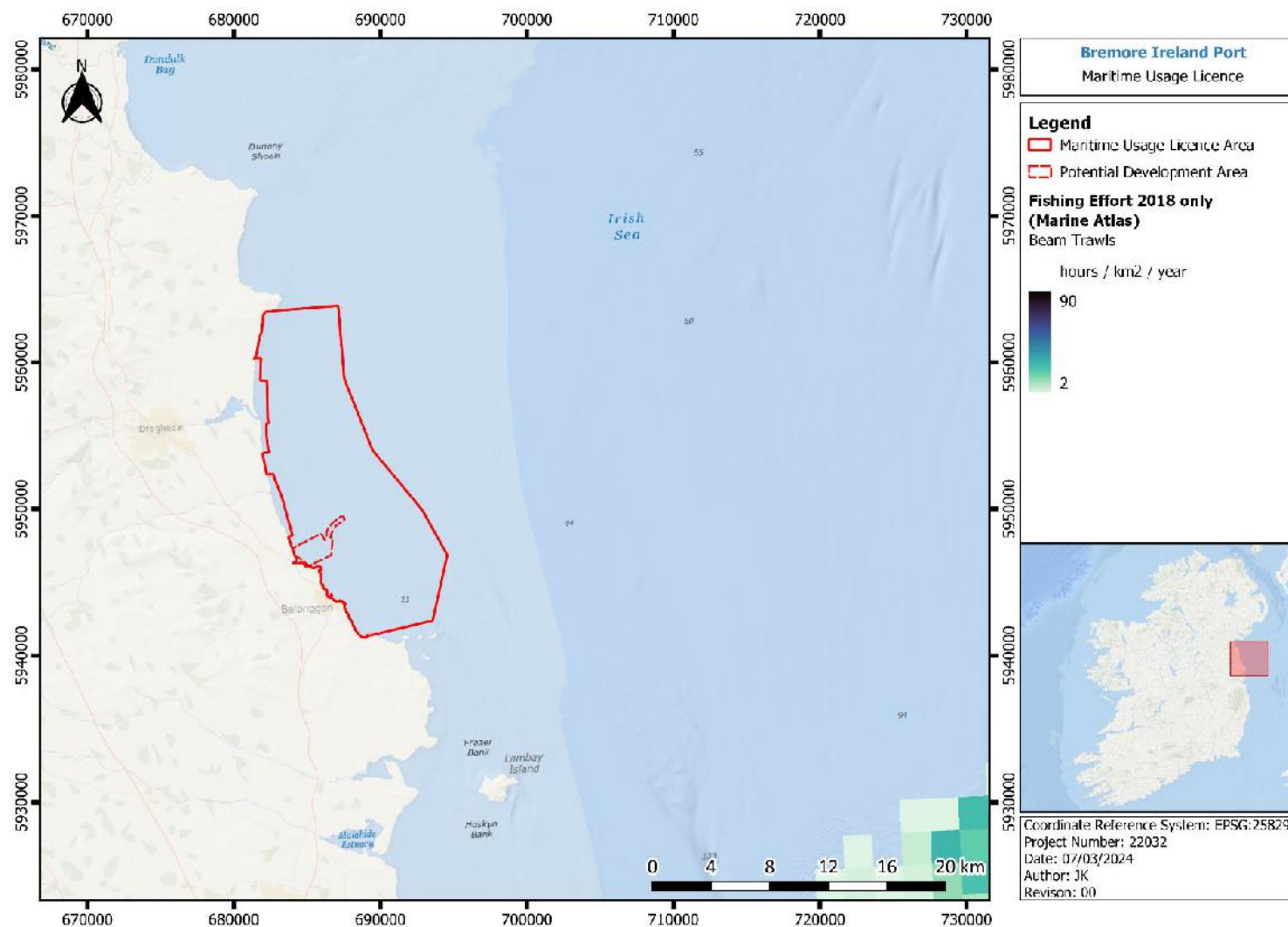
##### **6.5.2.1 FISHING ACTIVITY**

Ireland's Marine Atlas (Ireland's Marine Atlas, 2024) indicates that bottom otter trawls and dredge fishing activity areas overlap with the proposed site investigation survey activities and/or port development area of the Licence Area. Distribution of different fishing methods adjacent to and overlapping with the Licence Area recorded over the course of 2018 (the most recent year where these data are available from Ireland's Marine Atlas) are presented in Figure 6-11 to Figure 6-15 below. The Licence Area overlaps with the *Nephrops norvegicus* Functional Unit 15, with most of the commercial fishing activity in the area is focussed on otter trawling for Nephrops (Figure 6-16). There may be other areas of fishing not recorded in Ireland's Marine Atlas.

Further to the above, the project has been actively observing fishing practices in the area by deployment of a vessel logging and recording inshore fishing activity which is still being undertaken and will continue for the foreseeable future. The project along with other external consultants have put a great deal of time and effort into understanding the complexities of the international fishing effort both on and near the project site.

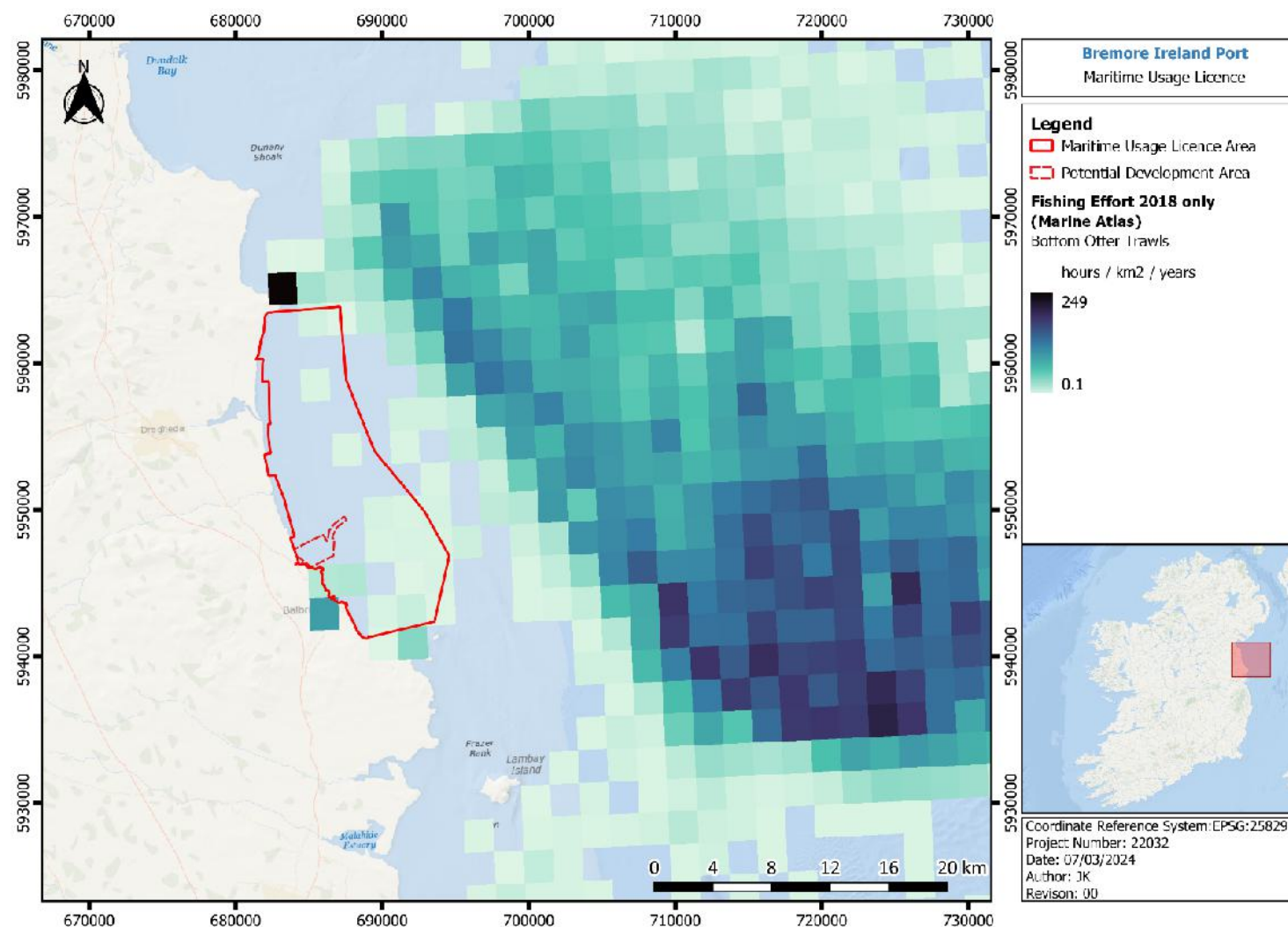
A good understanding of the effort across multiple fishery types has been obtained and worked into our strategy and stakeholder engagement approach for the commercial fisheries and other maritime area users operational in the vicinity of the proposed site.





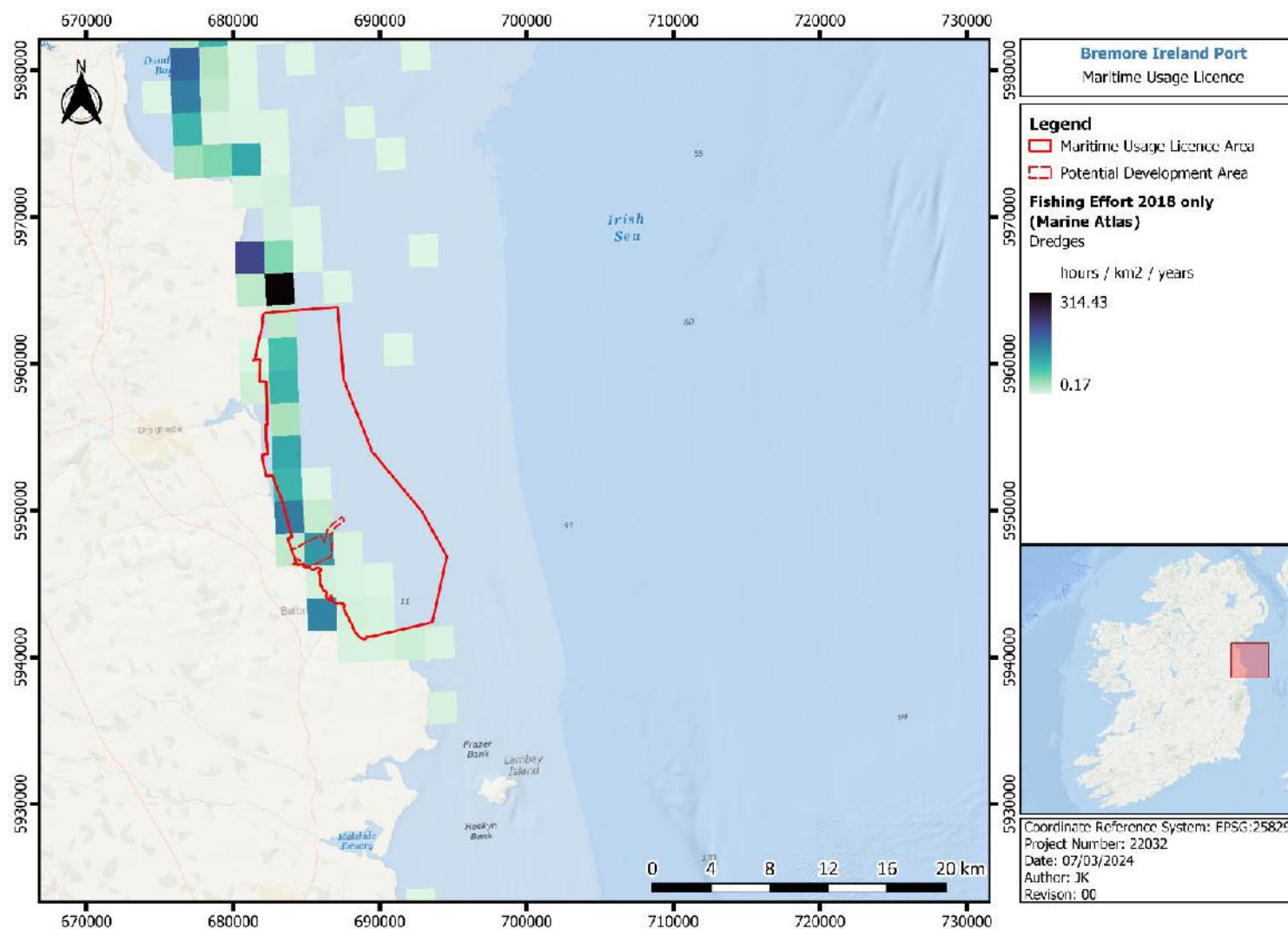
**Figure 6-11 Beam Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)**





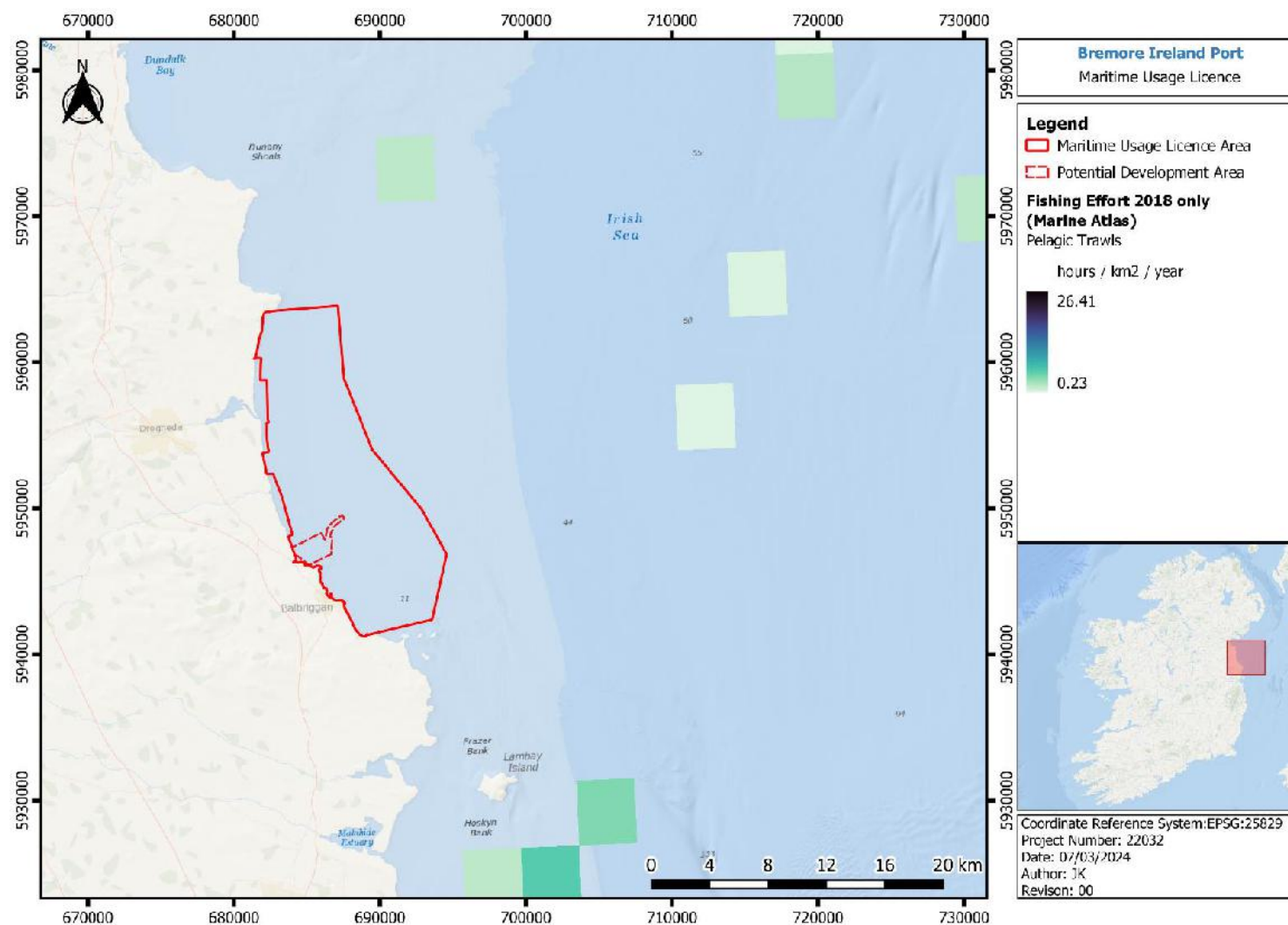
**Figure 6-12 Bottom Otter Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)**





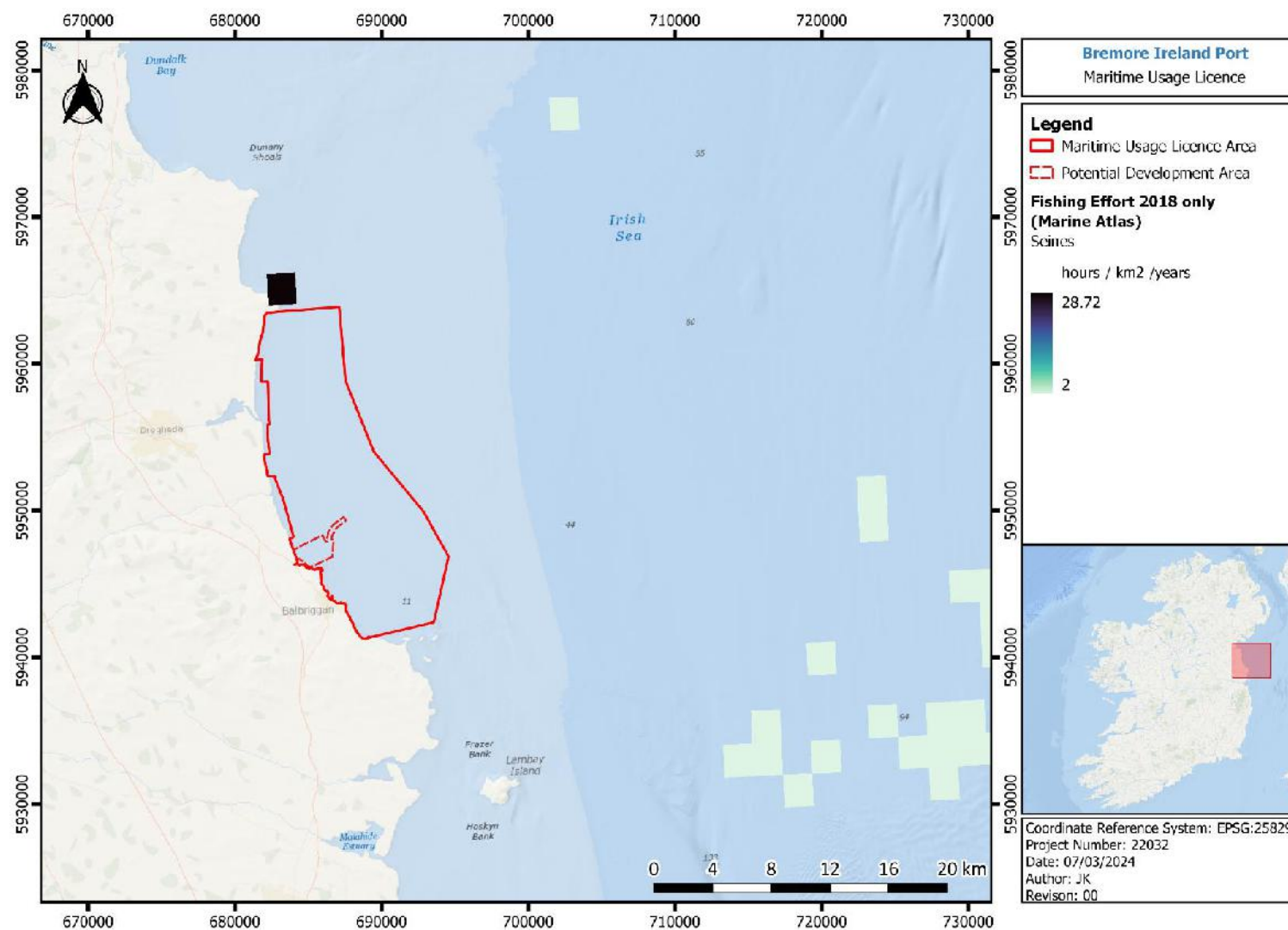
**Figure 6-13 Dredge Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)**





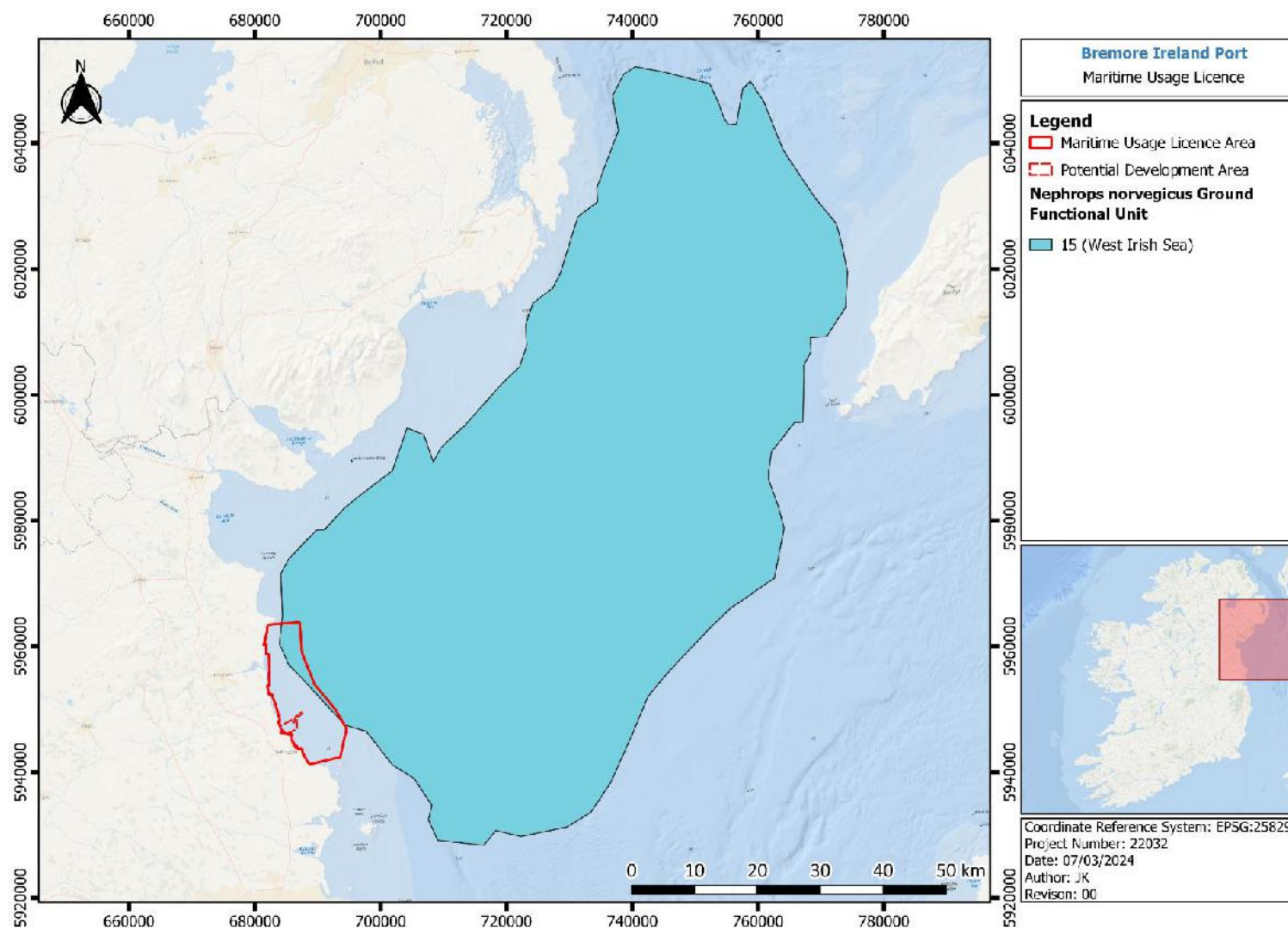
**Figure 6-14 Pelagic Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)**





**Figure 6-15 Seine Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)**





**Figure 6-16 *Nephrops norvegicus* Functional Unit 15 and the Licence Application Area (Ireland's Marine Atlas, 2021)**



### **6.5.2.2 AQUACULTURE ACTIVITY**

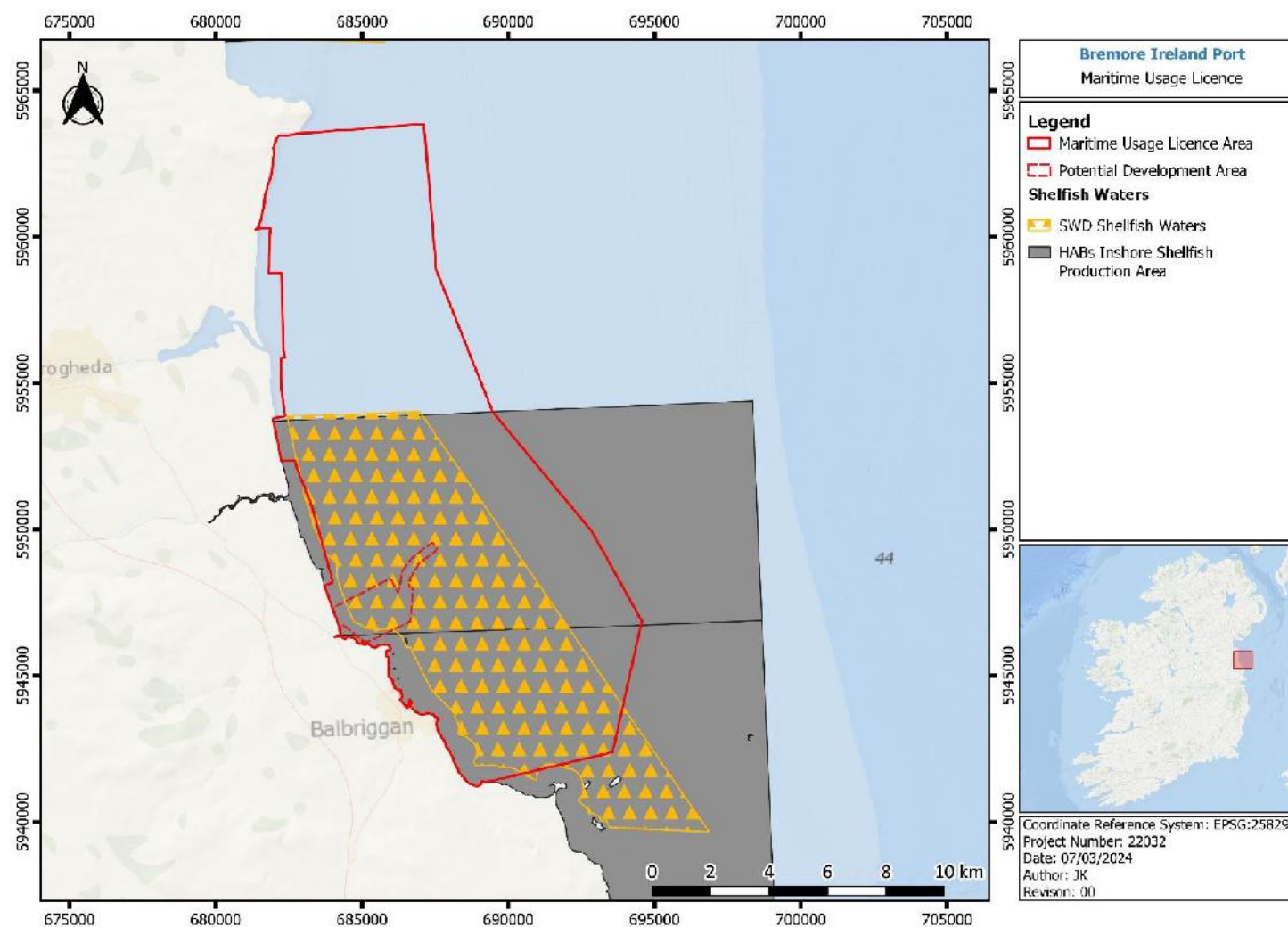
There is no overlap between the DAFM aquaculture sites and the Licence Application area. There are no licenced aquaculture sites within or adjacent to, or in the vicinity of the Licence Application Area. The closest aquaculture facility is located approximately 25 km from the licence area in Carlingford Lough, Co. Louth, for Pacific Oyster.

Designated Harmful Algal Blooms (HABs) Inshore Shellfish Production Areas (ISPA) are administrative units used for reporting purposes in the management, collection and analysis of shellfish and phytoplankton sample data, for aquaculture production activities. Shellfish Waters Directive Areas (SWDA) aim to protect or improve shellfish waters in order to support shellfish life and growth. They are designed to protect the aquatic habitat of bivalve and gastropod molluscs, which include oysters, mussels, cockles, scallops and clams.

Both are shown in Figure 6-17. There is partial overlap between the Licence Application Area and the Shellfish Waters Directive (SWD). These areas include the Balbriggan/Skerries zones. There is an overlap of approximately 70.00 km<sup>2</sup> with the proposed MUL area and 3.44km<sup>2</sup> with the potential development area.

There is partial overlap between the Licence Application Area and the designated Harmful Algal Blooms (HABs) Inshore Shellfish Production Areas (ISPAs) shown in Figure 6-17. These areas include Meath at Gormanstown and Dublin Skerries zones. There is an overlap of approximately 66.79 km<sup>2</sup> between the Licence area the Gormanstown HABs ISPA and full overlap with the potential development area. There is an overlap of 34.94 km<sup>2</sup> between the Skerries HABs ISPA and the proposed Licence area, and 0.14km<sup>2</sup> of an overlap with the potential development area.





**Figure 6-17 HABs Inshore Shellfish Production Areas and SWD Shellfish Waters in the vicinity of the Licence Application Area**



The shellfish species recorded at the HABs areas are listed in Table 6-6.

**Table 6-6 Shellfish Species recorded at the Gormanstown and Skerries HABs Inshore Shellfish Production Areas**

HABs Inshore Shellfish Production Area species Meath – Gormanstown		HABs Inshore Shellfish Production Area species Dublin – Skerries
<i>M. edulis</i>	<i>O. edulis</i>	<i>E. arcuatus</i>
<i>G. gigas</i>	<i>P. maximus</i>	<i>E. silqua</i>
<i>T. philippinarium</i>	<i>S. solida</i>	<i>T. semidecussata</i>
<i>D. exoleta</i>	<i>E. arcuatus</i>	<i>V. senegalensis</i>
<i>G. glycymeris</i>	<i>E. silqua</i>	<i>V. verrucosa</i>
<i>P. lividus</i>	<i>C. edule</i>	
<i>A. operaculalis</i>	<i>T. semidecussata</i>	
<i>V. senegalensis</i>	<i>V. verrucosa</i>	

### 6.5.3 POTENTIAL EFFECTS

The shellfish could be subject to the following impacts as a result of the proposed site investigation activities.

- Habitat disturbance and smothering during all intrusive site investigation activities
- Increased suspension of solids in the water column
- Sediment penetration and loss
- Exposure to underwater noise

### 6.5.4 ASSESSMENT OF POTENTIAL EFFECTS

While studies on potential impacts of seismic surveys on invertebrates such as *Nephrops norvegicus* are limited, Carroll et al., 2017 provide a review of the available literature on the effects/impacts of underwater noise on invertebrates. Behavioural and neurological responses of invertebrates to stimuli were referred to as auditory evoked potentials (AEPs), with lobster (*Homarus americanus*) showing AEP responses at noise frequencies of 5000 Hz as adults, and prawns showing a response at 500 Hz. The observed AEPs were found not to always accurately reflect behavioural responses. For invertebrates, crustaceans were the most studied group. Previous studies reviewed indicate that airgun exposure resulted in no increase in mortality in scallops up to ten months after exposure and no evidence of increased mortality in reef-associated invertebrates was identified four days after exposure, in shrimp two days after exposure and for lobster weeks or years after exposure. No evidence of mortality of lobster larvae following airgun exposure was identified.

Behavioural responses which may negatively affect populations by reducing the rate of foraging or reducing ability to avoid predators were also considered. Behavioural responses of marine invertebrates to sound were found to mainly be 'startle' responses and changes in burrowing activity. For example, scallops burrowed more quickly into the sediment after being exposed to sounds from



airguns. Some crabs showed changes in feeding and the ability to find food. Bioturbation may also impacted/affected after exposure to continuous or impulsive low frequency noise.

Crustaceans, including *Nephrops norvegicus*, are considered to be displacement sensitive rather than pressure sensitive to noise with frequencies ranging between 40 to 200Hz, as their sensory organs perceive acoustic events as movements rather than pressure changes (El-Diari et al., 2024). Therefore, while noise produced by the proposed site investigation activities may be perceived by and drive behavioural responses such as increased burrowing in *Nephrops* and other invertebrates, and there may be some burrowing activity, no mortality is anticipated, and any effects will be localised and short in duration.

During the proposed site investigation activities, namely the geophysical and geotechnical survey operations, the deployment of metocean equipment and during mobile ecological surveys, other vessels will be requested to maintain a safe distance from the survey vessels due to their restricted manoeuvrability. Fishermen will also be requested to avoid the static survey equipment once it is deployed, which will have a very small footprint.

Additionally, for the duration of the geophysical survey only, fishermen with static gear such as whelk/lobster/crab pots within the survey area will be requested to temporarily remove them. The impact upon the commercial fishing sector will be minimised by planning of the survey to minimise the spatial extent and duration of gear removal necessary. The resulting effect on static gear fisheries will be very small and of short duration. Furthermore, given the short duration and temporary nature of the proposed site investigation activities, any potential effect on shellfish species of commercial importance, commercial static gear fisheries and recreational fishing is not expected to be significant.

Bremore Ireland Port acknowledges that the information relating to fishing activity in the area is likely to be incomplete and will appoint an FLO which will continue to engage with local fishing community to determine the full extent of fishing effort in the Licence Area, and to minimise disruption to the activity.

In summary the effect of the site investigation activities will be localised and temporary in nature, any sediment disturbed as a result of geotechnical surveys is expected to be dispersed by the prevailing tides.

## **6.6 AIR QUALITY**

There will be no releases to air, other than routine vessels exhausts. Air quality standards will not be exceeded. There is not likely to be a significant effect on the environment.

## **6.7 NOISE AND VIBRATION**

Geophysical and geotechnical surveys (including vessels) in the marine environment are a potential source of noise and vibration, therefore may have an impact on the marine environment.

### **6.7.1 ASSESSMENT OF POTENTIAL EFFECTS**

There is likely to be an increase in noise from the proposed geophysical and geotechnical survey activities. As part of the SISAA the physical disturbance and therefore vibration to benthic



communities was assessed along with a detailed impact assessment carried out in the RAAIVS which concluded that other marine mammal and leatherback turtle species, whose range overlaps the Licence Area, will not be significantly affected by the site investigation activities proposed.

## **6.8 LANDSCAPE AND SEASCAPE**

### **6.8.1 ENVIRONMENTAL SETTING**

The Licence Area is not subject to any designation intended to protect landscape quality. The Licence Area overlaps with the Northeastern Irish Sea Islands and Beaches regional Seascape Character Area (SCA) 16. This SCA is typified by low lying and estuarine coastal plains with long, narrow sandy beaches such as Portmarnock, Balcarring, Port Beach and Clogherhead. The coastline is also indented with several sheltered bays and headlands.

This SCA stretches from Ireland's Eye, just to the north of Howth Head in Dublin, to Carlingford Lough in County Louth (Marine Institute, 2020). The water depths along this section of the Irish Sea are relatively shallow, between 50 and 70 m. The region also includes islands such as Ireland's Eye, Lambay Island, Rockabill and Skerries Islands.

Ports and harbours nearby include Skerries Harbour (0.65 km from the licence area), Balbriggan Harbour (2.50 km from licence area), Drogheda port (4.76 km from the licence area), Clogherhead Harbour (1.58 km from the licence area), Dundalk Port (27 km from the licence area) and Warrenpoint Port (40 km from the licence area). These ports and harbours are used by fishing vessels, passenger ferries and recreational traffic.

### **6.8.2 ASSESSMENT OF POTENTIAL EFFECTS**

The visual disturbance caused by the proposed SI activities will be limited to the presence of 1-2 survey vessels on site. The area is characterised by a number of relatively high-density vessel routes, which are mainly associated with transiting into and out of local ports and harbours including Dublin and Drogheda Ports. For example, during Q2 2023, 3,036 vessels arrived across Ireland's seven main ports, with 44 vessels arriving in the second quarter to Drogheda Port and a total of 1,891 vessels arriving to Port (CSO, 2023a).

No significant effects to landscape and seascape receptors are predicted.

## **6.9 MARINE TRAFFIC**

### **6.9.1 INTRODUCTION**

The Irish Coastguard monitors the movement of vessels in Irish waters via Automatic Identification System (AIS) for maritime transport safety and security. The European Communities (Vessel Traffic Monitoring and Information System) Regulations 2010 governs the use of AIS systems and states that "Any fishing vessel with an overall length of more than 24 metres but less than 45 metres which is (a) registered in the State, (b) operating in the territorial waters, or (c) landing its catch in a port of the



State, shall be fitted with an automatic identification system (Class A) which meets the performance standards drawn up by the IMO”.

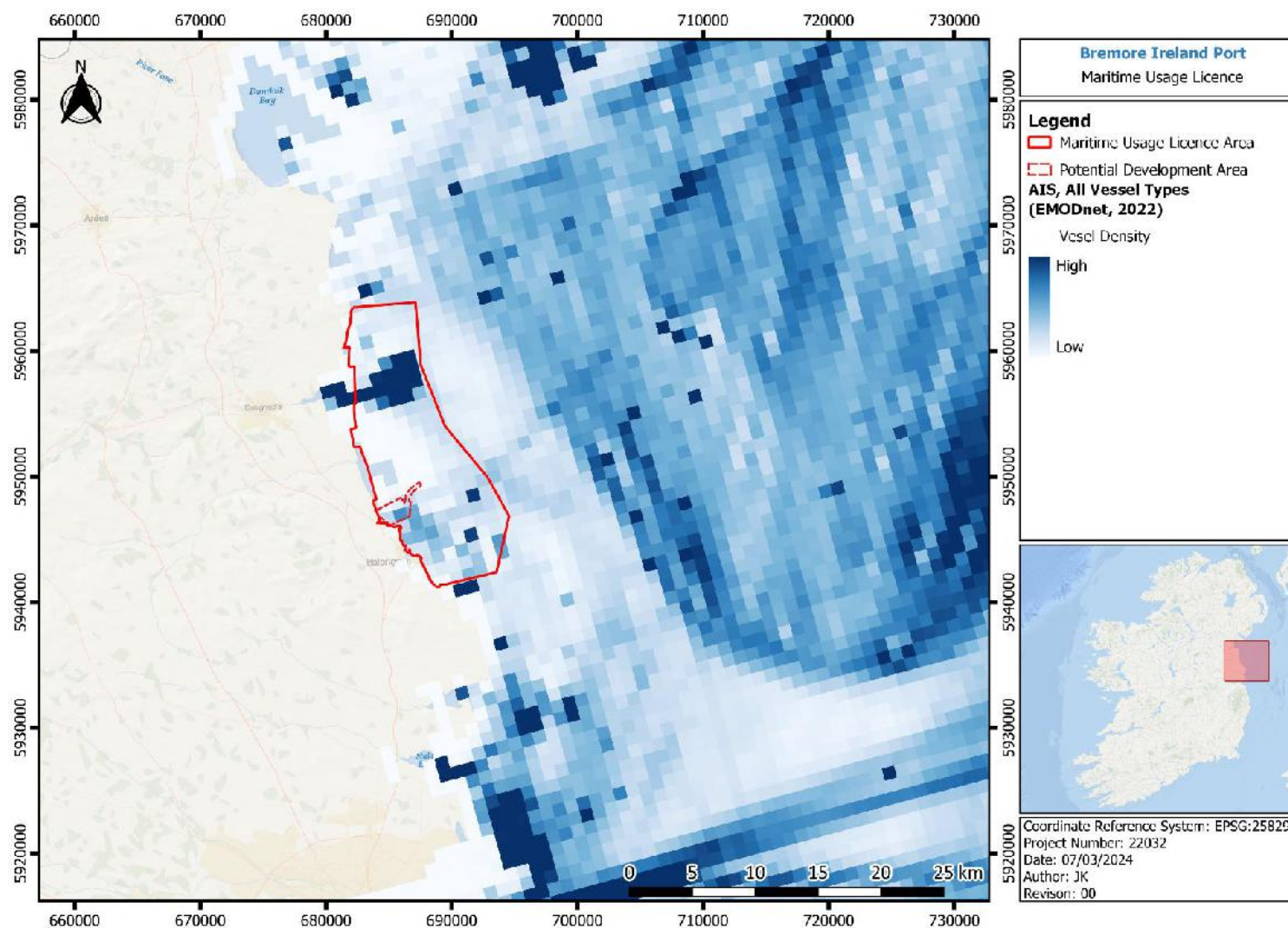
The Merchant Shipping (Safety of Fishing Vessels) (15 – 24 metres) Regulations 2007 states that “All vessels of length 18m and over shall be fitted with an automatic identification system (AIS), which shall meet the performance standards drawn up by the IMO, not later than 1 January 2009” and that “All vessels over 15 metres in length overall (Loa) but less than 18 metres in length (L) shall be fitted with an automatic identification system (AIS), which shall meet the performance standards drawn up by the IMO, not later than 1 January 2010.”

### **6.9.2 RECEIVING ENVIRONMENT**

Figure 6-18 shows all vessels density data available for the 2022 period within and surrounding the Licence Area from the European Marine Observation Data Network (EMODnet) dataset. Figure 6-19 to Figure 6-22 provides a breakdown of the vessel density types from this 2022 dataset, which show the individual density of vessel traffic for fishing, tanker, cargo and passenger vessels within and surrounding the proposed Licence Area.

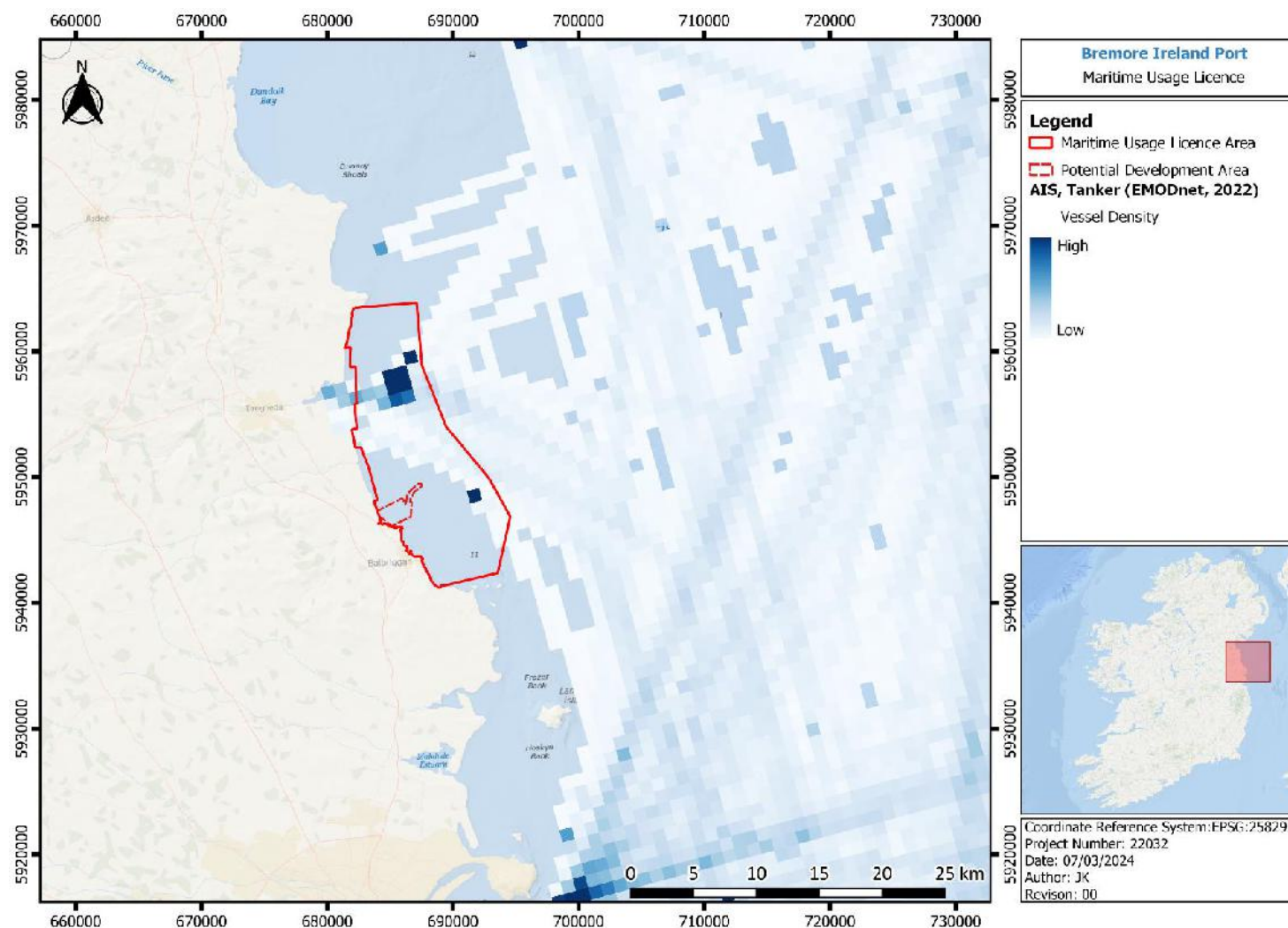
Most navigation routes within the proposed area are associated with harbour traffic in and out of Drogheda Port. Fishing vessels make up most of the marine traffic in the area, with additional small fishing ports and harbours located at Balbriggan harbour, Skerries harbour, and Clogher Head harbours.





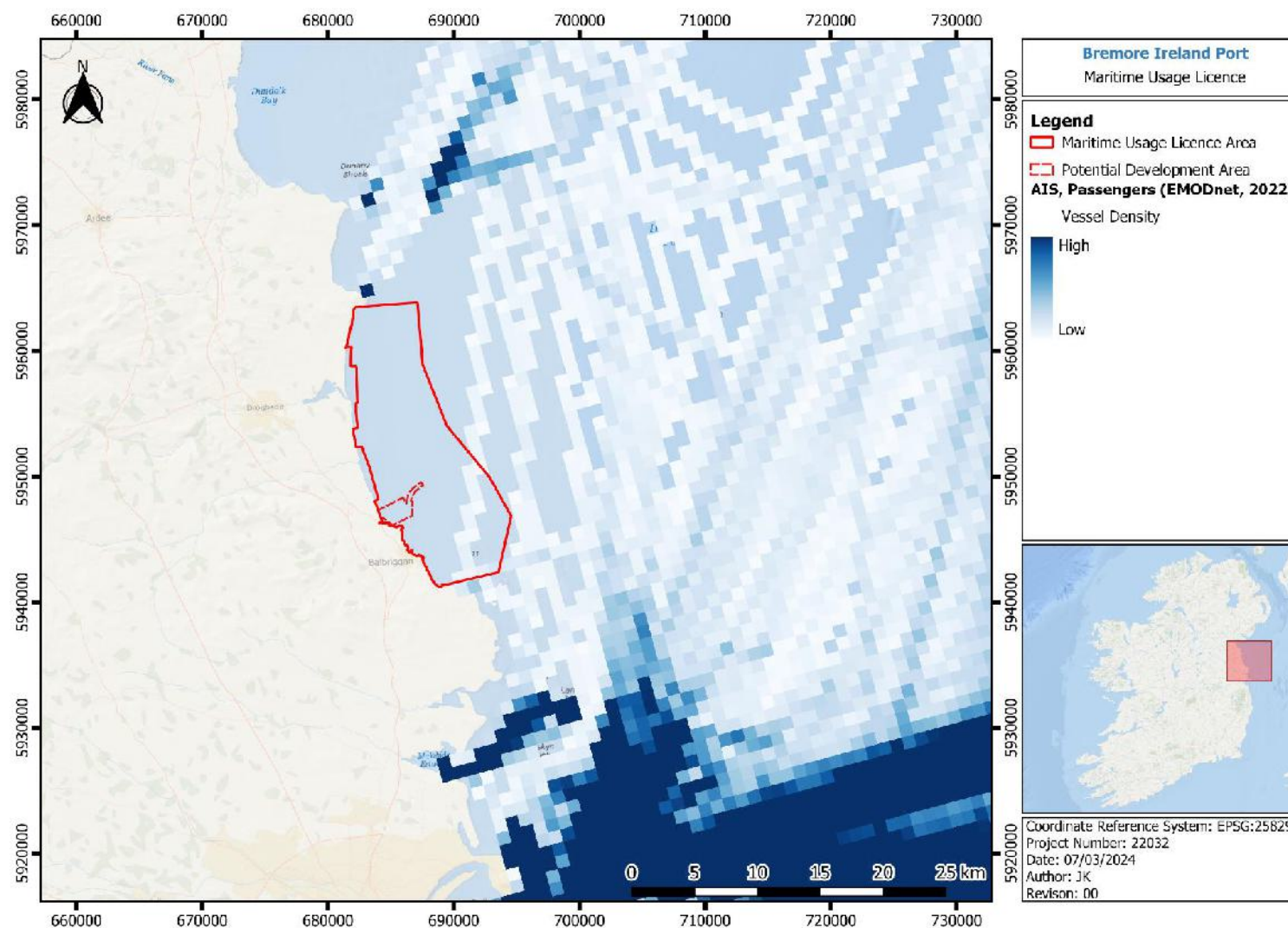
**Figure 6-18 All Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)**





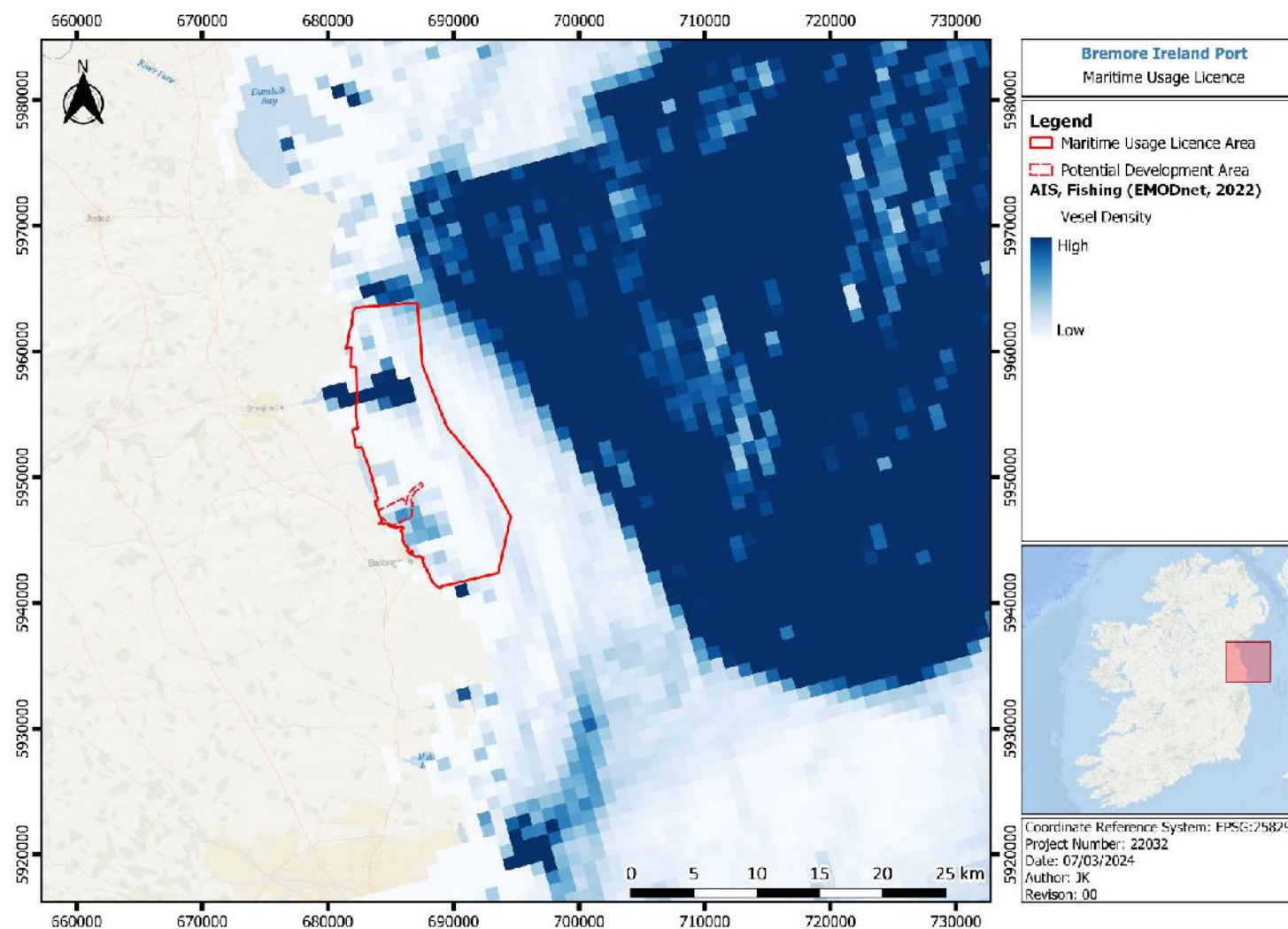
**Figure 6-19 Tanker Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)**





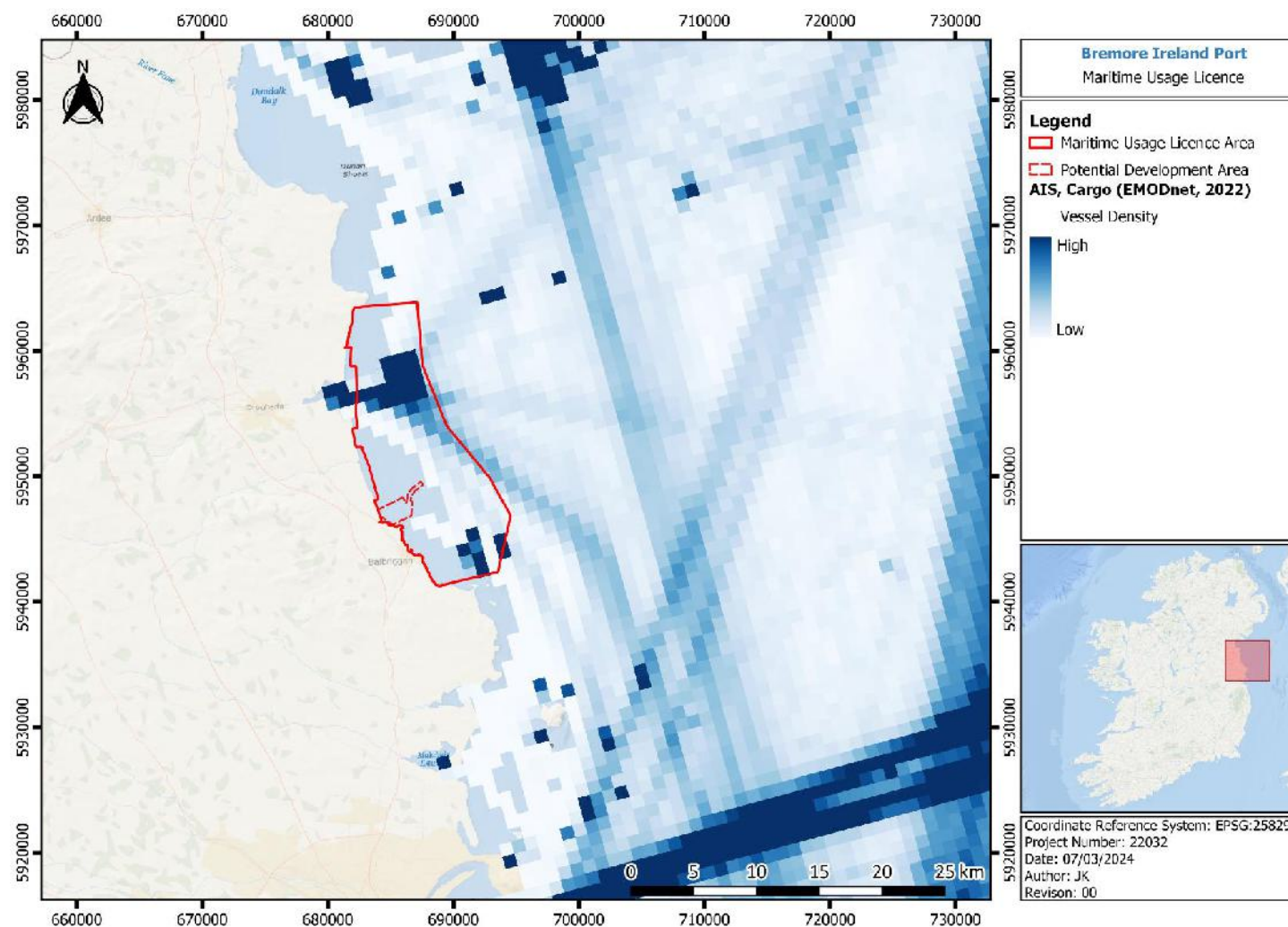
**Figure 6-20 Passenger Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)**





**Figure 6-21 Fishing Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)**





**Figure 6-22 Cargo Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)**



### **6.9.3 POTENTIAL EFFECTS**

The potential effects on marine traffic include an increased risk of collision with the static survey equipment and with the survey vessels.

### **6.9.4 ASSESSMENT OF POTENTIAL EFFECTS**

Up to two geotechnical vessels will be engaged in undertaking the geotechnical survey. They will typically be travelling at slow speeds and will also be stationary for a large portion of the time (approximately 6 hours at a CPT location, 24-36 hours at a nearshore borehole location and up to 48 hours at an offshore borehole location).

Therefore, potential effects on navigational channels within the area will be addressed through engagement with the relevant stakeholders, including the Irish Coast Guard, the Department of Transport, Tourism and Sport, local ports and harbours and users of the navigational channels, at appropriate times. No specific exclusion zone will be sought; however, vessels will be asked to maintain a safe distance, in keeping with accepted maritime safety practices. During the survey and deployment operations the vessels will display lights, shapes and other internationally recognised identification or warning signals.

## **6.10 ARCHAEOLOGICAL & CULTURAL HERITAGE**

### **6.10.1 INTRODUCTION**

Shipwreck data available through both the INFOMAR project and National Monuments Database is shown in Figure 6-23.

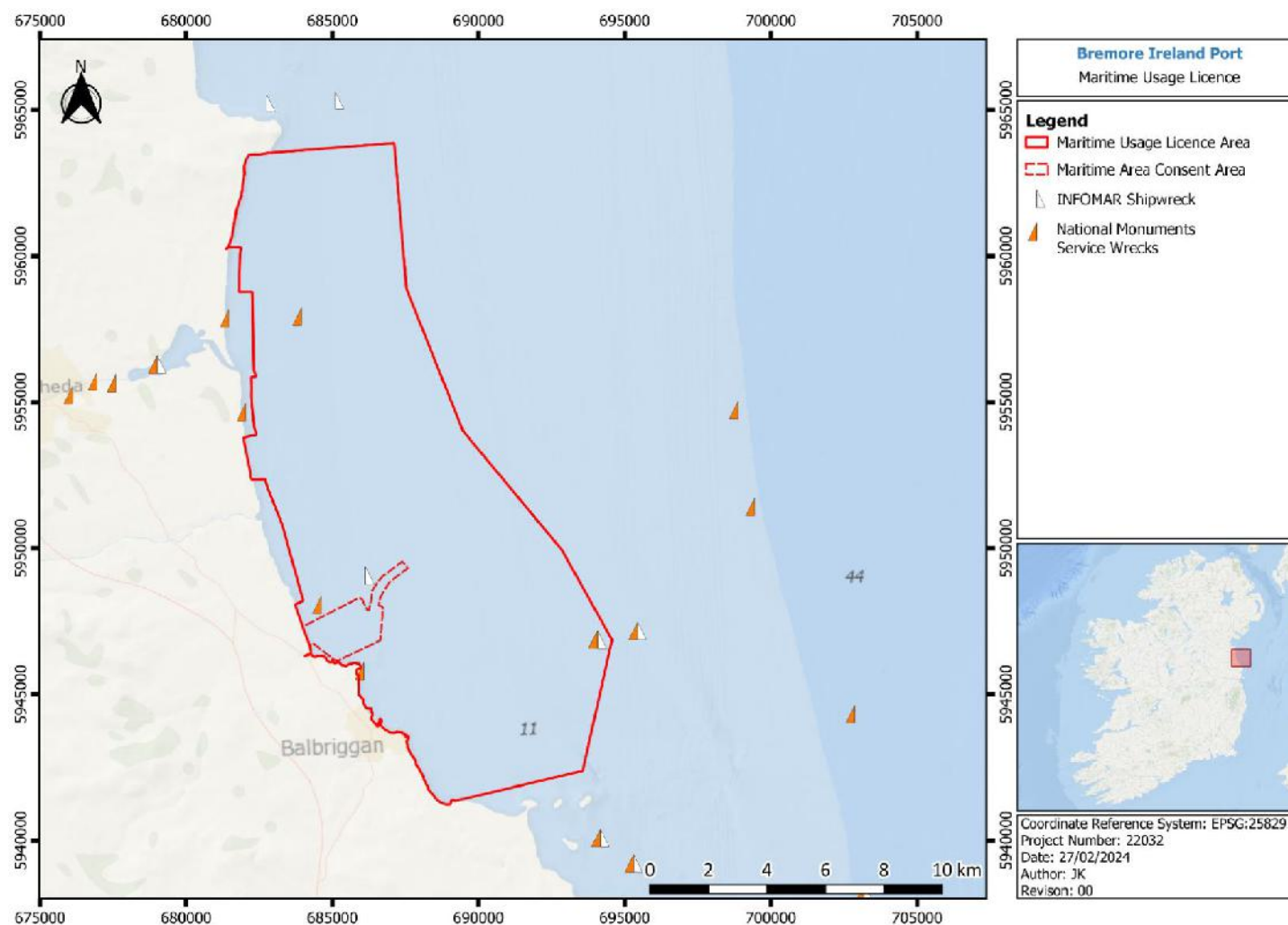
### **6.10.2 RECEIVING ENVIRONMENT**

INFOMAR is a joint venture between the Geological Survey of Ireland and the Marine Institute surveying Ireland's seabed. Part of this involves the identification, mapping, and archiving of shipwrecks in Irish waters. Within the Licence Area, two (2) shipwrecks have been identified from the INFOMAR database.

The National Monuments Database shipwreck data shows 4 unconfirmed shipwrecks within the Licence Area. Locations of many of the wrecks from the National Monuments Database are unconfirmed as, unlike the INFOMAR data, the records do not have recent survey data associated with them.

Most notable of these is the 'Gormonston Logboat', just to the north of the Licence Application Area's Potential Development Area, found during the laying of the ICPL offshore gas pipeline (NMS, 2020, N. Brady, personal communication October, 2022).





**Figure 6-23 National Monuments Service Wrecks and INFOMAR shipwreck database in the vicinity of the Licence Area**



### **6.10.3 POTENTIAL EFFECTS**

The potential effects to underwater archaeology include:

- Direct damage to known and unknown shipwrecks during intrusive site investigations.

### **6.10.4 ASSESSMENT OF POTENTIAL EFFECTS**

Activities on site will be temporary in nature and the impact on archaeology and cultural heritage in the proposed Licence Application Area is considered to be low. Therefore, potential effects on archaeology and cultural heritage is considered not to be significant.

## **6.11 POPULATION & HUMAN HEALTH**

### **6.11.1 POPULATION**

BIPDAC wish to ensure individuals and communities do not experience significant diminution in their quality of life from the direct or indirect effects arising from the proposed site investigation activities. All the impacts of a project or development have the potential to impinge on human health, directly and indirectly, positively and negatively.

All proposed site investigation activities will be conducted in accordance with all relevant Health and Safety Legislation and Regulations, and in adherence to all major international shipping conventions, adopted by the International Maritime Organization (and the International Labour Organization) concerning maritime safety and pollution prevention. This will ensure there will be no impact nor any significant negative effects on human health and/or on health and safety during the proposed survey activities. Additionally, the following mitigation measures will be undertaken in advance of site investigation surveys to mitigate potential impacts:

- Appropriate marine notices will be issued in the form of formal marine notices,
- Communication with the relevant Harbour Masters, and
- Engagement with relevant stakeholders.

These will ensure there will be no impact nor any significant negative effects on human health and/or on health and safety during the proposed survey activities.

### **6.11.2 TOURISM**

Overall, the area surrounding the licence application area has a high value for tourism and sea-based activities (The Marine Institute, 2020).

Principal urban centres are all located at harbour or estuaries, with sheltered bays, like those around the Dublin, Meath and Louth areas. The stretch of coastline between these areas is composed of long, sandy beaches which is a popular holiday location with mobile home and parks present in areas such as Clogherhead (Marine Institute, 2020). Areas such as Blackrock are also popular areas for water sports and walks available along promenades (Marine Institute, 2020). Scenic and expansive views are found along this coastline and in areas such as Howth, Skerries and Lambay. Clogherhead is also a popular location as a significant headland with wide ranging views across the long expanse of beaches.



Many of the small harbours throughout this coastal stretch had historically and continue to be busy fishing areas. In Mornington, Co. Meath, for example, the main type of fishing was based around salmon and mussel dredging.

The Northeast Irish Sea area, and similar to the Dublin Bay region, has evidence of Viking activity and Norse seafarers which can be found in the placenames associated with the regions. Other historic monuments with a marine element/background include several Martello Towers which have been identified as nationally significant for the area of the Bremore-Ballbriggan area. Additionally, historic lifeboats stations and lighthouses are located at Ballbriggan. Historic piers are also a feature of this Seascape Character Area (SCA) region, with several found at places such as Rogerstown, Rush, Giles Quay and Port Oriel (Clogherhead) in Louth (Marine Institute, 2020). There is an important passage tomb cemetery at Bremore, where there are no less than five tombs and other associated later monuments (Marine Institute, 2020).

### **6.11.3 ASSESSMENT OF POTENTIAL EFFECTS**

Short term and localised impact of the proposed site investigation activities on tourism and recreation may occur. An FLO will be appointed to the project, who will maintain communications with the local fishing communities and other marine users, including leisure users, in order to minimise disruption to leisure and recreation activities.

A Marine Notice will be issued in advance of the proposed site investigation activities. No specific exclusion zone will be sought; however, vessels will be asked to maintain a safe distance in keeping with accepted maritime safety practices.

Activities on site will be kept to the minimum duration possible and will be temporary in nature, with the maximum time expected on site in any one place c. 24-36 hours for boreholes. These are not likely to interact with other vessel traffic. Therefore, significant effects on marine traffic or other marine users are considered not to be significant.

## **6.12 MAJOR ACCIDENTS & DISASTERS**

The proposed site investigation activities are not anticipated to exacerbate natural disasters such as earthquakes, subsidence, landslides, erosion or flooding.

The potential for a major accident to arise as a result of the proposed activities will be minimised through mitigation measures outlined in Section 7 below. Safety of shipping and navigation mitigation will include publication of a formal Marine Notice, lights, shapes and other internationally recognised identification or warning signals displayed on survey vessels, and compliance with all requirements of the International Regulations for Preventing Collisions at Sea.

## **6.13 CLIMATE**

The survey will be conducted over a relatively short timeframe and effects contributing to climate change will not arise.



Across the seven main Irish ports, which include Drogheda, Cork, Waterford, Rosslare and Dublin, 3,036 vessels passed through between April and June of 2023 (CSO, 2023). For context, the number of arrivals at Drogheda Port was 44 vessels and 1,891 vessels passed through Dublin Port in Q2 2023 (CSO, 2023).

The site investigation activities will introduce a very small number of additional vessels to the area, which will be spread over the survey area and present for a relatively short duration while the site investigation activities are taking place (i.e. 1 day for metocean device deployment, weeks for non-intrusive surveys and weeks/months for geotechnical operations). Modern suitable vessels for the proposed surveys will have appropriate vessel certification and use the Common Marine Inspection Document (CMID), a standard format used for the inspection of offshore vessels, that promotes safety and efficiency of vessel operations (IMS, 2018). Therefore, there is not likely to be a significant effect on climate.

## **6.14 WASTE**

Any waste generated during the site investigation survey activities will be disposed of on land. There will be no planned release of potentially harmful substances or waste from the survey vessels.

Strict maritime regulations, normal vessel operating standards and precautions, compliant with all International Maritime Law and National Maritime Legislation, will ensure the risk of a release is low and no significant effects are predicted.

In addition, all vessels used shall, as required by law, be MARPOL compliant and fully certified by the Maritime Safety Office. Therefore, it is considered not likely that there would be any occurrence of a pollution event, accidental or otherwise, that could directly or indirectly affect the environment.

## **6.15 MATERIAL ASSETS**

### **6.15.1 INTRODUCTION**

The Irish Marine Atlas and the Foreshore Licence database were reviewed to determine potential infrastructure underlying the Licence Area.

### **6.15.2 RECEIVING ENVIRONMENT**

One offshore gas pipeline ('ICPL') runs through the Licence Application Area and one ICPL and one High Voltage Direct Current electricity connection cable ('East-West Interconnector') have been identified to the south of the Licence Application Area (Figure 6-24).



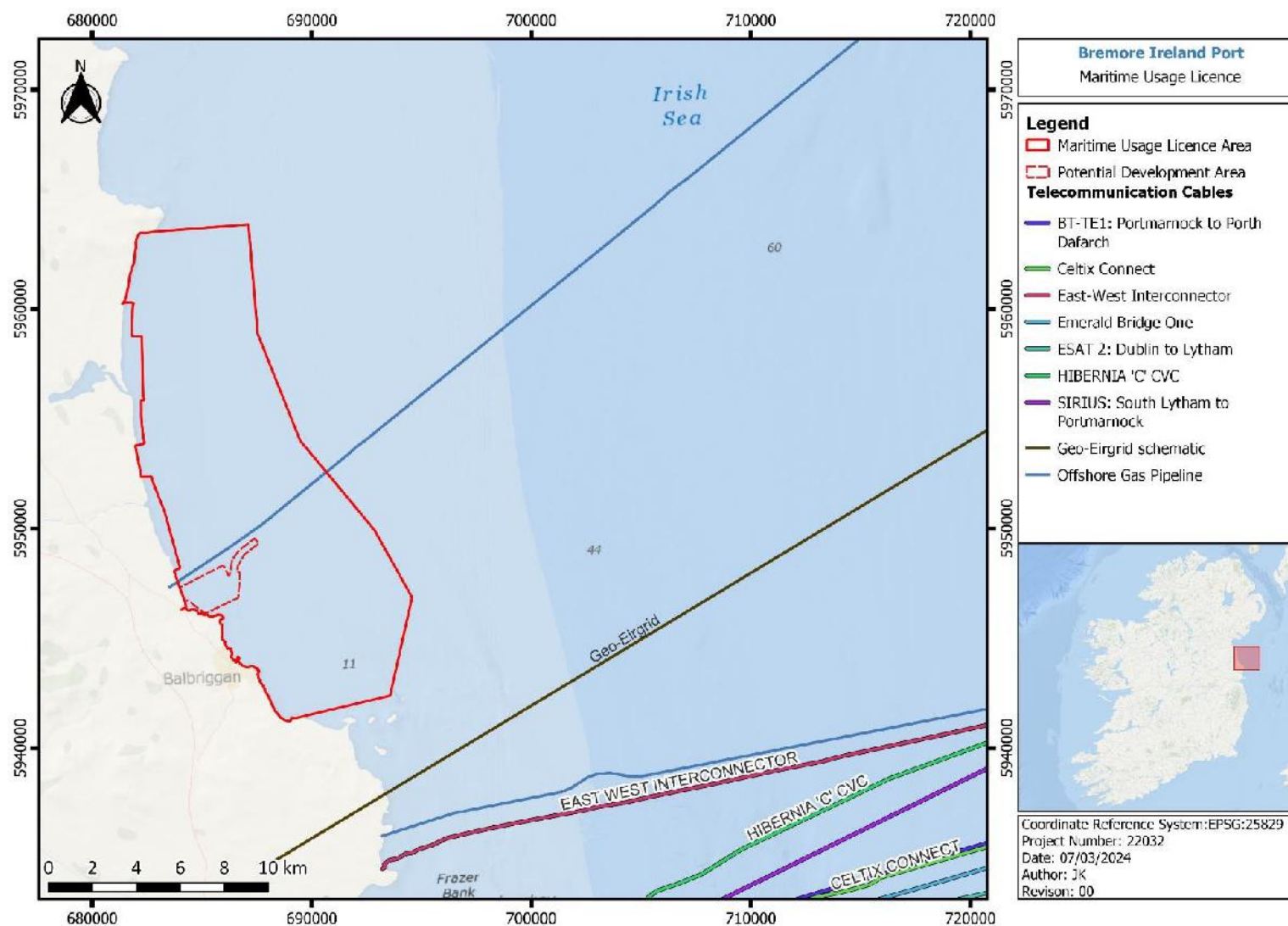


Figure 6-24 Material Assets – subsea cables



### **6.15.3 POTENTIAL EFFECTS**

The proposed site investigation activities have the potential to result in damage to existing infrastructure, due to direct impact of vessel spud cans, seabed sampling equipment or moorings.

### **6.15.4 ASSESSMENT OF POTENTIAL EFFECTS**

Geotechnical sampling locations will be positioned a minimum of 100 m from the as-found position of existing cables and buried pipelines or 250 m from the as-laid position if the position is not confirmed during the non-intrusive surveys. Third party asset owners will be consulted prior to site investigation activities commencing. Furthermore, the mitigation measures outlined in Section 7 will ensure that the risk of impact upon seabed infrastructure is mitigated for, with no significant effects predicted.

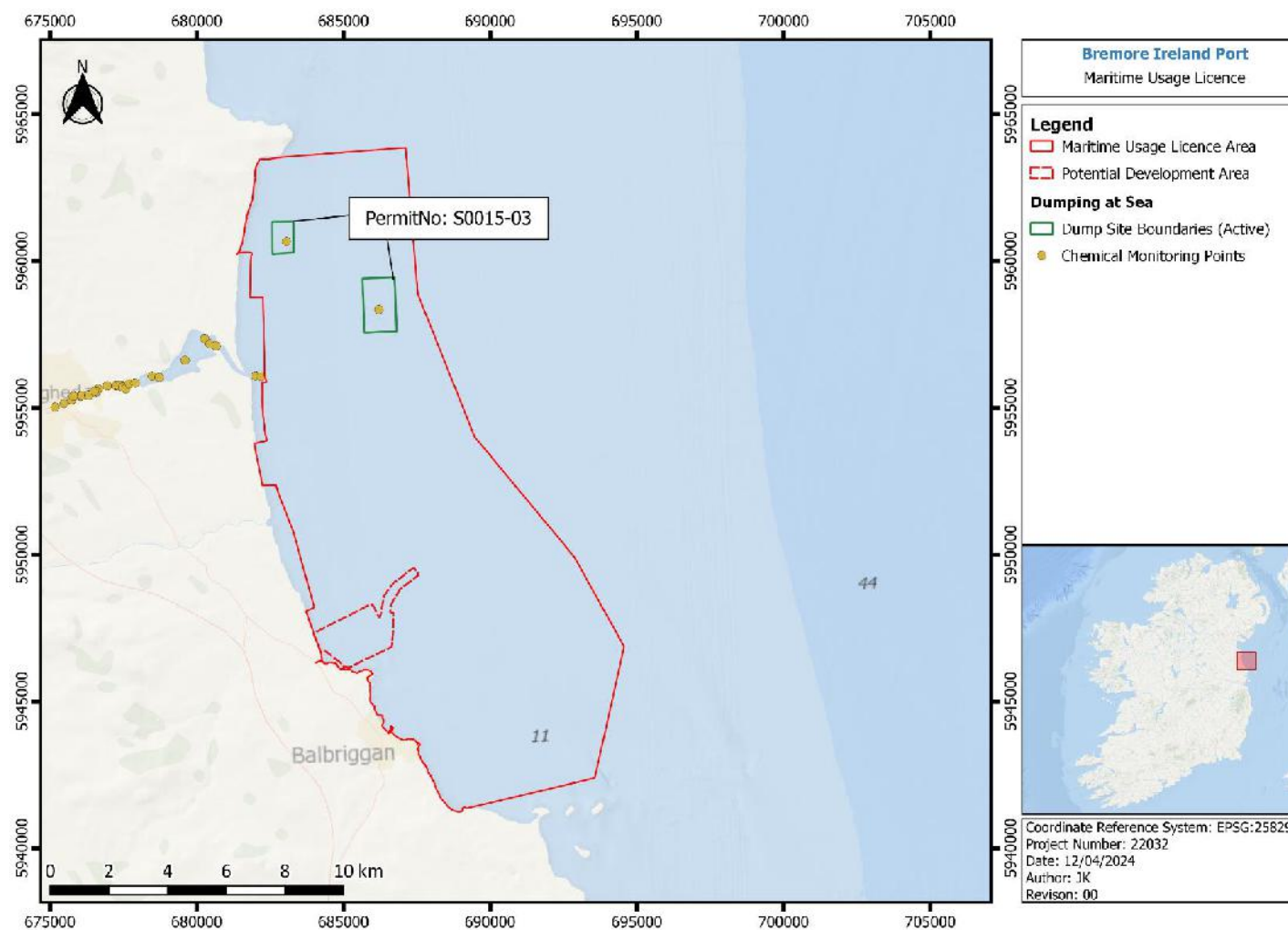
## **6.16 INTERACTIONS**

A review of available information for the area surrounding the Licence Area was undertaken to identify other activities and potential plans, projects and activities in the area. This included the DHLGH License Applications and Determinations search tool (DHLGH, 2021) and the Environment Protection Agency (EPA) Dumping at Sea Register (EPA, 2022b).

The dumping at sea sites in the vicinity of the Licence Area are shown in Figure 6-25. The dump sites indicated show activities within and around Drogheda port (EPA, 2022b). Two of the dump sites outside Drogheda port are current permits held by Drogheda Port Company for the release of dredge material until 2029. The remaining dump sites outside Drogheda Port were previous permits held for the release of dredged material through the hull of vessels from Drogheda Harbour Commissioners with these permits ending in 1984 and 1993. A previous permit for the release of dredged material for the purpose of beach nourishment near Gormanstown was also held by Drogheda Port Company, with this permit ending in 2007. Previous permits were also held in 2002, by Bórd Gáis Éireann, with a dump site near Gormanstown for the release of dredged material through barge hold splitting while the vessel is in motion. None of the previous or current dump sites overlap with the Potential Development Area.

The chemical monitoring sites within the vicinity of the Licence Application Area are Figure 6-25. This displays the monitored sampling areas for Drogheda Port and Malahide Marina. None of the chemical monitoring points are within or adjacent to the Potential Development Area. The chemical monitoring points within Drogheda Port which were sampled in 2019 showing black, slightly sandy slightly gravely organic silt. The chemical monitoring sampling in 2018 within Malahide Marina recorded dark brown, clay, no visible signs of life. The monitoring points adjacent to the Licence Area were sampled in 1996 from Drogheda Harbour, with no descriptions available on the sample appearance.





**Figure 6-25 Dumping at sea in the vicinity of the Licence Area (EPA, 2022b)**



## **6.17 OTHER PROPOSED DEVELOPMENTS**

The following offshore wind development related Foreshore Licence Applications have been identified as being within the Cumulative Effects Spatial Scope and Cumulative Effects Temporal Scope of the Licence Area:

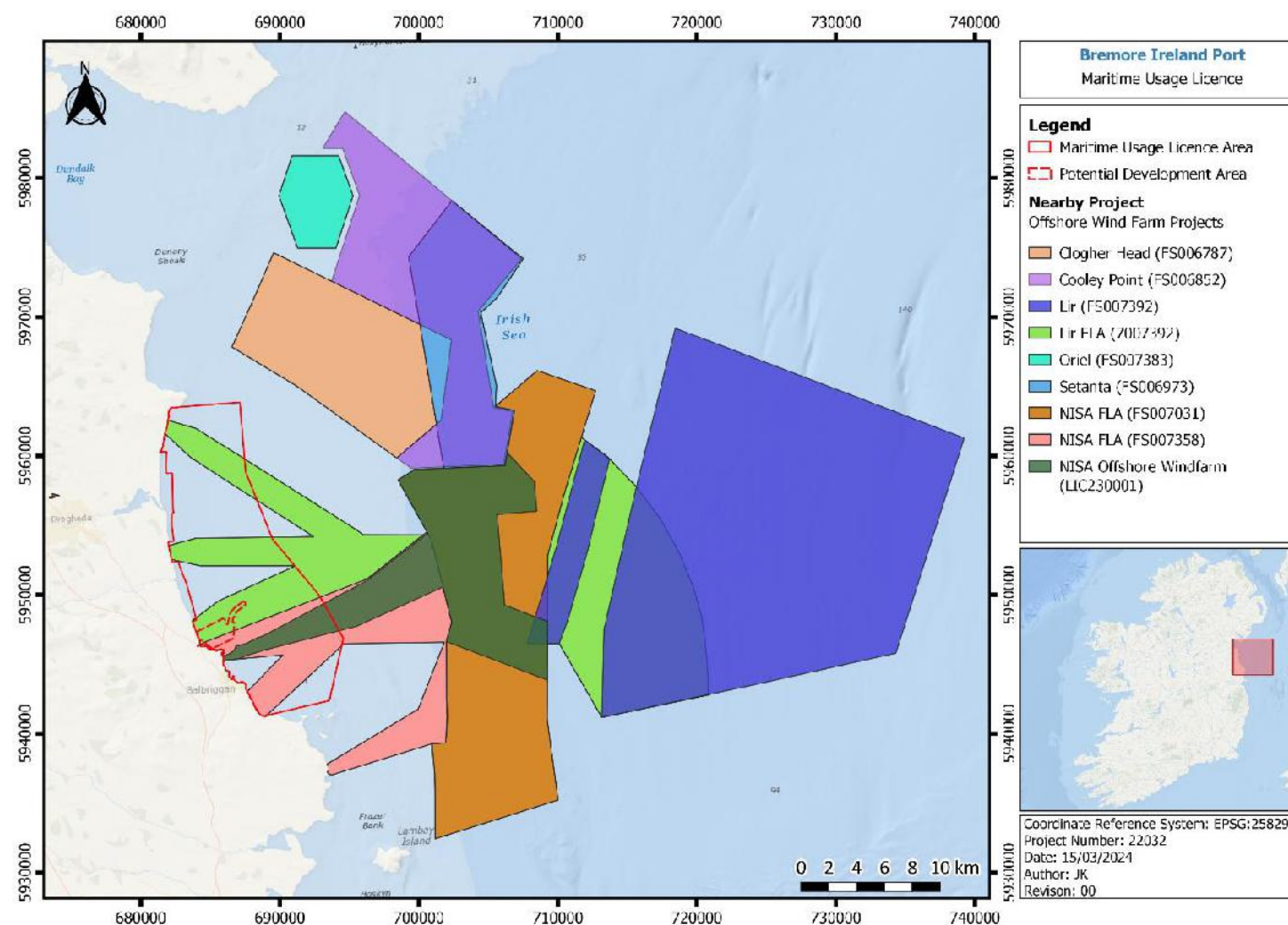
- Lir Offshore Array Ltd. (OWF)
- Setanta (OWF)
- Clogher Head (OWF)
- Statkraft North Irish Sea Array (NISA) Site Investigations Array Area (OWF)
- Statkraft North Irish Sea Array (NISA) Cable Route (OWF)
- North Irish Sea Array (NISA) Windfarm Limited (OWF)

Other developments identified within the Cumulative Effects Spatial Scope and Cumulative Effects Temporal Scope of the Licence Area are:

- Mares Connect Electricity Interconnector Foreshore Licence Area
- Drogheda Port Company Maintenance Dredging

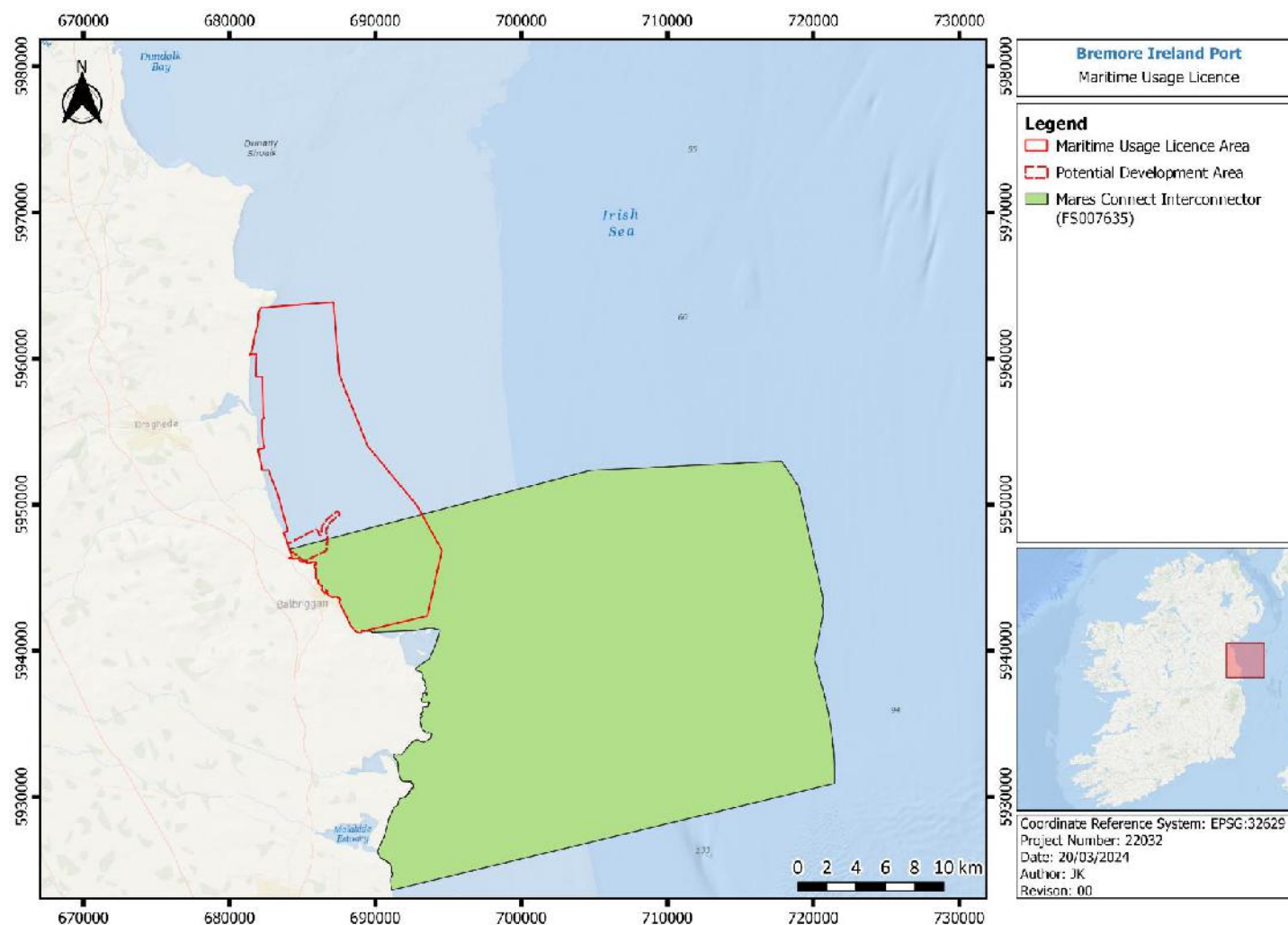
The locations of these projects are shown in Figure 6-26 and Figure 6-27.





**Figure 6-26 Other Proposed Wind Farm Project Foreshore Licence Application Areas within the vicinity of the Licence Application Area**





**Figure 6-27 Location of non-OWF projects and plans within the Cumulative Effects Spatial Scope**



The possible cumulative effects of the projects detailed above, and in Appendix B of this document, and the Licence Application proposed site investigation activities were identified and assessed in Section 5 of the SISAA document submitted as part of this application, where it was found that there was the possibility of cumulative effects.

The NIS document submitted as part of this application concluded that adverse cumulative effects of the proposed site investigation activities and the projects identified and detailed in the paragraphs above, are not considered likely if the mitigation measures outlined within the NIS and below are employed.



## **7 SUMMARY OF MITIGATION MEASURES PROPOSED**

The potential impacts on the receiving environment from the activities proposed under this Licence Application were identified above. A summary of the mitigation measures proposed is provided in Table 7-1 below.



**Table 7-1 Summary of the proposed mitigation measures for the Bremore Ireland Port Site Investigation Activities**

Proposed Mitigation Measures	
Section	Mitigation
<b>Land &amp; Soils</b>	Not required as all activities are in the marine environment.
<b>Water</b>	<p>Biodegradable polymer mix will be used throughout drilling operations where possible. Chemical material used will be from the List of Notified Chemicals (approved chemicals) and discharged into the marine environment under the Offshore Chemical Notification Scheme.</p> <p>Strict maritime regulations, normal vessel operating standards and precautions, compliant with all International Maritime Law and National Maritime Legislation, will ensure the risk of a chemical release is low and no significant effects are predicted.</p> <p>In addition, all vessels used shall, as required by law, be MARPOL compliant and fully certified by the Maritime Safety Office.</p>
<b>Biodiversity</b>	
<b>Marine Benthos</b>	<p>As no likely significant effects are expected for any designated Annex I benthic habitat of any SAC due to the proposed site investigation activities, no mitigation measures are proposed.</p> <p>To mitigate against impacts on habitats of conservation importance:</p> <ul style="list-style-type: none"> <li>For subtidal surveys an underwater camera system will be used in advance of grab sampling to identify areas of protected habitat. If protected habitat is identified, the area will not be subject to physical sampling and seabed imagery will be used as an alternative.</li> <li>With respect to intertidal surveys, these will be undertaken in daylight hours and sensitive species within the survey area will be identified, recorded and avoided during sampling.</li> </ul>



Proposed Mitigation Measures	
	<ul style="list-style-type: none"> <li>Samples taken within the intertidal area will be small and by their nature will be taken from soft sediments only. The total area affected will be small in comparison to the overall area and given the nature of the sediment and its location will be temporary in effect.</li> </ul>
Natura 2000 Sites	<b>Annex I Habitats</b>  As no likely significant effects are expected for any protected benthic habitat due to the proposed site investigation activities, no mitigation measures are proposed.
	<b>Annex II Species</b>  See Marine Mammals for proposed mitigation measures for Annex II marine mammal species; and see Fish Ecology for proposed mitigation measures for Annex II migratory fish species.
	<b>Birds</b>  Intertidal trial pit investigations will be observed and supervised by a qualified and competent ecologist. This measure will ensure that any adverse effect due to disturbance caused by the activities will be mitigated for.  As no likely significant effects are expected for bird species due to the proposed site investigation activities, no other mitigation measures are proposed.
Marine Mammals	The proposed site investigation activities are temporary in nature and of short duration. Mitigation measures to be employed during geophysical acoustic surveys include:
	<b>Marine Mammal Observers (MMOs)</b> – A qualified and experienced Marine Mammal Observer (MMO) will be appointed to monitor for marine mammals and to log all relevant events using standardised data forms provided by the DAHG. During daylight hours the MMO(s) will carry out visual observations and during hours of darkness MMOs will carry out Passive Acoustic Monitoring (PAM) to monitor for the presence of marine mammals before the soft start commences and will recommend delays in the commencement of the site investigations should any species be detected within the relevant monitored zone.
	<b>Pre-start monitoring</b> – Marine Mammal monitoring will be conducted for a pre-soft start search of 30 minutes i.e., prior to the commencement of marine operations (MBES, SS, sub-bottom profiling, geotechnical seabed sampling). This will involve a visual



Proposed Mitigation Measures	
	<p>observation (during daylight hours) or acoustic monitoring (during hours of darkness) to determine if any marine mammals are within the relevant zone of the activities.</p>
	<p><b>Monitored zone</b> – Should any marine mammal species be detected within a radial distance of the relevant zone of the survey vessel, commencement of site investigation activities will be delayed until their passage, or the transit of the vessel, results in the cetaceans being of sufficient distance from the vessel. In both cases, there will be a 30-minute delay from the time of the last sighting within the relevant zone of the survey vessel to the commencement / recommencement of the operations. The MMO will use a distance measuring stick or reticule binoculars to ascertain distances to marine mammals. Note: once started, site investigations will not cease should cetaceans approach the survey vessel.</p>
	<p><b>Soft start</b> – A soft start is the gradual ramping of power over a set period of time, to give any marine mammals adequate time to leave the area.</p> <p>Once the soft start commences, there is no requirement to halt or discontinue the procedure at night-time, if weather or visibility conditions deteriorate, or if marine mammal species enter the monitored zone.</p> <p>In commencing a seismic survey operation, including any testing of seismic sound sources, where the output peak sound pressure level exceeds 170 dB re: 1µPa @1m, a ramp up procedure will be undertaken in line with the 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters' (DAHG, 2014).</p> <p>Energy output will commence from a low energy start-up and be allowed to gradually build up to the necessary maximum output over a period of 20-40 minutes (the exact time period will be dependent on survey parameters and equipment and will be designed in consultation with an experienced marine ecologist).</p> <ul style="list-style-type: none"> <li>• This controlled build-up of energy output will occur in consistent stages to provide a steady and gradual increase over the ramp-up period.</li> <li>• If marine mammals enter or are detected within the monitored zone while the ramp-up procedure is under way but incomplete, the energy output will not be increased until the marine mammals are no longer within the monitored zone.</li> </ul>



Proposed Mitigation Measures	
	<p><b>Line changes</b> – Where the duration of a survey line or station change is greater than 40 minutes, the activity will, on completion of the line/station being surveyed, either cease (i.e., shut down) or preferably undergo a reduction in energy output to a lower state where the peak sound pressure level from any operating source is <math>\leq 170</math> dB re 1 <math>\mu</math>Pa @ 1 m. Prior to the start of the next line/station, if the power was shut down, all pre-survey monitoring measures and soft start procedures will be followed as for start-up. If there has been a reduction in power, a soft start will be undertaken gradually from the lower output level. The latter sound reduction measure will be applied to line changes at night-time or in daytime conditions of poor visibility. Where the duration of a survey line/station change is less than 40 minutes the activity will continue as normal (i.e. under full output).</p>
	<p><b>Breaks in survey periods</b> – If there is a break in sound output from survey equipment for a period greater than 30 minutes (e.g., due to equipment failure, shut-down, survey line/station change) then all pre-start monitoring measures and ramp-up procedures will recommence prior to re-starting.</p>
	<p><b>Reporting</b> – All recordings of marine mammal species will be made using standardised data forms provided by the NPWS. Full reporting on operations and mitigation will be provided to the NPWS to facilitate reporting under Article 17 of the EC Habitats Directive and future improvements to guidance (DAHG, 2014). The report will also include feedback on how successful the measures were. This requirement will be communicated to the MMOs at project start up meetings and at crew change.</p>
	<p><b>Survey vessels speed and course</b> – The project survey vessels will be moving at a maximum speed of approximately 5 knots during surveys to allow for marine mammal species to move away from the vessel should they be disturbed by the vessel presence or noise emissions. During transit times, the survey vessels will be travelling at speeds greater than 5 knots. However, these movements are not considered to deviate from normal vessel traffic in the Licence Area. Should marine mammal be found to be in the direct path of a survey vessel, during or outside of survey times, the survey vessel will slow down or, if possible, alter course to avoid collision.</p>
	<p>In addition, should Bremore Ireland Port identify that a temporal overlap is likely between these proposed site investigation activities and those projects identified in the SISAA as having the potential to cause in-combination effects to marine mammals, Bremore Ireland Port will engage with those projects to ensure that activities are sufficiently distanced to ensure that adverse effects on marine mammals are mitigated for.</p>



Proposed Mitigation Measures	
<b>Fish Ecology</b>	<p>The soft-start/ramp-up procedure described in the 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters' protocol (DAHG, 2014) will be followed to ensure that any adverse effect to fish species due to disturbance caused by underwater noise will be mitigated for.</p> <p>If a temporal overlap is likely between the proposed site investigation activities and projects identified as having the potential to cause in-combination effects to noise pressure sensitive fish species, Bremore Ireland Port will engage with those projects to ensure that activities are sufficiently distanced to ensure that adverse effects on such species are mitigated for.</p>
<b>Commercial Fisheries</b>	<p>During the proposed site investigation activities, other vessels will be requested to maintain a safe distance from the survey vessels due to their restricted manoeuvrability. Fishermen will also be requested to avoid the static survey equipment once it is deployed, which will have a very small footprint.</p> <p>For the duration of the geophysical survey fishermen with static gear such as whelk/lobster/crab pots within the survey will be engaged by the fishery liaison officer and potential moves of static fishing gear will be discussed. It will be the projects position to mitigate for potential impacts upon the commercial fishing sector and endeavour to minimise disturbance due to the presence of the survey. The proposed site investigation activities will be temporary and have a short duration.</p> <p>Bremore Ireland Port will appoint an FLO to engage with the local fishing community in order to determine the full extent of fishing effort in the Licence Area, and to minimise disruption to the activity.</p> <p>In addition to the project FLO, it is the intention of the project to have in place an offshore fisheries liaison officer during survey activity as required that will further mitigate for interactions between the survey vessels and fishermen including the various commercial offshore activities within the area.</p> <p>As a further mitigation measure, Afloat scouting surveys will continue to be undertaken across the project area at regular intervals to ensure the trend for fisheries in the area is understood ahead of the surveys being undertaken.</p> <p>The project fisheries liaisons office will visit the ports in the area ahead of any surveys being undertaken and as previously done, discuss in detail the forthcoming survey campaign with fishing industry.</p>
<b>Aquaculture and Shellfish Ecology</b>	<p>As no likely significant effects are expected for aquaculture operations or shellfish in result of the proposed site investigation activities, no mitigation measures are proposed.</p>



Proposed Mitigation Measures	
<b>Air Quality</b>	No likely significant effects are predicted from the site investigation activities on Air or Climate, therefore no mitigation measures were proposed.
<b>Landscape and Seascape</b>	As no likely significant effects are expected to any landscape or seascape in result of the proposed site investigation activities, no mitigation measures are proposed.
<b>Marine Traffic</b>	<p>Traffic Routes within the site will be addressed through engagement with the relevant stakeholders, including the Irish Coast Guard, the Department of Transport, Tourism and Sport, local ports and harbours and users of the navigational channels, at appropriate times. No specific exclusion zone will be sought; however, vessels will be asked to maintain a safe distance, in keeping with accepted maritime safety practices.</p> <p>During the survey and deployment operations the vessels will display lights, shapes and other internationally recognised identification or warning signals.</p> <p>Mitigation measures will be in place to ensure compliance with the International Regulations for Preventing Collisions at Sea and standards, including a formal notice to mariners in advance of any activity, appropriate navigation lights and liaison with Port authorities to agree the timing of works and to agree a communication protocol.</p> <p>The proposed site investigation activities will be temporary and have a short duration.</p>
<b>Archaeological and Cultural Heritage</b>	Known or suspected wrecks will be avoided during physical sampling activities. Geophysical survey activities will be conducted, and data collected assessed for archaeological features of interest, in advance of intrusive survey activities. All proposed physical sampling locations will be assessed in advance by a suitably qualified archaeologist to ensure that the proposed site investigation activities do not negatively impact on locations where there is known or potential archaeology.
<b>Population and Human Health</b>	All proposed site investigation activities will be conducted in accordance with all relevant Health and Safety Legislation and Regulations, and in adherence to all major international shipping conventions, adopted by the International Maritime Organization (and the International Labour Organization) concerning maritime safety and pollution prevention.
<b>Tourism and Recreation</b>	An FLO will be appointed to the project, who will maintain communications with the local fishing communities and other marine users, including leisure users, in order to minimise disruption to leisure and recreation activities.



Proposed Mitigation Measures	
	<p>A Marine Notice will be issued in advance of the proposed site investigation activities. No specific exclusion zone will be sought; however, vessels will be asked to maintain a safe distance in keeping with accepted maritime safety practices.</p> <p>Activities on site will be kept to the minimum time period possible and will be temporary in nature</p>
<b>Major Accidents and Disasters</b>	Safety of shipping and navigation mitigation will include publication of a formal Marine Notice, lights, shapes and other internationally recognised identification or warning signals displayed on survey vessels, communication protocol with the relevant Harbour Master and compliance with all requirements of the International Regulations for Preventing Collisions at Sea.
<b>Climate</b>	No likely significant effects are predicted from the site investigation activities on Air or Climate, therefore no mitigation measures were proposed.
<b>Waste</b>	Strict maritime regulations, normal vessel operating standards and precautions, compliant with all International Maritime Law and National Maritime Legislation, will ensure the risk of a chemical release is low and no significant effects are predicted. In addition, all vessels used shall, as required by law, be MARPOL compliant and fully certified by the Maritime Safety Office.
<b>Material Assets</b>	Geotechnical sampling locations will be positioned a minimum of 100 m from the as-found position of any cables and buried pipelines identified during the non-intrusive surveys. Third party asset owners will be consulted prior to site investigation activities commencing.
<b>Interactions</b>	<p>Relevant mitigation measures were included in the Sections above where possible cumulative effects were identified on particular receptors. Adverse cumulative effects of the proposed site investigation activities with the projects identified in Section 6.17 are not considered likely due to the:</p> <ol style="list-style-type: none"> <li>1. Implementation of effective communication between Bremore Ireland Port and those projects listed in Section 6.17;</li> <li>2. Likely timing and phased nature of proposed site investigation activities;</li> <li>3. Temporary nature of proposed site investigation activities;</li> <li>4. Very localised and imperceptible effects of proposed site investigation activities; and</li> <li>5. Implementation of mitigation measures outlined above;</li> </ol>



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## Appendix A Programme of Works

The proposed programme of SI to be undertaken within the licence area is summarised in Table 2 2 below and discussed in more detail in Appendix A.

Two types of site investigation activities will be undertaken; remote sensing activities which typically do not contact the seabed, and direct sampling activities which do. All Site investigation activities will be undertaken within the MUL Area.

Summary table

Survey	Methods	Purpose	Sampling Effort
<b>Hydrographical and Geophysical</b>	Multibeam Echosounder (MBES)	MBES is a system for collecting detailed topographical data of the seabed. Typical equipment includes the Kongsberg EM3002D multi-beam system with mounting system including AML SV Smart Probe, Kongsberg EM 2040 or similar. For these surveys the equipment will operate at a typical central frequency of 200 - 400kHz (700kHz optional) with sound pressure levels in the range of 200-228dB re1μPa @1m.	MBES may be undertaken across the Licence Application Area to a suitable percentage coverage.
	Side Scan Sonar (SSS)	SSS surveys are used to determine sediment characteristics and seabed features. The EdgeTech 4200 may be taken as an indicate example of an SSS device and for these surveys will have a potential operating frequency range of approximately 230/540kHz in the offshore area and 540/850kHz in the shallower nearshore area with sound pressure levels of 228dB re1μPa @1m.	SSS may be undertaken across the Licence Application Area to a suitable percentage coverage.
	Magnetometer	A magnetometer is used to identify magnetic anomalies and hazard mapping for metal obstructions, shipwrecks and unexploded ordnance on the surface and in the shallow sub-surface. The Geometrics G-882 can be taken as an indicative equipment example, it is a passive device (i.e. it does not emit any sound waves into the marine environment).	Magnetometer survey may be undertaken across the Licence Application Area to a suitable percentage coverage.
	Sub-bottom Profiling (SBP)	SBP is used to develop an image of the subsurface, identifying different strata encountered in the shallow sediments. The Innomar SES-2000 Medium is an indicative example of a parametric system with a primary and secondary frequency range of 85-115kHz and 2-22kHz, respectively, and sound pressure levels of up to 247 dB (typically operated at <200dB) re1μPa @ 1m, which would be used in both nearshore and offshore areas. The Applied Acoustics AA301 is an indicative example of a boomer, with sound pressure levels in the range of 208-215dB re1μPa @ 1m which would be used in the nearshore shallower area. The applied Acoustics Duraspark 400 is an indicative example of a sparker system used in sub-bottom profiling, with sound pressures in the range of 204-216dB re1μPa @1m.	SBP may be undertaken across the Licence Application Area to a suitable percentage coverage.
<b>Geotechnical</b>	Boreholes	Boreholes will typically be a maximum of 40 m deep.. All drilling equipment used will follow the ISO and API technical specifications for drilling equipment.	Up to 60 no. boreholes will be required within the Proposed Development



Survey	Methods	Purpose	Sampling Effort
		Marine rotary drilling is a technique used to bore holes into the seabed. The drilling process involves rotating a drill bit attached to a drill string and applying downward pressure to cut through the rock formations. Geotechnical sampling tools, including push and piston samples, can then be deployed into the ground to recover intact material. The typical frequencies emitted from rotary drilling are between 0.001-0.120kHz and a recorded sound pressure of approximately 145dB re1μPa @1m.	Area within the Licence Application Area.
	Cone Penetration Tests (CPT)	CPTs are a method for testing in situ soil parameters. CPTs can be performed as either Seabed CPTs or downhole in boreholes.	Up to 60 no. CPTs will be required covering both the preliminary and interim campaign within the Proposed Development Area within the Licence Application Area.  The spacing interval will be determined by the variability and level of understanding of the shallow geology.
	Vibrocore / Gravity Corer	Vibrocore and Gravity Corer are methods of collecting un-consolidated seabed samples.	Up to 60 no. sample locations will be required for either vibrocore or gravity sampling with a target depth of 6m BSF within the Proposed Development Area within the Licence Application Area.
<b>Metocean &amp; geomorphology</b>	Acoustic Doppler Current Profiler (ADCP)	This equipment is installed on the seabed and anchored with a suitable mooring structure. It is generally a short-term deployment used to gather seasonal data (e.g. winter storm data) however may be deployed for longer.	Up to 5 ADCPs may be used to examine wave and current conditions in the Licence Application Area.
	Wave Buoy	Wave rider buoys may be deployed to measure wave heights and direction to feed into the detailed design of the project within the Licence Application area. They will be moored to the seabed by a suitably sized mooring structure.	Up to 2 Waverider buoys may be deployed within the Licence Application area.
	Sediment traps	Sediment traps are containers that are used to collect particles falling toward the sea floor. Particle size and accumulation rates will be used to inform sediment transport modelling.	Up to 10 nr. sediment traps may be placed in in the Licence Application area for an approximate duration of 60 days.
<b>Ecology</b>	Bird and Marine Mammal Survey	Identify bird and marine mammal species distribution and behaviour within the Licence Application Area.	Bird and marine mammal surveys may be undertaken



Survey	Methods	Purpose	Sampling Effort
			across the Licence Application Area
	Fisheries Survey	Identify fish species distribution and fishing activity within the Licence Application Area. Exact details of monitoring required will be determined through engagement with the relevant authorities such as SFPA, the Marine Institute and through local knowledge where appropriate.	Fisheries surveys may be undertaken across the Licence Application Area
	Benthic Ecology (subtidal benthic survey, intertidal habitat walkover survey)	<p>This survey is designed to identify the expected benthic communities and habitats at the site.</p> <p>In the intertidal area features of conservation importance will be identified by means of intertidal habitat mapping with core/quadrat sampling and hard substrate quadrat sampling where appropriate. This may consist of the intertidal Phase I walkover survey of the area with identification of the main habitats present (in the form of biotope mapping).</p> <p>Subtidal sample locations may be subject to drop down video in advance of grab sampling.</p> <p>Samples of water may be taken at the same time for analysis.</p>	There will be up to 200 no. subtidal grab sampling locations within the Licence Application Area. Multiple samples/replicates may be taken at each location.
	Marine Mammal Acoustic Monitoring (CPODs)	Marine mammal acoustic monitoring using CPODs deployed on the seabed. SoundTrap hydrophones may be deployed alongside the CPODs for periods throughout the monitoring campaign.	Either 4 permanent sites will be selected, or the 4 sites will be relocated every 3 months during battery change. The CPOD locations are subject to archaeological survey results.
<b>Archaeological</b>	Underwater Archaeology	Identification and assessment of metallic and other targets recorded during the marine geophysical surveys.	Underwater Archaeology survey may be undertaken across the Licence Application Area

## A.1 SITE INVESTIGATION ACTIVITIES

### A.1.1 GEOPHYSICAL SURVEY

The proposed geophysical survey programme involves a multi-disciplinary approach that is designed to acquire a full suite of data which includes collection of single beam echosounder, multibeam echosounder, side scan sonar, magnetometer and sub-bottom profiler data. The collected data will be used to better understand the water depths, topography and relief and structure of the seabed and the subsurface structure, in particular the sub-surface stratigraphy, determining sediment strata and the elevation of competent bedrock. With the exception of the Acoustic Corer, which sits on the seabed, the geophysical survey processes are non-physically intrusive and at no point will the equipment used make contact with the seafloor. The exact equipment to be used will be confirmed following a tender process to procure the site investigation contractor. However, the operating



frequencies (outlined in Table 2-2) represent the operating frequencies typically employed in site investigations for offshore wind.

The objectives of the geophysical survey shall be to:

- Obtain up to date high-resolution water depth measurements across the site.
- Obtain information on the seabed surface (type, texture, variability, etc.) and in particular, to identify any seabed features that may be of interest to the overall project.
- Identify any shallow geohazards and man-made hazards (including but not limited to outcropping, boulders, shallow gas, wrecks, debris etc.).
- Determine the stratigraphy across the site and quantify the variability in the lateral and vertical extents to depths of up to approximately 50m below seabed, if necessary.
- Identify the presence of bedrock should it exist within the top 50m.
- Identify any magnetic anomalies.
- Identify marine habitat areas as the basis for benthic survey to be carried out.
- Identify sensitive marine habitats which will need to be avoided during geotechnical and environmental sampling.

#### **A.1.1.1 MULTIBEAM ECHOSOUNDER (MBES)**

A Multibeam Echosounder (MBES) system will be used to provide detailed bathymetric mapping throughout the Licence Area.

MBES is an acoustic imaging system used to create detailed three-dimensional maps of the seafloor. It works by sending out a fan-shaped beam of sound waves, which reflect off the seafloor and return to the MBES. The MBES measures the time it takes for the sound waves to travel to the seafloor and back, as well as the strength of the returning echoes, to create an accurate picture of the seafloor topography.

The MBES emits multiple beams of sound waves at different angles, allowing it to cover a wide range of the seafloor with each pass. This enables it to create detailed maps of underwater terrain, including the depth and shape of the seafloor, the location of underwater features such as ridges, canyons, and seamounts, and the distribution of marine habitats and resources.

The MBES system will be hull mounted. The exact equipment used will be confirmed following the appointment of a survey contractor. The Kongsberg EM2040 may be taken as a typical example (Figure 1). MBES is non-intrusive therefore does not interact with the seabed. MBES may be undertaken across the Licence Area to a suitable percentage coverage.





**Figure 1: EM2040 Multibeam Echosounder (Kongsberg).**

#### **A.1.1.2 SIDE SCAN SONAR (SSS)**

Side Scan Sonar (SSS) is a sensor which is typically towed behind the vessel on an armoured tow cable, although some models can be pole mounted on the side of the vessel. A dual frequency SSS system will be used to provide detailed imagery of the seabed throughout the Licence Area which will aid with seafloor sediment/bedrock and geomorphology mapping as well as for identifying any shallow geohazards (Figure 2).

Side scan systems are available from a number of manufacturers. These units vary in size, working and technical characteristics and acquisition configuration (towed or vessel mounted). Dual frequency digital systems allow more survey flexibility; some systems can acquire and record both frequencies swaths independently and simultaneously. Using these systems, operator may use a higher frequency to produce sharper images and narrow swath or use the lower frequencies to obtain wider seabed coverage at lower resolutions. The exact equipment used will be confirmed following the appointment of a survey contractor.

The system will be adequate to the depth range of the study area and the seabed discrimination level required. The design of transects will consider the geographic and depth extent of the study area, seabed coverage ratio, overlap coverage desired, priority areas to survey, prevailing winds and currents, etc. Often, the complete coverage of the seabed is the ultimate goal of an acoustic survey design, to enable the creation of full mosaics. In these cases, theoretically, parallel transects should be run to produce swath overlapping of, at least, 50%. When complete coverage is not necessary to define seabed boundaries, consecutive swaths overlapping 20 to 30% can be adequate. However, in some cases, transect spacing of at least 75% of the swath width can provide reasonable overlapping to compensate any loss of resolution at the outer range limits. This is very dependable on weather conditions and the survey will be planned accordingly by an experienced sonar operator.

SSS is non-intrusive therefore does not interact with the seabed. SSS may be undertaken across the Licence Area to a suitable percentage coverage.





**Figure 2: EdgeTech 4205 MP Side Scan Sonar Towfish (EdgeTech)**

### **A.1.1.3 MAGNETOMETER**

A magnetometer is a passive device that is towed behind a survey vessel. It is used to detect ferrous objects on the surface or in the subsurface. Magnetometer surveys are widely used prior to intrusive works to highlight any obstruction or potential risk such as existing infrastructure, shipwrecks and unexploded ordnance (Figure 3).

The vessel will tow the magnetometer in a submerged pod. The exact equipment used will be confirmed following the appointment of a survey contractor though it is expected the magnetometer will be of the Caesium Vapour type and capable of recording variations in magnetic field strength during survey to an accuracy of  $\pm 0.5$  nT.

A Magnetometer is non-intrusive therefore does not interact with the seabed. It may be undertaken across the Licence Area to a suitable percentage coverage and the parameters of the survey may be determined by the requirements of the Underwater Archaeology Unit of the National Monuments Service. Requirements for magnetometer and SSS survey are set out in Table 1.

**Table 1: Underwater Archaeology Unit Requirements for Magnetometer Survey**

Survey Type	Requirements for Archaeological Purposes
<b>Side Scan Sonar</b>	<ul style="list-style-type: none"> <li>Operational frequency of 410/500kHz.</li> <li>50m survey line spacing.</li> <li><u>100% site coverage</u> (overlap of areas may be required)</li> </ul>
<b>Magnetometer</b>	<ul style="list-style-type: none"> <li>Proton or caesium magnetometer</li> <li>50m side spacing</li> </ul>





**Figure 3: Magnetometer (Geometrics)**

#### **A.1.1.4 SUB-BOTTOM PROFILING (SBP)**

Sub-Bottom Profiling aims to create a 2-D image of the subsurface of the seabed and can potentially exceed depths of 50m below seabed, depending on the geological conditions encountered and the choice of system used. Different types of SBP are available including chirp, pinger, boomer, sparker and parametric chirp systems (Figure 4 to Figure 6). The most appropriate system will be decided depending on the seabed, anticipated geological environment and the objectives of the survey.

A Sub-Bottom Profiling (SBP) system may be used to determine the stratigraphy across the site and quantify the variability in the lateral and vertical extents to a depth of at least 50 m below seabed. A parametric system (e.g., Innomar “Standard” Sub-Bottom Profiler) combined with a sparker system such as the Applied Acoustics dual 400 Tip Sparker are most likely to be used for offshore wind data acquisition purposes. This survey is non-intrusive therefore does not interact with the seabed. It may be undertaken across the Licence Area to a suitable percentage coverage.





Figure 4: Example of Boomer Sub-Bottom Profiler (INFOMAR, 2023)



Figure 5: Example of Pinger Sub-Bottom Profiler (EdgeTech)



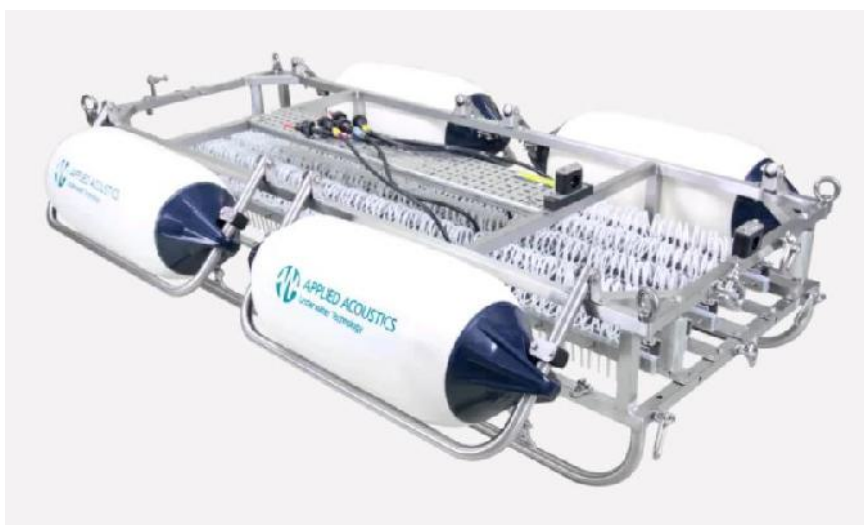


Figure 6: Example of Sparker sub-bottom profiler (Applied Acoustics)

### **A.1.2 SEABED IMAGERY**

Underwater camera systems may be used for underwater imagery inspections to provide high quality video and stills data.

#### **A.1.2.1 DROP CAMERA SYSTEMS**

The SeaSpyder Telemetry system is an underwater camera system designed for operation in water depths up to 1000 m utilising a standard coaxial sonar umbilical cable. This system is one of the most commonly used camera systems for underwater video inspections. The system as standard offers simultaneous uninterrupted recording of low latency live video footage along with high resolution stills photography, along with interfacing to a wide range of sensors, scaling lasers and dataloggers. The stills camera is fitted with a high quality 18 mega pixel digital SLR Camera offering full control of all photographic parameters including manual focus, shutter speed and aperture. The stills camera is housed within a robust 1000 m rated aluminium enclosure along with an internal IP video camera. All data are transferred directly to the surface unit for live interpretation; this includes video, stills photos, serial sensor data and ethernet data such as an imaging sonar.

#### **A.1.2.2 ROV CAMERA SYSTEMS**

Remotely Operated Vehicles (ROVs) are tethered, unoccupied, highly manoeuvrable vehicles controlled by qualified personnel onboard of the ship or platform from which they are deployed. ROVs are to assist in a variety of industries including Search and Rescue, Military, Recreation and Discovery, Aquaculture, Marine Biology, Oil, Gas, Offshore Energy, Shipping and Submerged Infrastructure.

ROV manoeuvrability and real-time visualisation (through stills and video) means that operators can use them effectively to investigate the seabed with greater control of observations than would be achieved with towed or drop-down video camera frame. Larger systems can be used to collect representative samples.

There are several classes of ROV, examples are provided in in Table 2.



Table 2: Examples of Remote Operated Vehicles (ROV)

Classification of ROV	Description
Light Work Class ROV	A Light Work Class ROV is used in activities such as cleaning, drilling; various survey works. It can be also used during inspections for reparation works. Additionally, they can be equipped in for example laser scanners or specialized inspection devices and sensors. They can operate at depths of 3,000 m (Cappoci, et al, 2017).
Surveyor Interceptor ROV (SROV)	The Surveyor Interceptor ROV (SROV) is new generation survey support ROV developed by Reach Subsea AS and MMT. It was designed for pipeline inspection and seabed surveys to provide improved, accurate data at higher speed as being towed by the ship in speeds up to 6 knots. This result in substantially better inspection quality with production of high quality and density data at a lower cost per km.

### A.1.3 DIRECT SAMPLING SITE INVESTIGATION ACTIVITIES

#### A.1.3.1 GEOTECHNICAL SURVEY

Typically, individual geotechnical site investigation locations correspond to key structure locations. However, the positioning of individual geotechnical site investigation locations also needs to take into consideration environmental constraints such as the position of sensitive habitats or archaeological features. The purpose of the geotechnical survey is to evaluate physical properties of the superficial seabed sediments and/or bedrock formations. These methodologies will ensure that a comprehensive understanding of the subsurface is achieved to a suitable depth.

The location, quantity, target depths and type of scheduled geotechnical sampling will be determined following the interpretation of the geophysical survey results but indicatively may comprise of up to:

- 60 no. boreholes
- 60 no. seabed CPTs
- 60 no. gravity corer
- Up to 200 no. grab/core samples\* (grab/core samples will be collected for benthic ecology survey and are included here as subtidal sample collection may be combined with the geotechnical campaign)
- 10 sediment traps.

#### Downhole Sampling

The geotechnical survey will be undertaken across a range of water depths and will be performed by a geotechnical drilling rig mobilised on board a jack-up barge or a Dynamic Positioning (DP) controlled drillship. This scope of work shall comprise of sampling boreholes and CPT boreholes that



may be co-located. This shall provide in situ soil properties and recover soil samples or rock cores for the full depth range of interest.

A vessel shall be fully equipped with a rotary drilling rig capable of deploying various sampling and coring methods. An example of which is presented in Figure 011. Coring through rock will require a large diameter system such as the Geobore S. The vessel will also be able to deploy downhole CPT equipment in a borehole adjacent to the sampling borehole. All equipment shall be deployed downhole, and all thrust shall be top loaded.

Generally, vessels shall be maintained and operated in accordance with SNAME TR5-5A. Sampling methodologies shall be in accordance with BS EN ISO 22475 and CPT testing in accordance with ISO 22476.

During drilling, borehole wall integrity will be maintained using drilling mud mixed with sea water. This drilling fluid may include for example biodegradable miscible guar gum or bentonite. This drilling mud and any drill risings will disperse into the water column. During fieldworks, the retrieved samples and cores shall be logged, and the CPT data processed and interpreted, to produce borehole and CPT logs that includes interpreted stratigraphy. An example of the combined borehole logs is presented in Figure 011.





Figure 011: Example of a drill rig mobilised on a jack-up (Comacchio MC1200)

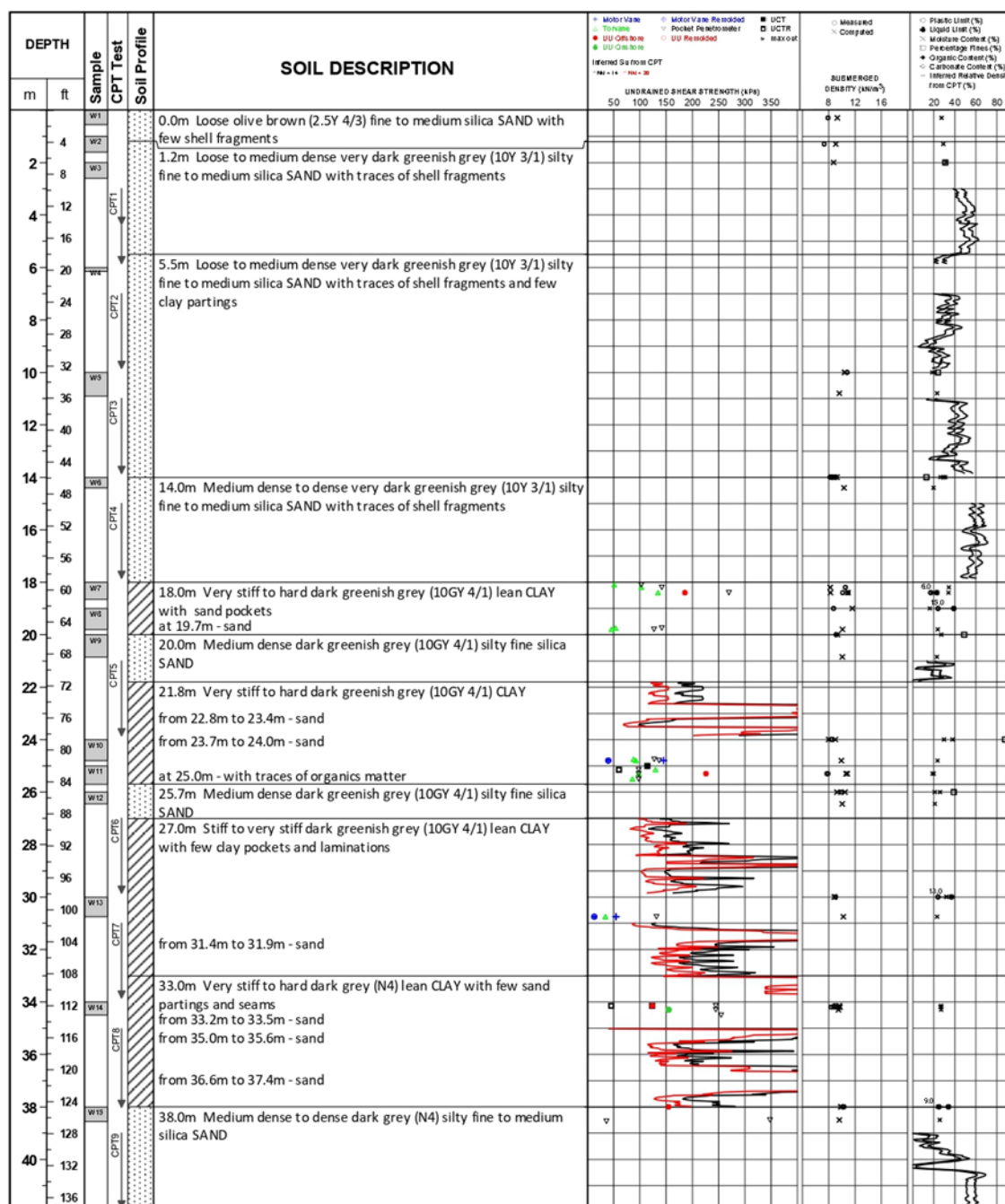


Figure 012: Example of a typical borehole log.

### A.1.3.2 CONE PENETRATION TESTS (CPT)

The Cone Penetration Test (CPT) is a geotechnical test used to measure in situ properties of soil. The CPT is one of the most commonly employed site investigation techniques for offshore projects worldwide. CPT is performed by pushing an instrumented and calibrated steel cone into the ground at a constant rate. During testing, the resistance on the cone tip and sleeve are measured, as well as pore water pressure. These results can be used to derive soil parameters and interpret soil behaviour.



There are two broad categories of CPT testing methods as discussed below:

#### **Down-borehole CPT**

Downhole CPT: Downhole CPTs may be deployed using traditional offshore rotary heave compensated drilling rig or drilling rigs mobilised on to jack-up barges. The CPT test start depth may be at seabed or any depth below. The CPT tool is deployed by wireline through the drill string, which then in turn latches within the drill bit. The CPT test starts, and the cone advances out through the drill bit and into virgin soil. The test stroke length is typically 3m. The CPT tool is recovered to deck, and the borehole is advanced by drilling to the depth corresponding to the end of test depth. A drill string is then used to drill out the hole at the CPT location. Downhole CPT test only experiences friction along the CPT sounds rod length.

By contrast, the seabed CPT experiences friction along the entire length of the CPT rod, which may be up to 40m in length, which may cause refusal. The downhole CPT test is quick, but the cumulative time associated with deploying and recovering the tool, drilling and adding pipe, means that a comparative target depth takes longer compared to seabed CPT. However, downhole CPT may provide CPT data to greater depths, primarily limited by the length of pipe available.

#### **Seabed CPT**

Seabed CPTs involve mobilizing a self-contained and automated CPT test unit housed within a seabed frame. This frame is typically kept on the deck of a dynamically positioned vessel and may be deployed using a dedicated Launch and Recovery System (LARS) – such as an A-frame – or in the case of larger CPT unit, through a moonpool (as illustrated in Figure 8-1). The vessel will hold station over the target position and deploy the CPT unit. The CPT is connected to the vessel via an umbilical, which acts as a lift wire and data transfer umbilical.

Depending on the CPT unit, the CPT rods may need to be built up overboard prior to deployment through the water column. Once on seafloor, the cone is pushed into the seabed until it reaches refusal. Refusal is defined as the point where one of the following criteria are met: target penetration depth is reached, maximum system thrust is reached, excessive load on the tip or the sleeve, or excessive cone inclination occurs, or a combination of these.

The objective of the survey will typically define the size and configuration of the CPT unit. A lightweight CPT unit with maximum penetration depth of 10m, may weigh about 5 tonnes and are frequently used for the export cable route survey. For deep seabed CPT testing, with target penetration depths of 20 to 40m, the seabed unit will weight in the order of 20 to 25 tonnes. The test typically takes 2 to 5 minutes, depending on the target penetration depth, however total time taken to be deployed and recovered may be in order of one to two hours. If at each location the technical requirements of the project are met, the CPT unit is lifted back on to the vessel and the vessel moves on to the next location. If target depth is not achieved, then the CPT unit may “bump-over” – which is where the unit is lifted a small distance of seafloor and moves horizontally so another test can be completed.





**Figure 8-1: Example of a Block Push Seabed CPT System (Fugro Seacalf)**

### **A.1.3.3 SAMPLING AND CORING**

Sampling and coring equipment provide a means to recover samples to deck to allow for logging and testing offshore, and onward testing at onshore laboratories.

As for CPT testing, sampling may be conducted via dedicated seabed units or downhole. Coring is generally only achieved downhole. Downhole samplers include the push and piston samplers for soils, and coring equipment for rock.

**Downhole sampling and coring:** The wireline push or piston sampler is lowered into the drill string where it latches into the Bottom Hole Assembly (BHA). The attached sample tube is then pushed into the ground ahead of the drill bit to sample the soil. Before the push commences, the piston is located at the bottom of the sample tube preventing any ingress of drill cuttings and travels up the tube as it penetrates the ground minimising sample disturbance and maximising recovery. When the piston is not fitted the push sampler head has a hole which allows water to escape whilst penetrating the ground.

After the test has completed the hole is then covered by a ball and held in place using a spring this is to prevent losing the sample when recovering the tool. Sample tubes (or Shelby tubes) are typically 1m in length with various wall thicknesses and internal diameters. Generally, the thinner walled tubes are used for soft cohesive material, and thicker walls for granular material. Depending on various factors, high quality, undisturbed samples may be recovered.

Rock core samples are recovered by either using the main drill string or using piggy-back drill rig. For the former, a double tube barrel is dropped into and latched into the BHA. This set up comprises two concentric steel tubes joined in such way to permit the rotation of the out tuber without causing rotation of the inner tube. Within the inner tube is a liner that can be recovered without the need to recover the entire BHA and drill string. Piggy-back coring is achieved when a separate rig with smaller diameter drill string it deployed through the main drill string. In both cases, the drill bit is advanced, and a core of rock is recovered within the liner. When the core is recovered to deck it is



logged, tested and prepared for onward testing at an onshore laboratory. Typical core diameters can range from 70mm up to 100mm, though larger is possible.

**Seabed Samplers:** Vibrocoring is a method for retrieving samples of up to 6m in length from mudline. Penetration into the soil is afforded by the reciprocal motion of the motor at the top of the barrel. High frequency, low amplitude vibration that is transferred from the vibrocore head down through the attached barrel. This vibration energy allows the core barrel to penetrate the sediments under self-weight. The core barrel is fitted with a plastic liner, core catcher and cutting shoe. The vibrocore rig is similar to that seen in Figure 8-2.

Once coring is started, the core barrel will penetrate to the target depth or refusal. Samples will be recovered in the plastic liner, split into 1m lengths, processed, sealed appropriately for onward freight to an onshore laboratory. Vibrocore is best suited to non-cohesive soils (e.g. gravel or sand) as samples recovered are considered disturbed. Vibrocore samples are typically 50 – 100mm and have a maximum diameter of 110mm.

Gravity or piston core (self-weight penetration sampler) is performed where cohesive soil is expected. The sampler is comprised of an outer barrel with PVC inner barrel, and a cutting shoe. The sampler may be fitted with a piston which effectively reduces the resistance to the soil entering the liner and may result in a superior quality sample. The sampler penetrates the seabed under its own weight. Upon refusal or at target depth, the sampler is recovered on deck where the sample is split, typically into 1m lengths, logged and tested in the offshore laboratory. The typical diameter of the liner is in the region of 60mm with a typical maximum diameter of 120mm.

The exact equipment to be used will be confirmed following a tender process to procure the site investigation contractor. Indicative locations are shown in Figure 2-1, however final individual site investigation locations will depend on the geophysical survey locations. Some locations may need to be avoided due to environmental reasons including sensitive archaeological features or unsuitable substrate types.





**Figure 8-2: Example of a Crane Deployed Vibrocore System**

#### **A.1.3.4 GRAB SAMPLERS**

Grab samplers recover samples from approximately the top 0.2 - 0.5m of seafloor. These samples may be used to classify the seabed, or for chemical and biological analyses. These samples are generally deployed overboard using a crane or gantry from a vessel.

For geotechnical grab sampling a grab sampler with dimensions of a 0.5 x 0.5 x 0.5 m is recommended, though multiple sampling with smaller samplers can be used. The aim of this sampling is to recover sufficient seabed material for onshore classification and testing for ground truthing of the seafloor seismic interpretation. The grab sample locations may be co-located with other seabed sampling.

Grab samplers generally comprises of steel buckets that are deployed open and which trigger shut when the sampler is in contact with the seafloor. As the buckets close, sediment and biological material are retained inside the sampler. The grab sampler is then recovered to deck and place on a trestle or table. The retained material is then visually inspected for acceptance and then transferred to adequate container or on to a designated mat for further offshore processing and logging. Grab samplers may come either as single or double, and in a variety of different sizes. There are various grab sampler types including, but not limited to, the following:

Single Van Veen Grab: It is ideal for the collection of sediment samples for biological and environmental sampling. In a range of sizes (0.025m<sup>2</sup>, 0.1m<sup>2</sup>, 0.2m<sup>2</sup>, 0.3m<sup>2</sup>) each model has a marine grade stainless steel bucket with hinged access flaps on the top allowing sub sampling of the collected sediment before it is emptied from the grab. The bucket is operated with a pair of stainless-steel lever arms that increase the tension to secure the sample securely in the grab as it is



retrieved to the surface. Additional lead weights can be added to the back of the bucket to improve stability in strong currents and to the lever arms to increase the equipment's ability to perform in harder conditions. More information on the technical specifications can be found at:

<https://www.cms-geotech.co.uk/single-van-veen-grabs>



**Figure 8-3: Single Van Veen Grab (OSIL)**

Double Van Veen Grab: The Double 0.1m<sup>2</sup> Van Veen Grab allows collection of two samples at the same. This equipment is frequently used to carry out sampling where biological and chemical samples are required from the same sampling location. The connection of two samplers into one is also time and cost-effective solution for the surveys where large number of sampling locations are planned with repetition of sediment sampling on the same location or when larger depths are considered. More information on the technical specifications can be found at <https://www.cms-geotech.co.uk/double-van-veen-grab->.



**Figure 8-4: Double Van Veen Grab Sampler (OSIL)**

Mini and Standard Hamon Grabs (0.1m<sup>2</sup> and 0.2 m<sup>2</sup> respectively): These grabs are particularly used for the collection of samples generally from coarse (sand and gravel) sediment substrates and used for benthic macrofauna and particle size measurement. The grab is relatively simple to operate in almost any water depth.

A 0.1m<sup>2</sup> sample area is a standard practice used in many benthic sampling applications. The Hamon Grab is a box shaped sampling scoop mounted in a triangular frame. Upon contact with the seabed, tensioned wires are released, which causes the sampling bucket to pivot through 90° pushing



seabed sediment into the bucket. On completion of its travel the open end of the bucket comes against a rubber sealed steel plate which stops the sediment escaping during recovery. 0.1m<sup>2</sup>

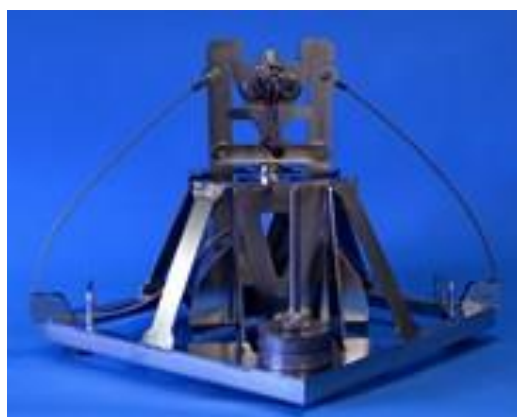
Hamon Grab refers to 0.1m<sup>2</sup> area of seabed sampled. The depth of scoop penetration is up to 20 cm. On recovery the grab is landed onto a rectangular base from where access can be gained to the inside of the bucket via an inspection window. Whilst in the stand the grab sample can then be easily emptied into a sampling container located under the bucket. More information on the technical specifications can be found at <https://www.cms-geotech.co.uk/standard-hamon-grabs->



**Figure 8-5: Hamon Grab (CMS – Geotech Ltd)**

Day Grabs (single and double): The Single Day Grab is built from two stainless steel bucket sections combined within a stainless-steel frame that level to the seabed when it is deployed. When frame is in contact with the seabed, the latch plates on the buckets unlock and they are released. A typical 0.1 m<sup>2</sup> operational Day Grab weights between 60-165 kg (sediment sample weight not included), where additional weights can be added to the frame as required. Insufficient weight can lead to the frame being pushed upwards as the buckets are drawn into the sediment, reducing the effective bite depth. The sampler has sturdy design, simple mechanism and ability to access the undisturbed surface of the sample. It not designed for work on hard, coarse, substrata. More information on the technical specifications can be found at <https://www.cms-geotech.co.uk/single-day-grab> and <https://www.kc-denmark.dk/products/sediment-samplers/day-grab/day-grab-1000-cm%C2%B2.aspx>)





**Figure 8-6: Day Grab (KC Denmark A/S)**

Generally, any grab sampling will be carried out by deploying sampling gear from the vessel, as per standard operation procedure for deck works involving this kind of equipment (taking into account the technical specification of the grab in use). Various grabs will be available for the benthic survey provision to ensure adequate sampling equipment for various sediment types.

#### **A.1.4 METOCEAN SITE INVESTIGATIONS**

Metocean site investigations, using the equipment outlined in this section, are necessary to evaluate the wind, wave and current conditions across the Licence Area. These site investigation activities will involve the mobilisation of buoys and bottom profilers to collect data over periods varying from hours up to 12 months although floating LiDARs may be deployed for up to 24 months. The proposed metocean survey equipment include floating LiDAR, Waverider buoys and Acoustic Doppler Current Profilers (ADCP).

##### **A.1.4.1 FLOATING LIDAR**

Offshore wind farms typically require at least 12 months of measured wind data to allow for an understanding of the wind conditions and an accurate assessment of the generating capacity within a site selected for development. Typically, 12 months data would be collected at a suitable location within an OWF area. If there is sufficient time to move the LiDAR to another location within the OWF area to gather further data, the opportunity to move it would typically be taken as any additional data would increase the accuracy of the dataset over the entire OWF area. Three locations have been included in this Licence Application for LiDAR deployment within the OWF area. This may comprise of one floating LiDAR moved after 12 months or it may comprise 3 floating LiDARs deployed at the same time, depending on time constraints and availability of equipment.

Exact specifications of the floating LiDAR equipment, the associated mooring arrangement and installation vessel will become available following award of the tender contract. An installation vessel will be required for the launch and recovery of this equipment, the details of which will become available on award of the tender contract. The same type of vessel used for the installation will be required to service the floating LiDAR.



A typical floating LiDAR deployment involves the LiDAR unit being mounted on a buoy which is moored using a mooring chain and concrete anchor (e.g. AXYS Technologies Buoy) (Figure 021). The device provides measurements across the entire potential rotor diameter and beyond and can be configured to measure up to 10 different heights from 12.5 to 300 metres above the sea surface.

The buoy will be moored to the seabed for a duration of 12 (12 months in a single location) and will be powered by solar panels, batteries and micro wind turbine generators.



Figure 021: Typical Floating LiDAR (AXYS Technologies)

#### **A.1.4.2 WAVERIDER BUOYS**

These buoys are used to collect wave data, which is typically updated hourly online and processed onshore, providing vital information for marine users. Each wave rider buoy is anchored to the sea floor. The buoys are specially designed to follow the movement of the sea surface. The anchoring system includes a length of rubber chord that is capable of stretching up to three times its length. The flexibility of the mooring allows the wave rider to follow the fluctuating water surface. Fluctuations in the surface water are measured by either an accelerometer mounted inside the wave rider buoy or by a GPS unit which is converted to radio signals that are transmitted to a receiver station onshore. The electronics and the navigation light are powered for up to twelve months by a bank of dry cell batteries mounted around the inside of the hull. Figure 022 shows a typical wave rider buoy (Datawell BV Waverider 4) which also measures surface current; it is proposed that up to 3 wave rider buoys will be deployed.





Figure 022: Directional Waverider 4 with Acoustic Current Meter (Datawell BV)

#### A.1.4.3 ACOUSTIC DOPPLER CURRENT PROFILER (ADCP)

It is proposed that up to 5 ADCPs will be deployed on the seabed. The purpose of the ADCP is to determine the principal tidal current regime of the Licence Area. Exact details of any ADCP and deployment location within the Licence Area will not be available until a contract has been awarded. An example ADCP model to be used is the Nortek Signature500 ADCP which is both a current profiler and a wave directional system in one unit, displayed in Figure 023(a). The following points provide an overview of an ADCP system.

- A typical ADCP unit consists of a mechanical measurement instrument housed within a trawler resistant protection frame. An example frame is provided in Figure 023(b).
- The displayed ADCP frame dimensions are 1.8 m (l) x 1.3 m (w) x 0.6 m (h). Each ADCP frame has a footprint of approximately 2.34 m<sup>2</sup> on the seabed.
- The seabed frame should be equipped with a conductivity temperature and depth (CTD) device and an ADCP.
- Typical installation layouts consist of the frame being connected to a weighted base with a weight of approx. 300 kg. This should be attached to a ground line, a clump weight (approx. 150 kg) and to an acoustic release system carrying a rope retrieval system.
- This will ensure that all equipment is recovered from the seabed after the monitoring period (minimum period of 30 days).

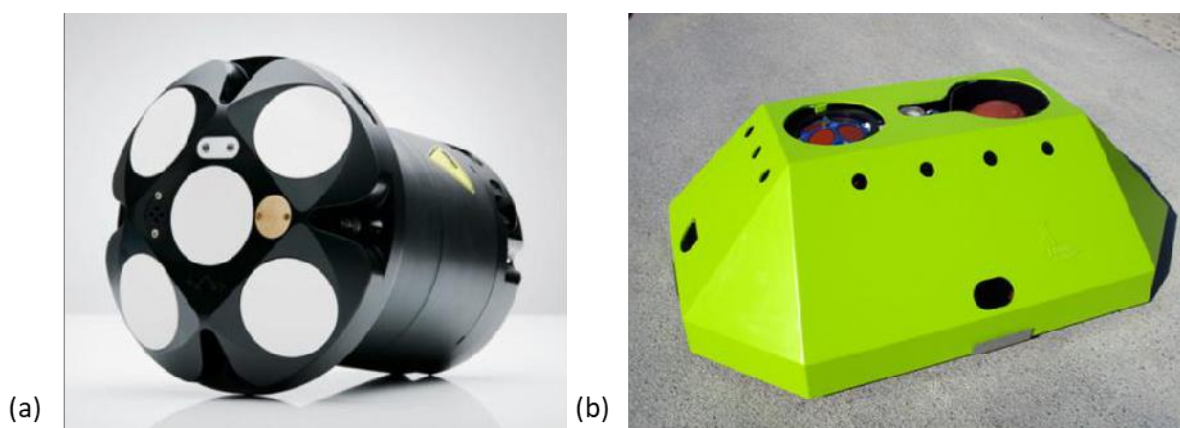




Figure 023: (a) Nortek Signature500 ADCP1 (b) Trawl resistant protection frame2

### **A.1.5 ECOLOGICAL SITE INVESTIGATIONS**

The purpose of the ecological site investigation activities is to collect baseline data that will primarily be used to inform the Environmental Impact Assessment Report (EIAR), by describing the environmental conditions within the Licence Area, and subsequently developing appropriate mitigation measures for any potential environmental impacts. The ecological scope of work proposed for the Licence Area includes the following:

- Bird and Marine Mammal Surveys
- Fisheries survey
- Subtidal benthic survey
- Intertidal benthic survey

#### **A.1.5.1 BIRD AND MARINE MAMMAL SURVEYS**

Boat based bird and marine mammal observational surveys may be undertaken over the licence or a proportion of the licence area. These may be boat or aerial based surveys. This will be used to establish the baseline for bird and marine mammal species distribution and behaviour within the area and will feed into the EIAR, AA and project design.

#### **A.1.5.2 FISHERIES SURVEY**

A fisheries survey may be carried out to determine the species and their distribution within the Licence Area. The Sea Fisheries Protection Authority will be consulted regarding the exact nature of the survey, survey design and survey methods to be applied. In addition, consultation with the local fishing industry will be undertaken in advance of any survey effort and survey design will take into consideration fish spawning and fishing seasons. The aim of a fisheries survey would be to maximise the accuracy and value of the information to the ongoing design of the project and to feed into engagement with fishing communities. The information will also feed into the EIAR. Engagement with the relevant stakeholders will commence in the coming months on this matter.

#### **A.1.5.3 SUBTIDAL BENTHIC SURVEY**

The aim of the proposed subtidal benthic survey is to determine and map the distribution and extent of marine benthic biological communities and habitats in the Licence Area. This will be comprised of a boat-based epibenthic video and still photographs inspection (by a drop down or remote operated vehicle (ROV) camera system as described in Section 1.2) followed by a benthic sampling programme undertaken using a suitable grab sampler to collect benthic macrofaunal and physio-chemical data (Section 1.1.3). The sampling locations will be selected to sample different representative habitats; geophysical data will be used where available to stratify and target sampling.

The resulting information (i.e. from seabed imagery and grab samples) will inform an assessment of the taxa, communities and habitats present and will be used as ground-truthing data and overlaid on available geophysical data to accurately map biotopes and delineate protected habitat features (e.g. biogenic and rocky reefs). This information can then be used to undertake Annex I habitat



assessments for any Annex I features present within the Licence Area using feature appropriate guidance (i.e. for Annex I biogenic or stony reef).

Where grab sampling is not possible, sufficient coverage of video (e.g. transect of length >50 m) and number of stills (e.g. n >15) will be taken from the sample location to identify habitats and habitat boundaries (video) and to identify and enumerate taxa present (stills) in order to characterise the habitats and epifaunal communities present.

Day Grab /Van Veen/ Double van Veen will be used in 'softer' sediments (e.g. mud, fine sand) for quantitative benthic macrofaunal sample collection for analysis and for physio–chemical analysis.

Physio–chemical analysis would include the following standard parameters unless specified differently by the client or regulator:

- Particle size analysis
- Sediment organic matter and carbon analysis
- Major trace element analysis
- Hydrocarbon analysis

If the grab sampler cannot gather a sufficient sample of 5 cm minimum depth due to nature of sediment (e.g. coarser sands and gravels), then a mini-Hamon grab will be used to collect benthic macrofaunal collection and particle size analysis (PSA). In this case the minimum sample retention should be a 5l volume. Three grab samples will be retrieved for benthic fauna analysis. An additional grab sample will be collected for particle size and chemical analysis. This will ensure sufficient data are collected for quantitative analysis of benthic fauna and physio–chemical analysis.

To minimise repetition of benthic sampling approaches, it is proposed to use double van Veen grabs or double Day grabs, where suitable (i.e. in water depths >100 m). This will provide two samples for each grab therefore minimising the number of deployments needed to obtain the required four samples.

All retrieved and accepted samples will be processed on deck. Benthic fauna samples will be sieved through a 1mm mesh sieve or a 0.5mm mesh sieve as required. Photographic records will be taken (following retrieval of the grab sampler and sieve residue following processing through the mesh sieve). The faunal residue will be transferred to properly labelled sealable wide neck containers and preserved in buffered 10% w/v formaldehyde solution (or 96% ethanol if required) for subsequent transport and analysis at a specialist benthic fauna analysis laboratory. The laboratory will ideally have NE Atlantic Marine Biological Analytical Quality Control (NMBAQC) applied protocols in place and be a participant in the NMBAQC invertebrate scheme. The containers with the biological samples will be kept in a well-ventilated area at all times due to the high toxicity of the preserving medium used.



#### **A.1.5.4 INTERTIDAL BENTHIC SURVEY**

Intertidal benthic ecology surveying involves the study of the ecological interactions between organisms living on and within the sediments of the intertidal zone. The intertidal zone is the area of the shore that is covered by water during high tide and exposed during low tide.

The purpose of intertidal benthic ecology surveying is to gain a greater understanding into the ecological interactions between the organisms living in the intertidal zone and their environment. This information can then be used to assess the health and resilience of intertidal ecosystems and to inform management decisions related to conservation and restoration efforts.

Intertidal benthic ecology surveying consists of the collection and analysis of data related to the abundance, diversity, and distribution of intertidal organisms, as well as physical and chemical characteristics of the sediment and water. These methods include:

- **Walkover survey:** On conducting a walkover survey, biotopes are identified according to the European Nature Information System (EUNIS) classification which are in-line with relevant guidance (Parry, 2015) (and correlated to the Marine Nature Conservation Recorder (MNCR) biotopes). When possible, boundaries of biotopes were tracked using handheld Garmin E-Trex 10 GPS devices and the Phase One Habitat Survey Tool Kit application (v1.4.0). The distribution of any features of conservation interest will be recorded using photographs and GPS fixes when encountered. Other information to be recorded included general site conditions, sediment surface features, sediment type and characteristics, topography, and anthropogenic pressures.
- **Remote sensing:** This involves the use of aerial or satellite imagery to map the distribution and extent of intertidal habitats and can be used to augment or replace a walkover survey
- **Transect sampling:** This involves sampling along a line or transect, allowing for the assessment of changes in the abundance and diversity of organisms and physical characteristics along the intertidal zone.
- **Quadrat sampling:** This process involves the use of a square frame to sample a specific area of the intertidal zone. Organisms within the quadrat are identified and counted, and physical characteristics of the seabed within the quadrat are recorded. Typically used for rocky areas.
- **Core sampling:** This process involves the use of sediment cores to sample a specific area of the intertidal zone. Organisms within the core are identified and counted, and physical characteristics of the sediment are recorded. Typically used for sediment areas.

#### **A.1.5.5 MARINE MAMMAL ACOUSTIC MONITORING**

It is proposed that the site investigations may involve the use of Continuous Porpoise Detectors (CPOD) which would be installed for the purpose of acoustic monitoring of marine mammal activity within the Licence Application Area. Up to five CPODs would be deployed at any one time across the site.

A sound trap may be deployed alongside one of the CPODs for various durations throughout the monitoring campaign to obtain background noise measurements. The CPODs will be recovered approximately every three months to download data and change batteries. Upon each three-month recovery, they would likely be relocated based on a 4x4km survey grid across the site. The exact



locations of the CPODs have not yet been determined and their location will be determined in consultation with an experienced marine mammal ecologist. The currents in parts of the site may make some areas unsuitable for deployment.

#### **A.1.5.6 ARCHAEOLOGICAL SURVEY**

The proposed archaeological survey will comprise of identification and assessment of metallic and other targets recorded during the geophysical survey where magnetometer data will be acquired for further archaeological assessment. Submarine archaeological surveys use a variety of techniques to explore, and document submerged cultural heritage sites. These techniques include remote sensing, acoustic imaging, underwater photography and videography, and in-situ archaeological excavation.

Remote sensing techniques involve the use of satellite imagery, sonar, and other remote sensing technologies to detect, and map submerged cultural heritage sites. Acoustic imaging techniques use sound waves to create detailed images of underwater structures and objects. Underwater photography and videography are used to document submerged cultural heritage sites and provide a visual record of the site's condition and location. In-situ archaeological excavation involves the careful removal and documentation of artifacts and other cultural material from the site.

This will follow the baseline assessment that includes documentary and cartographic searches using several sources in order to locate all known cultural heritage assets within the Licence Area, and to identify the archaeological potential of the area. The baseline assessment will be carried out in line with industry best practice and any relevant offshore renewables and underwater archaeological guidance.

Survey specifications will consider archaeological data acquisition to enable professional archaeological interpretation and analysis of data. The data collected will be used to support the archaeological assessment. All required archaeological work will be carried out by a suitably qualified archaeologist to determine the location of all known archaeological features in advance of the intrusive geotechnical and environmental survey.

#### **A.1.6 WATER QUALITY MONITORING**

Water sampling will be conducted to collect data to inform assessment of water quality. Sample collection will be undertaken using water bottle rosettes and in situ sampling (i.e. with CTD probe) (Figure 024).





Figure 024: Example of CTD and Rosette sampling

## A.2 SURVEY VESSELS/PLATFORMS

Different marine vessels will be required for efficient deployment, execution, and recovery of the various site investigation activity equipment and methods. It is envisaged that different vessels may be required for the geotechnical, geophysical, ecological and metocean stages of the survey.

Geotechnical survey vessels are typically 55-90 m in length and have an endurance of up to 28 days. Their port of mobilisation will depend on previous work but may be Irish, UK, or another European location.

Geophysical survey vessels are typically between 15 m and 60 m in length and have an endurance of up to 14 days. These vessels are likely to use a local port for mobilisation and replenishment.

Some aspects of the geophysical / hydrographic surveying may be undertaken using unmanned surface vehicles (USVs) and / or autonomous surface vehicles (ASVs) should these vessels be permitted by the Marine Survey Office.

Drone based surveys may also be considered where appropriate, again subject to the relevant permissions.

The exact vessels and platforms to be used, will be confirmed following a tender process to procure the survey contractor. All vessels will be fit for purpose, certified, and capable of safely undertaking all required survey work. The vessels will conform to the following minimum requirements as appropriate:

- Station-keeping and sea keeping capabilities required by the specified work at the proposed time of year; the appointed contractor may provide supplemental tug assistance if such assistance benefits the operation;
- Endurance (e.g. fuel, water, stores, etc.) to undertake the required survey works;



- Staffing to allow all planned work to be carried out as a continuous operation (on a 24 hour per day basis for the offshore activities and on a 12 hour per day basis for the inshore activities);
- Equipment and spares with necessary tools for all specified works;
- Appropriate accommodation and messing facilities on board;
- Adequate soil laboratory testing facility.

The survey contractor and vessels will comply with international and national statute as appropriate. A non-exhaustive list of examples includes:

- Sea Pollution Act 1991 which transposes into Irish statute the requirements of the International Convention for the Prevention of Marine Pollution from Ships (MARPOL 73/78)
- Sea Pollution (Amendment) Act, 1999 - which gives effect to the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC).
- S.I. No. 372/2012 - Sea Pollution (Prevention of Pollution by Garbage from Ships) Regulations 2012.
- S.I. No. 492/2012 - Sea Pollution (Prevention of Pollution by Sewage from Ships) (Amendment) Regulations 2012
- S.I. No. 507/2012 - Merchant Shipping (Collision Regulations) (Ships and Water-Craft on the Water) Order 2012.







## Appendix B Consideration of Likelihood of Cumulative Effects

### Cumulative Effects Spatial Scope (CESS)

Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CESS?	Conclusion
Clogher Head  FS006787	Determination	Geophysical, Geotechnical and Environmental Site Investigation works	Yes:  3.14km from MUL application area	<b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are undertaken within the same time period.</b>  <b>Possible cumulative indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.</b>
Lir  FS007392	Applied	Geophysical, Geotechnical and Environmental Site Investigation works	Yes:  Overlaps with MUL application area (49.66 km <sup>2</sup> )	<b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are</b>



Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CESS?	Conclusion
				<p>undertaken within the same time period.</p> <p>Possible cumulative indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.</p>
<p>Statkraft North Irish Sea Array (NISA) Site Investigations Array Area</p> <p>FS007031</p>	Determination	Geophysical, Geotechnical and Environmental Site Investigation works	<p>Yes:</p> <p>7.41km from MUL application area</p>	<p>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are undertaken within the same time period.</p> <p>Possible cumulative indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.</p>



Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CESS?	Conclusion
Statkraft North Irish Sea Array (NISA) Cable Route  FS007358	Determination	Geophysical, Geotechnical and Environmental Site Investigation works	Yes:  Overlap with MUL application area  (36.46 km <sup>2</sup> )	<b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are undertaken within the same time period.</b>  <b>Possible cumulative indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.</b>
North Irish Sea Array Windfarm Limited LIC230001	Consultation	Geophysical, Geotechnical and Environmental Site Investigation works	Yes:  Overlaps with MUL application area (10.74 km <sup>2</sup> )	<b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are undertaken within the same time period.</b>  <b>Possible cumulative indirect effects on foraging seabirds if geotechnical or physical</b>



Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CESS?	Conclusion
				<b>disturbance activities are undertaken within the same time period.</b>
Setanta  FS006973	Determination	Geophysical, Geotechnical and Environmental Site Investigation works	Yes:  Overlaps with MUL application area (36.46 km <sup>2</sup> )	<b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are undertaken within the same time period.</b>  <b>Possible cumulative indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.</b>
Mares Connect Electricity Interconnector FS007635	Consultation	Geophysical, Geotechnical and Environmental Site Investigation works	Yes:  Overlaps with MUL application area (31.42 km <sup>2</sup> )	<b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are</b>



Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CESS?	Conclusion
				<p>undertaken within the same time period.</p> <p>Possible cumulative indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.</p>
<p>Drogheda Port Company – Maintenance Dredging</p> <p>FS007359 (temporary) and FS007028</p>	Determination	Maintenance Dredging	<p>Yes:</p> <p>Potential slight overlap</p>	Possible pathway for cumulative effects.
<p>Meath County Council – Laytown Beach</p> <p>FS006602</p>	Determination	Foreshore Licence Application for the removal of the existing damaged gabion sea defence system and its replacement with a new sea defence system using a rock armour revetment at Laytown Beach. Proposed works anticipated at earliest March 2017 and latest May 2017. Notice of determination 2018.	<p>Yes:</p> <p>0.42</p>	No possible pathway for cumulative effects.



**Temporal consideration of likelihood of cumulative effects (note only projects identified as having spatial overlap in above Table have been considered in this table)**

Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CETS?	Conclusion
Lir  FS007392	Applied	Geophysical, Geotechnical and Environmental Site Investigation works	Site Investigation works may be carried out at the same time as the site investigation works proposed in this application, however FS007392 will not be progressed unless the Lir Application Area is in a DMAP. No timeline is available for publication of the next DMAP, however progress to date with the South Coast DMAP and the ORESS 2.1 Indicative Roadmap indicate it would take 24-36 months for Lir to receive a Site Investigation Licence Licence from when the draft DMAP is published, if the Lir Application Area is in the next DMAP. Therefore, it is considered possible that there could be temporal overlap.	<b>Possible cumulative effects</b>
Setanta  FS006973	Determination	Geophysical, Geotechnical and Environmental Site Investigation works	Site Investigation works may be carried out at the same time as the site investigation works proposed in this application, however it is considered unlikely these would take place unless the Setanta Application Area is in a DMAP, as the project will not be able to obtain a MAC and proceed to planning. No timeline is available for publication of the next DMAP, however progress to date with the South Coast DMAP and the	<b>Possible cumulative effects.</b>



Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CETS?	Conclusion
			<p>ORESS 2.1 Indicative Roadmap indicate it would take 24-36 months for Setanta to receive a Site Investigation Licence Licence from when the draft DMAP is published, if the Setanta Application Area is in the next DMAP.</p> <p>Therefore, it is considered possible that there could be temporal overlap.</p>	
Mares Connect Electricity Interconnector FS007635	Applied	Geophysical, Geotechnical and Environmental Site Investigation works	<p>Mares intend to carry out survey works as soon as feasible, and within five years following the award of the Foreshore Licence.</p> <p>Therefore, it is considered possible that there could be temporal overlap.</p>	<b>Possible cumulative effects</b>
Clogher Head FS006787	Determination	Geophysical, Geotechnical and Environmental Site Investigation works	<p>Site Investigation works may be carried out at the same time as the site investigation works proposed in this application, however it is considered unlikely these would take place unless the Clogher Head Offshore Windfarm Application Area is in a DMAP, as the project will not be able to obtain a MAC and proceed to planning. No timeline is available for publication of the next DMAP, however progress to date with the South Coast DMAP and the ORESS 2.1</p>	<b>Possible cumulative effects</b>



Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CETS?	Conclusion
			<p>Indicative Roadmap indicate it would take 24-36 months for Clogher Head to receive a Site Investigation Licence Licence from when the draft DMAP is published, if the area is in the next DMAP.</p> <p>Therefore, it is considered possible that there could be temporal overlap.</p>	
Statkraft North Irish Sea Array  FS007358	Determination	Offshore Wind Farm Site Investigation Activities	Licence granted on 1 <sup>st</sup> September 2022 for a period of 3 years.	<p><b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are undertaken within the same time period.</b></p> <p><b>Possible cumulative effects on habitats due to suspended sediment from increased sedimentation caused by site investigation activities as project also overlaps with Rockabill to Dalkey Island SAC and indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.</b></p>



Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CETS?	Conclusion
Statkraft North Irish Sea Array (NISA) Site Investigations Array Area  FS007031	Determination	Offshore Wind Farm Site Investigation Activities	Licence granted on 1 <sup>st</sup> November 2021 for a period of 5 years.	<b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are undertaken within the same time period.</b>  <b>Possible cumulative effects on habitats due to suspended sediment from increased sedimentation caused by site investigation activities as project also overlaps with Rockabill to Dalkey Island SAC and indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.</b>
North Irish Sea Array Windfarm Limited LIC230001	Consultation	Offshore Wind Farm Site Investigation Activities	Site Investigation works may be carried out at the same time as the site investigation works proposed in this application, seeking a licence duration of up to 7 years.	<b>Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys are undertaken within the same time period.</b>



Project/Activity/ Development name and application/licen ce reference number	Licence status	Proposed activities	Within CETS?	Conclusion
				Possible cumulative effects on habitats due to suspended sediment from increased sedimentation caused by site investigation activities as project also overlaps with Rockabill to Dalkey Island SAC and indirect effects on foraging seabirds if geotechnical or physical disturbance activities are undertaken within the same time period.
Drogheda Port Company – Maintenance Dredging  FS007359 (temporary) and FS007028	Determination	Maintenance Dredging	Site Investigation works may be carried out at the same time as the site investigation works proposed in this application, with a licence of 8 years for dredging between the period 2021 to 2029.	Possible cumulative effects on marine mammals due to underwater noise disturbance if geophysical surveys and maintenance dredging activities are to take place within the same time period.



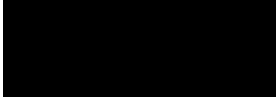
## GLOBAL PROJECT REACH



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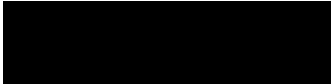
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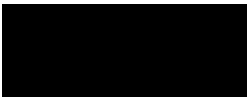
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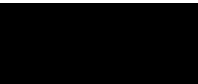
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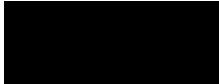
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