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Allod Energy Ltd Maritime Usage Licence Application for Geophysical Marine Site Investigation Activities Assessment of Impact of the Maritime Usage (AIMU) Report

Allód
HYDROGEN
STORAGE

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List of Abbreviations

AA	Appropriate Assessment
AIS	Automatic Identification System
CESS	Cumulative Effects Spatial Scope
CO	Conservation Objective
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
EIA	Environmental Impact Assessment
EMODnet	The European Marine Observation and Data Network
EPA	Environmental Protection Agency
EPS	European Protected Species
EU	European Union
FLO	Fisheries Liaison Officer
GDG	Gavin and Doherty Geosolutions Ltd.
GSI	Geological Survey of 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
NMPF	National Marine Planning Framework

NMS	National Monuments Database
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
NSER	Non-Statutory Environmental Report
OWF	Offshore Wind Farm
ROV	Remote Operated Vehicle
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
SSC	Suspended Sediments Concentration
SSS	Side Scan Sonar
UK	United Kingdom
VMS	Vessel Electronic Monitoring System
WFD	Water Framework Directive
WGS	World Geodetic System
WTG	Wind Turbine Generator

Glossary of Terms

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.
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.
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.
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.
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.
Licence Area	Licence Area refers to the entire area within the redline boundary as seen in Figure 1-1

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.
Metocean	Metocean 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.
Receiving Environment	The receiving environment is the environment upon which a proposed activity might have effects.
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.
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.
Water Courses	Natural or artificial channels through which water flows.
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

Allod Energy Ltd has prepared this report in support of an application for a Maritime Usage Licence under the Maritime Area Planning Act (2021) to undertake geophysical marine site investigation activities, with the objective of assessing an area in the Celtic Sea for potential hydrogen storage. The proposed investigations look to define the extent and internal character of halite rock beneath the seafloor, to assess and de-risk potential suitability for hydrogen storage development in halite.

The Licence Application Area (Figure 1-1 outlined in red) comprises the proposed indicative survey area, which includes the anticipated turning circle of vessels and the length and width of any streamers which may be used. The distance from the indicative survey area to the nearest landfall is 65 km. The total Maritime Licence Application Area covers 1,481 km^2 (148,100 ha).

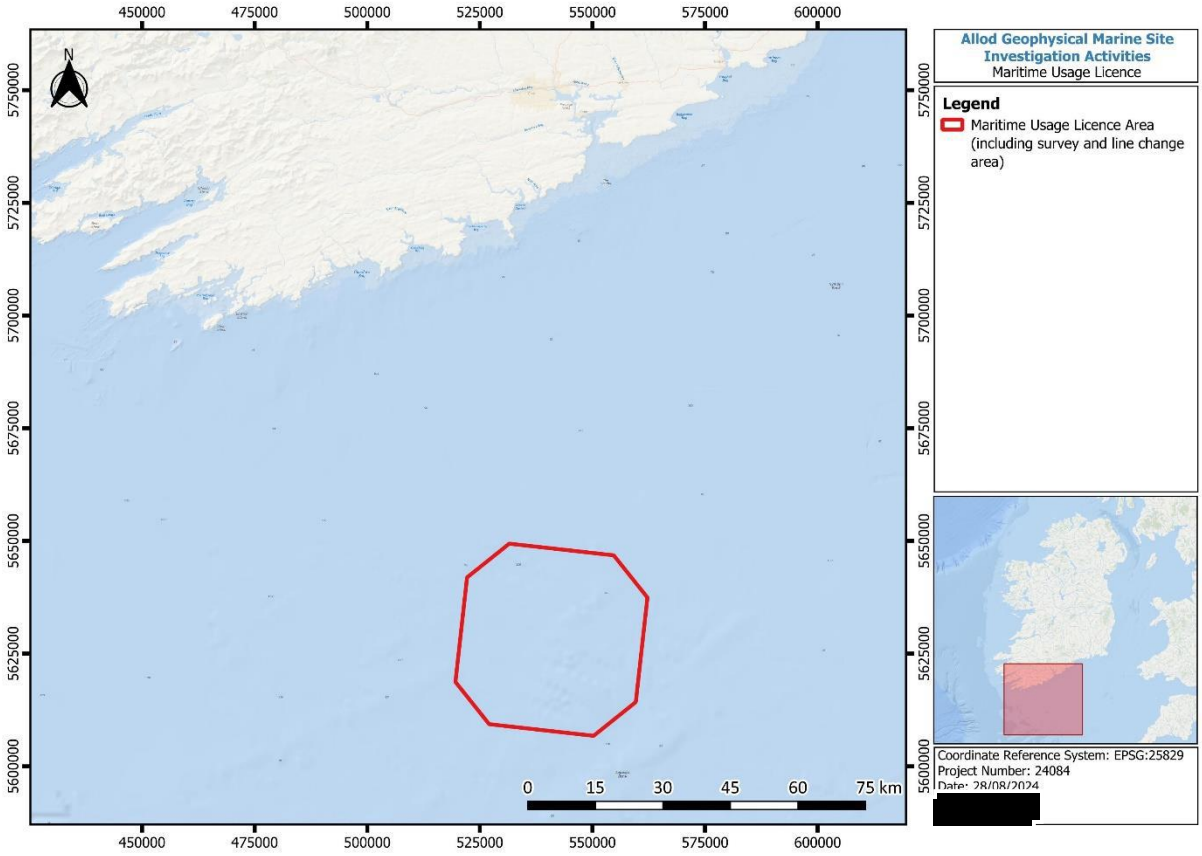

Figure 1-1: Allód Licence Application Area

1.1 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 on the potential effects from the proposed activities on the receiving environment.

1.2 METHODOLOGY

This report looks to summarise (Section 2) and detail (Appendix A) the proposed site investigation activities. This report gives the required consideration to the Environmental Impact Assessment (EIA) Directive, Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD) (Section 4).

A statement of consistency with the National Marine Planning Framework (NMPF) and the National Hydrogen Strategy are included in Section 5 of this report. 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).

The environmental aspects assessed in this report include:

- 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
- major accidents and disasters

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

1) Guidelines on the Information to be contained in Environmental Impact Assessment Reports; from the Environmental Protection Agency (EPA) (May, 2022)
2) 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)
3) OPR Practice Note PN02 Environmental Impact Assessment Screening, from the Office of the Planning Regulator (June, 2021)
4) Environmental Impact Assessment of Projects, Guidance on Screening (Directive 2011/92/EU as amended by 2014/52/EU), from the European Commission (2017)

5) 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 Environmental Science, MEngSc. Sustainable Energy Engineering) and checked by [redacted] (BSc, Hons Geological Science, MSc, Geochemistry). [redacted] is a Senior Environmental Scientist with extensive experience as an environmental consultant, undertaking various multi-disciplinary projects within consulting engineering. [redacted]is a Project Manager for Marine Advisory with a wealth of experience in the preparation and review of Foreshore Licence Applications, EIA Scoping Reports and EIA Reports and Maritime Usage Licence Applications. 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.

1.3 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: Summary of the proposed mitigation measures.
- Chapter 8: Presents the conclusions from this report.

2 DESCRIPTION OF THE PROPOSED SITE INVESTIGATION ACTIVITIES

This document has been prepared in support of a MUL Application, which seeks the consent to conduct geophysical marine site investigations to assess the suitability of an area in the Celtic Sea for potential hydrogen storage. It must be noted that this proposal is solely for the purpose of surveying and will not involve the construction of any temporary or permanent infrastructure.

2.1 LICENCE AREA

The Licence Area covers a total area of 1,481 km^2 and is outlined below (Figure 2-1). Note all proposed licensable activities will be conducted within the Licence Area below. The coordinates of the Licence Area are provided in Table 2-1.

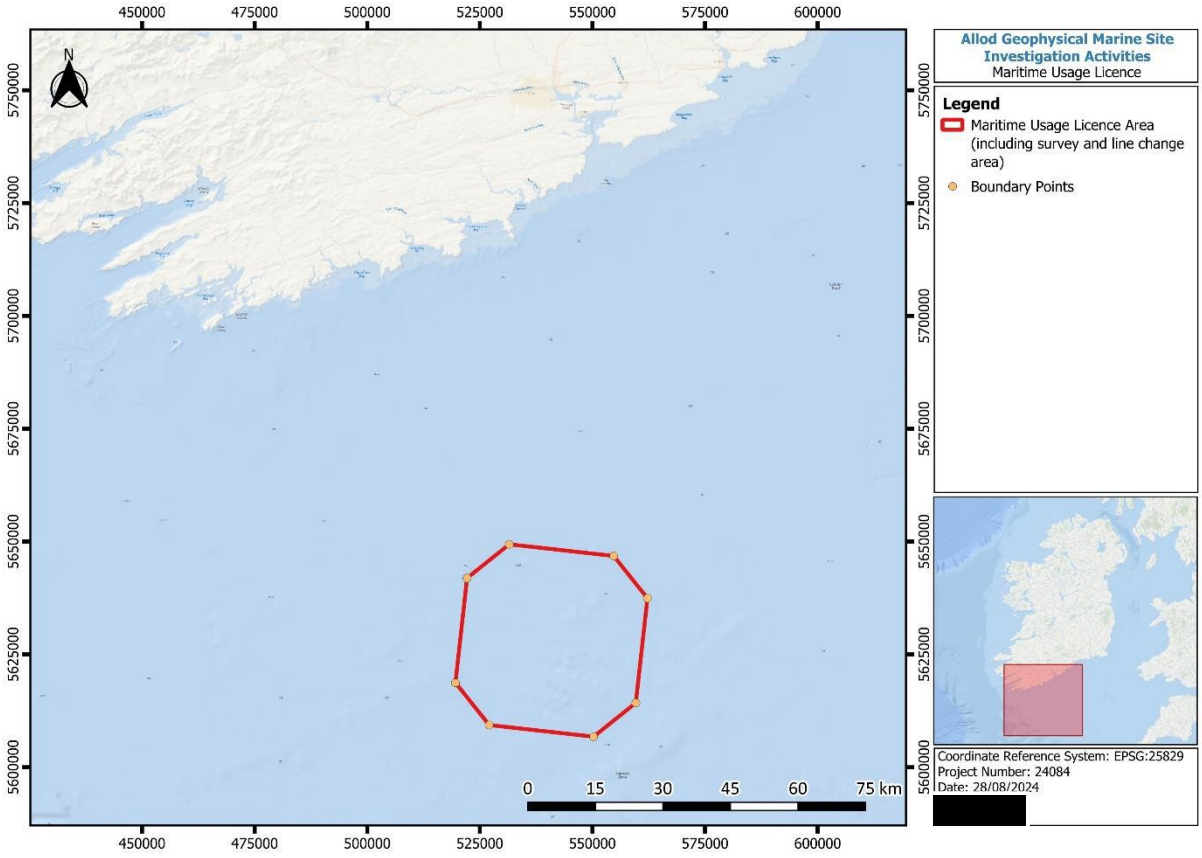

Figure 2-1 Licence Area with boundary points

Figure 2-2 highlights the indicative area of vessel operations (red), the area of interest for data collection (green) and available data for where similar historic site investigation campaigns were undertaken (blue). The approximate vessel operation areas for these historic survey campaigns

(dashed ochre) are shown as these have informed the rationale for the proposed licence area boundary, given the area of interest for data collection shown in green below.

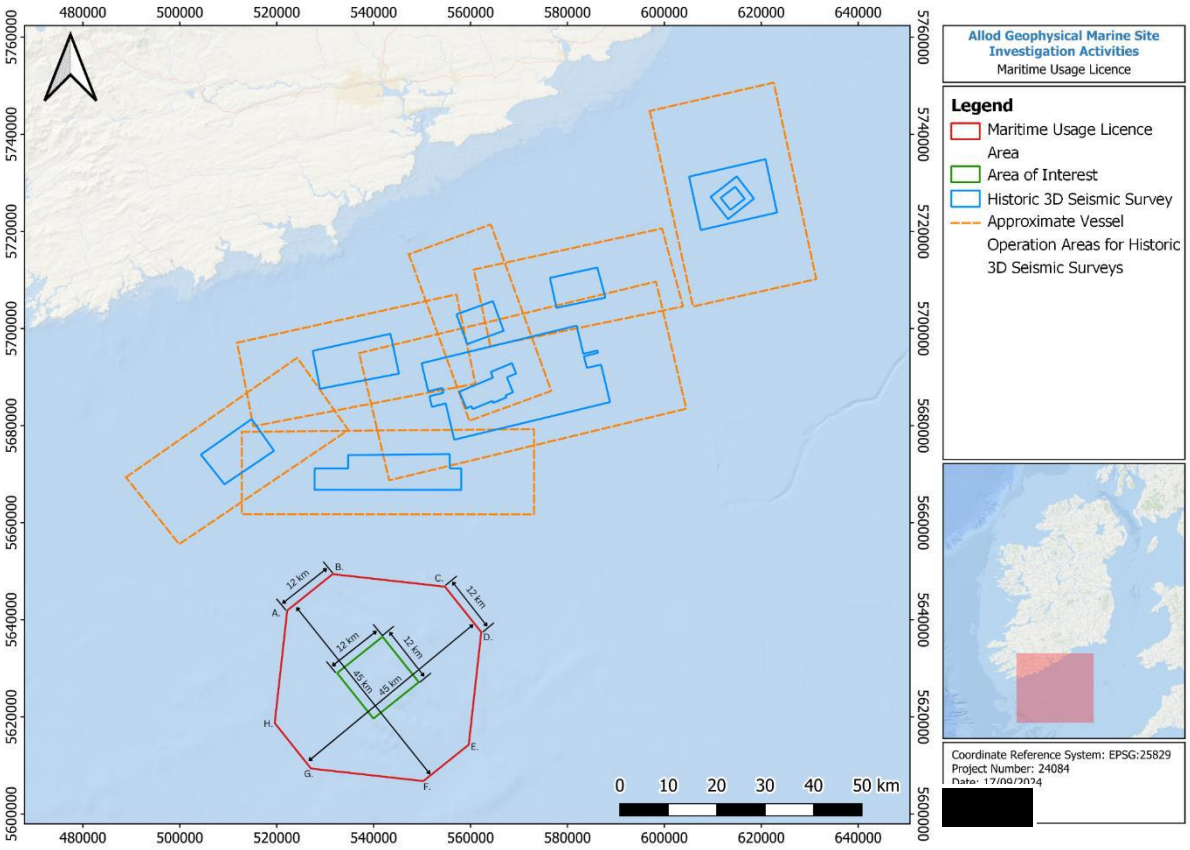

Figure 2-2: Illustrative Map of Allód Licence Area (red), Area of Interest(Green) and Other Historic Site Investigation Areas (Blue)

Table 2-1: Licence Area Coordinates

Id	Latitude (degrees decimal minutes)	Longitude (degrees decimal minutes)
1	50°59.712'N	8°33.034'W
2	50°58.215'N	8°13.235'W
3	50°53.114'N	8°6.929'W
4	50°40.621'N	8°9.357'W
5	50°36.631'N	8°17.375'W
6	50°38.117'N	8°37.025'W
7	50°43.191'N	8°43.351'W
8	50°55.696'N	8°41.073'W

2.2 PROPOSED SITE INVESTIGATION ACTIVITIES

The objective of the proposed surveys is to determine environmental conditions, and the seafloor and subsurface geological characteristics within the Licence Area. The proposed programme of site investigations to be undertaken within the Licence Area is summarised in Table 2-2 below and discussed in more detail in Appendix A. Table 2-2 provides information about the purpose and footprint of the SI activities.

The proposed site investigations will involve the imaging of halite rock in the indicative survey area by means of geophysical marine surveying. All site investigation activities will be undertaken within the Licence Area co-ordinates shown in Table 2-1. It must be noted that the exact technical specifications of the equipment to be used for these investigations will not be known until the survey contract has been awarded, however, a description of the typical equipment and survey parameters is described in Appendix A. All survey activities will follow the recommendations outlined in the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (DAHG, 2014).

The proposed surveys will involve using an airgun array in order to collect data about seabed and subseafloor features. The proposed survey will involve a 15m x 15m array of approximately 25 small airguns with a combined volumetric capacity of c. 4500 cubic inches (cu.in.) which will generate sound suitable for collecting data about the seabed and subseafloor features. The sound returned from the seabed and subseafloor is recorded by a series of hydrophones encased within streamers which are towed behind the airgun array. The survey is anticipated to utilise 10 streamers, each up to 8 km in length, with a 100 m spacing between each streamer, giving a total width of 1 km and total length of up to 8 km, totalling over 10,000 hydrophones which continuously record sound. In addition to these streamers, a potential complementary site investigation activity could be remote sensing activities whereby there may be up to 500 ocean bottom nodes (OBN's) on the seabed. If deployed, the OBN's will be placed on the seafloor at predetermined locations using an ROV and will remain on the seabed whilst the survey vessel sails a predetermined survey pattern emitting the sound source (i.e. the airguns). The OBN's are advanced hydrophones that record the sound returned from the subseafloor. They are beneficial to use as they isolate the sea surface noise (weather) and allow the measurement of shear waves. As the OBN's may be deployed, they have been included below in Table 2-2.

Devices such as MBES (Multi-Beam Echo Sounders), SSS (Side Scan Sonar) and a Magnetometer may also be used for surveying during these SI activities. These device may be used as we will endeavour to maximise the data retrieved during the survey activities to complement the Infomar data (of which as much as 80% within the survey area is currently of poor spatial resolution and quality)and minimise the need for future surveys in the area.

Table 2-2: Proposed Programme of Site Investigations

Survey Type	Equipment Type	Purpose	Sampling Effort
Ancillary	Remote Operated Vehicle (ROV)	An ROV will be used to deploy and recover the Ocean Bottom Nodes (OBNs) to and from the seabed.	OBNs may be deployed by ROV at up to 500 locations across the Maritime Usage Licence Area.
	Ultra-short baseline (USBL)	USBL is a tracking system for in-water equipment and consists of a transceiver on the survey vessel and a transponder on the subsea equipment to be tracked.	The USBL may be used across the Maritime Usage Licence Area to track the position of subsea equipment.
Geophysical	Airgun Array (2000 psi, 4500 in^3	An airgun array is used to emit low-frequency sounds in a downward direction, to image the geological structure of the below seabed.	The airgun array survey may be undertaken across the full extent of the Maritime Usage Licence Area.
	Ocean Bottom Nodes	OBN's are autonomous recording nodes which are placed on the seafloor using ROV's.	OBNs may be deployed by ROV at up to 500 locations across the Maritime Usage Licence Area. Each OBN has dimensions of 200x155x70mm and has a weight of 2.5kg in seawater.
Geophysical	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 Maritime Usage Licence Area to a suitable coverage.

Sub-bottom Profiling (SBP) - Boomer	SBP is used to develop an image of the subsurface, identifying different strata encountered in the shallow sediments.	SBP may be undertaken across the Maritime Usage Licence Area to a suitable coverage.
Sub-bottom Profiling (SBP) - Parametric Pinger	SBP is used to develop an image of the subsurface, identifying different strata encountered in the shallow sediments.	SBP may be undertaken across the Maritime Usage Licence Area to a suitable coverage.
Sub-bottom Profiling (SBP) – Sparker	SBP is used to develop an image of the subsurface, identifying different strata encountered in the shallow sediments.	SBP may be undertaken across the Licence Application Area to a suitable coverage.
Multibeam Echosounder (MBES)	MBES is a system for collecting detailed topographical data of the seabed.	MBES may be undertaken across the Maritime Usage Licence Area to a suitable percentage coverage.

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2.3 SURVEY SCHEDULE

The intention is to begin survey activities as soon as practicable following license award with survey activities anticipated to take 20 days, excluding any operational downtime. 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.

Table 2-3: Proposed Survey Schedules

Schedule 1 – Ideal Scenario	
November 2024	MUL granted
December 2024	Tender process
January 2025	Contractor Award
May 2025	Vessel mobilised
June 2025	Vessel demobilised; data acquisition complete
June 2026	3D data processing complete, ready for evaluation
August 2026	Commencement of desktop data evaluation
August 2027	Assessment/Desk studies complete
Survey Schedule 2 – Licence Timing/Weather Impacted Scenario	
January 2025	MUL granted
February 2025	Judicial Review required
February 2026	Judicial Review finalised, MUL upheld
February 2026	Tender process
March 2026	Contractor Award
May 2027	Vessel mobilised (in the event of no availability 2026)
June 2027	Vessel demobilised; data incomplete due to bad weather conditions
May 2028	Vessel re-mobilised for survey completion
June 2028	Vessel demobilised; data acquisition complete

June 2029	3D data processing complete
August 2029	Commencement of desktop data evaluation
December 2029	Unexpected hazards/anomalies/environmental constrains identified requiring further surveying
May 2030	Smaller survey targeting unexpected potential hazards/anomalies/ environmental assessments
December 2030	Additional data processing complete
December 2031	Assessment/Desk studies complete

The exact mobilisation dates will not be known until the process of procuring a contractor is complete. These investigations will be subject to vessel and contractor availability and in anticipation of delays with some of these elements, Allód are requesting a 7-year survey licence to allow for some of these unpredictable delays.

3 NEED AND ALTERNATIVES

The need for the proposed site investigation activities as described in Section 2 is to determine the suitability of the seafloor and subsurface geological characteristics within the Licence Area for potential hydrogen storage. Allód have carried out initial assessments of the offshore geology using available data, published by the Geological Survey of Ireland, which found salt suitable for cavern storage is restricted to a number of areas offshore Ireland. The area chosen for these proposed SI activities is one of the locations where halite/salt has been proven to exist.

Hydrogen storage will play a key role in achieving the objectives set out in the Climate Action Plan, National Hydrogen Strategy and National Marine Planning Framework. This is not an offshore renewable energy project as provided for through the DMAP process and therefore as an offshore renewable energy supporting infrastructure project is not restricted to the maritime areas within the draft South Coast DMAP area which are proposed for the development of offshore renewable energy and more specifically for fixed offshore wind infrastructure. This project, as ORE supporting infrastructure, similar to other supporting infrastructure including ports, electricity interconnectors and energy parks, large scale hydrogen storage will be required to ensure that Ireland can deliver on decarbonisation and renewable energy targets.

This is likely to be required sooner rather than later as a number of ORE projects that will be developed within the maritime areas located within the draft South Coast DMAP will not be grid connected and will need to propose alternative offtake solutions. Considering the scale of these projects they will require a combination of offtake solutions including green hydrogen generation and/or storage, private wire, energy parks and hybrid interconnection.

Also supporting the requirement for this project is the publication in November 2023[1] of an outline of a series of auctions for Ireland aimed at achieving 2040 offshore renewable energy targets. This document shows that Ireland plans to auction 1.2GW which may or may not be grid connected before the end of 2026 and a further 2GW (2 * 1GW) of non-grid connected offshore renewable energy before the end of 2026. A further 7.5GW will be auctioned off before the end of 2030. It is, as yet, undecided whether this capacity will be auctioned under a subsidy support scheme or a competitive seabed auction however what is certain is that a significant portion will be non-grid connected. This highlights the need for the progression of a number of projects of scale to provide alternative offtake routes to market.

The production of hydrogen with renewable energy has the challenge of intermittent and seasonal production. The Allód project aims to help overcome these challenges through the geological storage of hydrogen.

Existing, available data for the Licence Application Area has already been reviewed as part of a yearlong desktop study and is being used to inform the project, however, the data consists of several old 2D seismic datasets, of uncertain geographic positioning, of insufficient resolution and insufficient coverage to provide any certainty on the subsurface and meet the project's needs. The

[1] North Seas Energy Cooperation - Auction Timelines

available data has informed the design and specific technical requirements of the proposed site investigation activities. The next step in the project is to undertake project specific site investigations to provide up-to-date accurate data to inform progression of the project.

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[2] 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.

[2] Environmental Impact Assessment (EIA) Directive (Council Directive 201192/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU) https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:026:0001:0021:EN:PDF

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 site investigation activities do not constitute a project type or 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 groundwaters. 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.

As this Licence Application is for the purpose of geophysical marine surveying only, and will take place 65 km from the nearest landfall, it is anticipated that the survey associated with this application will not have a significant effect on water quality of inland, transitional and coastal surface waters and/or groundwaters.

As part of the survey OBNs may be deployed for the duration of the survey on the seafloor. A small amount of sediment disturbance can be expected during deployment and retrieval at each location however the effect will be very localised and considering the distance (65 km) from the nearest landfall will not have a significant effect on water quality of inland, transitional and coastal surface waters and/or groundwaters.

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

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 6.14
11	Energy and noise	Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.	Section 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 relevant national policies.

5.1 THE NATIONAL HYDROGEN STRATEGY (2023)

Hydrogen storage will play a key role in achieving the objectives set out in the National Hydrogen Strategy. Key drivers for this strategy include;

- Decarbonisation of Ireland's economy, hydrogen can aid this in difficult to decarbonise sectors where electrification is not feasible such as heavy goods transport and shipping.
- Enhance energy independence through development of indigenous zero carbon renewable fuel – act as an alternative for ~80% of our energy system which today relies on fossil fuel imports.
- Developing industrial opportunities – export markets for renewable hydrogen and potential bi-products in the form of Renewable Fuels of Non-Biological Origin , such as Sustainable Aviation Fuels.

The ability to store hydrogen will act as an enabler to achieve the above and meet the goals of the National Hydrogen Strategy. It is mentioned in the National Hydrogen Strategy that "*Geological storage solutions offer the most promising and least cost solution to the long durational storage of energy needed to support a future hydrogen economy.",* the surveying activities proposed under this application can pave the way for the future geological storage of hydrogen.

The surveys proposed in this project also support the objectives of the Climate Action and Low Carbon Development Act (2021), which outlines a legally binding target of a climate neutral economy no later than 2050, and a reduction in emissions of 51% by 2030. This project looks to support geological storage of hydrogen in the future which would support Ireland in reaching these goals.

The 2022 Sectoral Emissions Ceilings earmarks 2 GW of offshore wind for the purpose of renewable hydrogen production to be in development by 2030. This project would support these developments by providing a hydrogen storage outlet in the future.

EU directive 2023/2413 (RED3) and EU Regulation 2023/2405 (ReFuelEU) mandate targets for the use of Renewable Fuels of Non-Biological Origin (RFNBO) in all transport sectors by 2030. These RFNBO's are created using hydrogen and infrastructure to support the storage and security of supply of hydrogen will be critical for Ireland to meet these EU mandated targets.

The proposed survey activities have the objective of assessing the suitability of the proposed licence area for hydrogen storage in the future, with the aim of developing hydrogen storage infrastructure to contribute to meeting commitments of the:

- National Hydrogen Strategy
- Climate Action and Low Carbon Development Act (2021)

- 2022 Sectoral Emissions Ceilings
- EU directive 2023/2413 (RED3)
- EU Regulation 2023/2405 (ReFuelEU)

Table 5-1below outlines consistency of this Licence Application with policies relevant to the National Hydrogen Strategy.

Table 5-1: Table outlining consistency of this Licence Application with policies relevant to the National Hydrogen Strategy.

Policy	Description	Discussion	Conclusion
EU Energy System Integration Strategy	Sets out the need to develop a more integrated energy system and optimise the use of existing assets to deliver the energy transition at least cost. The strategy calls for application of the "energy efficiency first" principle, an acceleration of the electrification of energy demand and the promotion of renewable and low carbon fuels for sectors where electrification will not be feasible, or cost effective.	The Allód project is looking to carry out investigative surveys in the Celtic Sea to assess the suitability of halite bedrock for the purpose of hydrogen gas storage in the future. The storage of green hydrogen in bedrock would directly support the goals of the EU Energy Systems Integration System, aiding with the transition to renewable and low carbon fuels.	The proposed site investigation activities are consistent and compliant with the EU Energy System Integration Strategy
Long-term Strategy on Greenhouse Gas Emissions Reductions	This Strategy builds upon the decarbonisation pathways set by the carbon budgets, sectoral emissions ceilings and Climate Action Plan 2023 (updated 2024), to ensure coherent and effective climate policy.	The Allód project is looking to carry out investigative surveys in the Celtic Sea to assess the suitability of halite bedrock for the purpose of hydrogen gas storage in the future. The future storage of green hydrogen is directly supported by Allód's SI activities which in turn supports the future	The proposed SI activities are consistent and compliant with the Long-term Strategy on Greenhouse Gas Emissions Reductions Policy.

	It sets out indicative pathways, beyond 2030, towards achieving carbon neutrality for Ireland by 2050. It is underpinned by analysis of transition options across each key sector of the economy and provides a crucial link between Ireland's 2030 climate targets and the long-term goal set by Ireland's National Climate Objective and the European Climate Law.	decarbonisation of Ireland's economy.	
National Energy Security Framework	This Framework provided a response to Ireland's energy security needs in the context of the war in Ukraine. It focused on how to support households and businesses, in particular those most at risk of fuel poverty, and how to accelerate the country's shift to increased energy efficiency and indigenous renewable energy systems.	The Allód project is looking to carry out investigative surveys in the Celtic Sea to assess the suitability of halite bedrock for the purpose of hydrogen gas storage in the future. The storage of green hydrogen off the Irish coast would strongly improve Ireland's energy security, whilst also accelerating the country's shift to increased energy efficiency and indigenous renewable energy systems.	The proposed SI activities are consistent and compliant with the National Energy Security Framework Policy.

	The Framework also prioritised the development of a hydrogen strategy for Ireland.		
Climate Action and Low Carbon Development (Amendment) Act 2021	The Act commits Ireland to a legally-binding target of a climate neutral economy no later than 2050, and to a reduction in emissions of 51% by 2030. The Act provides the framework for Ireland to meet these targets, including the preparation of Sectoral Emissions Ceilings and the setting of Carbon Budgets. The 2022 Sectoral Emissions Ceilings included the delivery of an additional 2GW of offshore wind, earmarked for the production of renewable hydrogen, to be in development by 2030.	The Allód project is looking to carry out investigative surveys in the Celtic Sea to assess the suitability of halite bedrock for the purpose of hydrogen gas storage in the future. The storage of green hydrogen in bedrock would assist Ireland with its commitments to becoming a climate neutral economy by 2050.	The proposed site investigation activities are consistent and compliant with the Climate Action and Low Carbon Development (Amendment) Act 2021.

5.2 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 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 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.

5.2.1 NATIONAL MARINE PLANNING FRAMEWORK HIGH LEVEL OBJECTIVES

Some of the high-level objectives laid out in the NMPF in relation to energy include:

- To significantly reduce greenhouse gas emissions in Ireland;
- To make Ireland a leader in climate action;
- To increase the sustainable use of our extensive marine resource;
- To support Ireland's decarbonisation journey; and
- To provide enhanced security of energy supply.

This application relates to a licence to carry out SI works to obtain information on the geological composition below the seabed and inform the suitability of the rocks below the seabed in the Licence Application Area for the potential storage of green hydrogen. This will contribute to the above objectives, and bring economic, social and environmental benefits to the country and local coastal communities.

5.2.2 NATIONAL MARINE PLANNING FRAMEWORK SUSTAINABLE DEVELOPMENT GOALS

This proposed SI works are also supportive of the sustainable development goals (SDG) included in the National Marine Planning Framework. Of particular relevance are those goals related to climate change and energy including:

- SDG 6 Affordable and Clean Energy in terms of this projects aim to support the development of emerging technologies, particularly in the area of sustainable aviation and shipping fuels

- SDG 9 Industry, Innovation and Infrastructure – in terms of supporting the response to the climate change emergency and the development of emerging technologies in the energy industry
- SDG 13 Climate Action – in terms of supporting Ireland in achieving its climate change and decarbonisation targets

5.2.3 National Marine Planning Framework Sectoral Policies

Under the Maritime Area Planning Act 2021, as amended, and related policies on offshore wind generation, offshore wind development has moved to a plan led as opposed to developer led system. The first iteration of this is almost complete with the publication of the maritime areas within the draft South Coast DMAP (dSC-DMAP) which underwent public consultation in May and June 2024. The dSC-DMAP was accompanied by a Methodology Statement, a set of Policy Objectives, SEA and AA Screening reports. A further consultation was open from 1 to 30 August 2024 on a restricted volume of information such as further information on the data layers used to inform the work. The DMAP is expected to be brought before the Oireachtas for approval once it is in session for the Autumn term.

The policy document published makes it clear that the policy objectives for the South Coast DMAP relate to offshore wind development only and not to other projects or activities which may take place off the south coast. No restrictions are placed on the processing of applications for infrastructure that aims to support offshore wind development generally. This would include this project which will be part of an alternative offtake and others such as the proposed ORE Hub at Rosslare Europort or upgrades at Port of Cork or Cork Dockyard aiming to support the installation of offshore wind turbines.

As stated in Section 3 of this report, hydrogen storage will play a key role in Ireland achieving renewable electricity and decarbonisation targets. These targets have been repeatedly stated in successive Climate Action Plans as well as in sectoral targets for seven different industrial sectors, published in July 2022[3]. The targets of most relevance to this project are:

- Electricity (75% reduction by 2030, based on 2018 levels)
- Transport (50% reduction by 2030, based on 2018 levels)
- Industry (35% reduction by 2030, based on 2018 levels)

While the targets were published after the National Marine Planning Framework, they will be supported by a number of sectoral policy objectives set out in the NMPF. Offshore wind will provide a significant percentage of the 75% reduction in carbon emissions due to electricity consumption however not all of the electricity generated will be directly connected to the grid and therefore offshore geological hydrogen storage can contribute significantly to overcoming the challenges facing the sector in getting their product to the end user.

[3] Sectoral Carbon Emissions Reduction Targets to 2030, published July 2022.

In addition, offshore geological hydrogen storage can contribute significantly to the achievement of targets in both the transport and industrial sectors which are far harder to decarbonise through the storage of green hydrogen as the raw material for sustainable fuels (heavy goods transport, aviation and shipping).

This is not an offshore renewable energy project as provided for through the DMAP process and therefore, as stated previously is not restricted to the maritime areas within the draft South Coast DMAP area, however, the project should be considered as ORE supporting infrastructure and treated accordingly in line with the Government Decision of 14 September 2022 to prioritise ORE and ORE supporting infrastructure across all consenting processes. Similar to other supporting infrastructure including ports, electricity interconnectors and energy parks, large scale hydrogen storage will be required to ensure that Ireland can deliver on decarbonisation and renewable energy targets.

As green hydrogen on the scale at which it will be required into the future is a nascent industry, there are no green hydrogen specific sectoral policy objectives in the NMPF. However, a number of sectoral policies may be relevant, are examined in Table 5-2 and where applicable to this project are assessed for compliance.

The examination in Table 5-2 shows that while the Allód project is not an ORE project it does support the deployment of offshore renewable energy at scale, particularly as we move towards non-grid connected large scale ORE. As such the Allód project either supports or is in compliance with all relevant sectoral objectives included in the NMPF.

Table 5-2: Table outlining consistency of this Licence Application with relevant NMPF Policies.

Policy	Description	Discussion	Conclusion
ORE Policy 1	Proposals that assist the State in meeting the Government's offshore renewable energy targets, including the target of achieving 5GW 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. 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.	The Allód project is not an offshore wind development however the project can assist the state in meeting its offshore renewable energy targets through the provision of geological hydrogen storage at a scale that can be part of an alternative offtake solution to non-grid connected offshore wind developments. The high-level auction timeline published by the NSEC in November 2023 (refer Section 3) together with grid constraints means that a significant volume of offshore wind generated electricity will be non-grid connected. Green hydrogen and geological hydrogen storage will form a critical element of any solution to overcoming these challenges.	The Allód project supports ORE Policy 1.
ORE Policy 2	Proposals must be consistent with national policy, including the Offshore Renewable Energy Development Plan (OREDP) and its successor. Relevant Projects designated pursuant to the Transitional 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. 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 (or development of our marine resources) (Note – see Appendix D on Spatial Designation Process).	The Allód project is not an offshore wind development however the project can assist the state in meeting its objectives under the Offshore Renewable Energy Future Framework Policy Statement which includes objectives in relation to the development of a green hydrogen industry and the decarbonisation of industrial heat. It will do this through the provision of geological hydrogen storage at a scale that can be part of an alternative offtake solution to non-grid connected offshore wind developments.	The Allód project supports ORE Policy 2.
ORE Policy 3	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	The Allód project is not an offshore wind development and is not located within any area proposed for offshore wind development.	The Allód project complies with ORE Policy 3.

	generation (wind, wave or tidal should demonstrate that they will in order of preference: a) avoid, b) minimise, c) mitigate adverse impacts, or d) if it is not possible to mitigate significant adverse impacts, proposals should set out the reasons for proceeding. Applicants for non-ORE proposals in or affecting ORE sites should engage ORE developers in consultation during the pre-application processes as appropriate.		
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.	The Allód project is not an offshore wind development and therefore this policy objective is not relevant.	Not applicable
ORE Policy 5	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: a) avoid, b) minimise, c) mitigate adverse impacts.	The Allód project is not located within or adjacent to any ORE test site and therefore this policy objective is not relevant.	Not applicable
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 Allód project can support this policy objective through the provision of geological hydrogen storage at a scale that can be part of an alternative offtake solution to non-grid connected offshore wind developments including floating wind developments. The stored hydrogen can then be used as needed to support decarbonisation of industry in Ireland. The high-level auction timeline published by the NSEC in November 2023 (refer Section 3) together with grid constraints means that a significant volume of offshore wind generated electricity will be non-grid connected. Green hydrogen and geological hydrogen storage will form a critical element of any solution to overcoming these challenges.	The Allód project supports ORE Policy 6.
ORE Policy 7	Where potential for ports to contribute to ORE is identified, plans and policies related to this port must encourage development in such a way as to facilitate ORE and related supply chain activity.	The Allód project is not a port development and therefore this policy objective is not relevant to the project.	Not applicable

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.	The Allód project is not an offshore wind development. The Allód project is an offshore wind supporting project however it will not impact on any existing cables.	The Allód project complies with ORE Policy 8.
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 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.	The Allód project is not an offshore wind development. In addition, this application is for a licence to undertake site investigations and is located approximately 65km from the nearest landfall point therefore this policy objective is not relevant.	Not applicable
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.	The Allód project can support the delivery of offshore renewable energy through the provision of geological hydrogen storage at a scale that can be part of an alternative offtake solution to non-grid connected offshore wind developments including floating wind developments. The stored hydrogen can then be used as needed to support decarbonisation of industry in Ireland. However, the project	Not applicable

		is not land based and therefore this policy objective is not relevant.	
ORE Policy 11	Where appropriate, proposals that enable the provision of emerging renewable energy technologies and associated supply chains will be supported.	The Allód project can support the delivery of offshore renewable energy including emerging technologies such as floating offshore wind as well as the development of nascent industries and associated supply chains through the provision of geological hydrogen storage at a scale that can be part of an alternative offtake solution to non-grid connected offshore renewable energy developments. The stored hydrogen can then be used as needed to support decarbonisation of industry and the development of new industries in Ireland.	The Allód project supports ORE Policy 11.

6 ASSESSMENT OF IMPACTS

6.1 OVERVIEW

The following documents, also submitted in support of this Licence 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. Note this information, where relevant, is also summarised in this AIMU report.

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 3.1 Physical Disturbance to Marine Benthic Communities and habitat loss 3.2 Disturbance from Vibration and Underwater Noise 3.3 Injury due to Collision (Survey Vessels and Sampling Equipment) 3.4 Physical and Noise Disturbance to Bird Species 3.5 Pollution Event	Describes potential environmental impacts from the proposed site investigation activities on the receiving environment
	Section 4. Identification of relevant European Sites (SPAs and SACs) 4.2 Identification of relevant Natura 2000 sites using Source-Pathway-Receptor model and compilation of information Qualifying Interests and conservation objectives	Describes the Natura 2000 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 2 Appropriate Assessment where necessary)
	Section 5. Assessment of Likely Significant Effects (LSE) to Natura 2000 Sites in the Zone of Influence of Proposed Activities	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 5.6 Screening for In-combination effects	Describes other known or proposed plans and projects in the vicinity of the site investigation activities, including other proposed wind

Report	Section/Subsection	Content Description
		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 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 7. 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 4.6 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 Proposes measures necessary to avoid, reduce or offset any identified negative effects
	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. Risk Assessment 4.1 Identification of Potential Impacts 4.2 Anthropogenic Noise Related Risk Assessment 4.3 Collision Risk Assessment 4.4 Pollution Risk Assessment 4.5 Recommended Mitigation Measures 4.6 Residual Impacts	Describes potential environmental impacts from the proposed site investigation activities on Annex IV species

Sections 6.2 to 6.17 of this report consider potential impacts from the proposed site investigation activities.

6.2 LAND AND SOILS

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

6.3 WATER

6.3.1 THE WATER FRAMEWORK DIRECTIVE

The Environmental Protection Agency (EPA) provides information from river surveys on Water Framework Directive (WFD) status, pollution status and condition on hydrometric areas and river catchments around Ireland's coastline. The WFD uses the following definitions for waterbodies:

- "surface waters" means inland waters, except groundwater; transitional waters and coastal waters, except in respect of chemical status for which it shall also include territorial waters.
- "groundwater" means all waters which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
- "Inland water" means all standing or flowing water on the surface of the land, and all groundwater on the landward side of the baseline from which the breadth of territorial waters is measured.
- "River" means a body of inland water flowing for the most part on the surface of the land but which may flow underground for part of its course.
- "Lake" means a body of standing inland surface water.
- "Transitional waters" are bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows.
- "Coastal water" means surface water on the landward side of a line, every point of which is at a distance of one nautical mile (i.e. 1.85 km) on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured, extending where appropriate up to the outer limit of transitional waters.

6.3.2 POTENTIAL EFFECTS

Accidental spills of hazardous materials during the SI activities have the potential to negatively impact marine water quality within and surrounding the proposed survey licence area.

Due to the size of the equipment which is proposed to be used in these SI activities, and the distance from shore of the proposed licence area, the survey vessel will be refuelled at sea via the support vessels. During refuelling operations there may be an increased risk of accidental spills however these operations are carried out frequently and to the highest safety standards to ensure risk of a spill are extremely low.

6.3.3 ASSESSMENT OF POTENTIAL EFFECTS

The proposed licence area is located 65 km from the nearest landfall. It is therefore expected that there will be no potential impacts on Ireland's surface waters, groundwater, inland water, rivers, lakes, transitional waters and coastal waters. The proposed site investigation activities are not anticipated to result in a deterioration in a designated Water Framework Directive water body and

will not jeopardise the attainment of good status (or the potential to achieve good ecological and chemical status).

As the proposed site investigations will take place entirely at sea, this will result in a temporary increase in vessel traffic, which could increase the risk of the occurrence of accidents, which may result in the spillage of fuels into the marine environment. All vessels carry fuel during surveying activities, as are lubricants, any other potentially harmful substances would occur in very limited amounts stored in purpose made storage containers or facilities and are adequately secured. Collection and disposal of waste produced as a result of the onboard activities will form part of the Health and Safety and/or Environmental Management Plan.

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 (if required). Therefore, it is considered unlikely that there would be any occurrence of a pollution event that could directly or indirectly affect the marine environment.

By adhering to The International Convention for the Prevention of Pollution from Ships (MARPOL) and planning legislation, the occurrence of spills throughout the duration of the survey licence will be avoided.

Strict protocols will be followed for refuelling at sea, including the use of specialized equipment to minimize the risk of spills or leaks. All refuelling operations will be supervised by experienced personnel and carried out in favourable weather conditions to reduce the potential for accidents. Additionally, an emergency response plan will be in place to address any unforeseen incidents promptly. These measures are designed to safeguard the marine environments and ensure the refuelling process is both efficient and environmentally responsible.

6.4 BIODIVERSITY

6.4.1 MARINE BENTHOS

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[2]) 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.

6.4.1.1 MARINE BENTHIC HABITATS IN LICENCE AREA

Within the Licence Area, EUSeaMap (2023) predicts that the benthic habitats present are predominantly circalittoral fine sand or Circalittoral muddy sand, and deep circalittoral mud.

Figure 6-1 below illustrates the habitat types to be present in and surrounding the proposed survey area, classified down to EUNIS Level 4 habitats where possible. Detailed descriptions of these habitat types are also provided in Table 6-1 below.

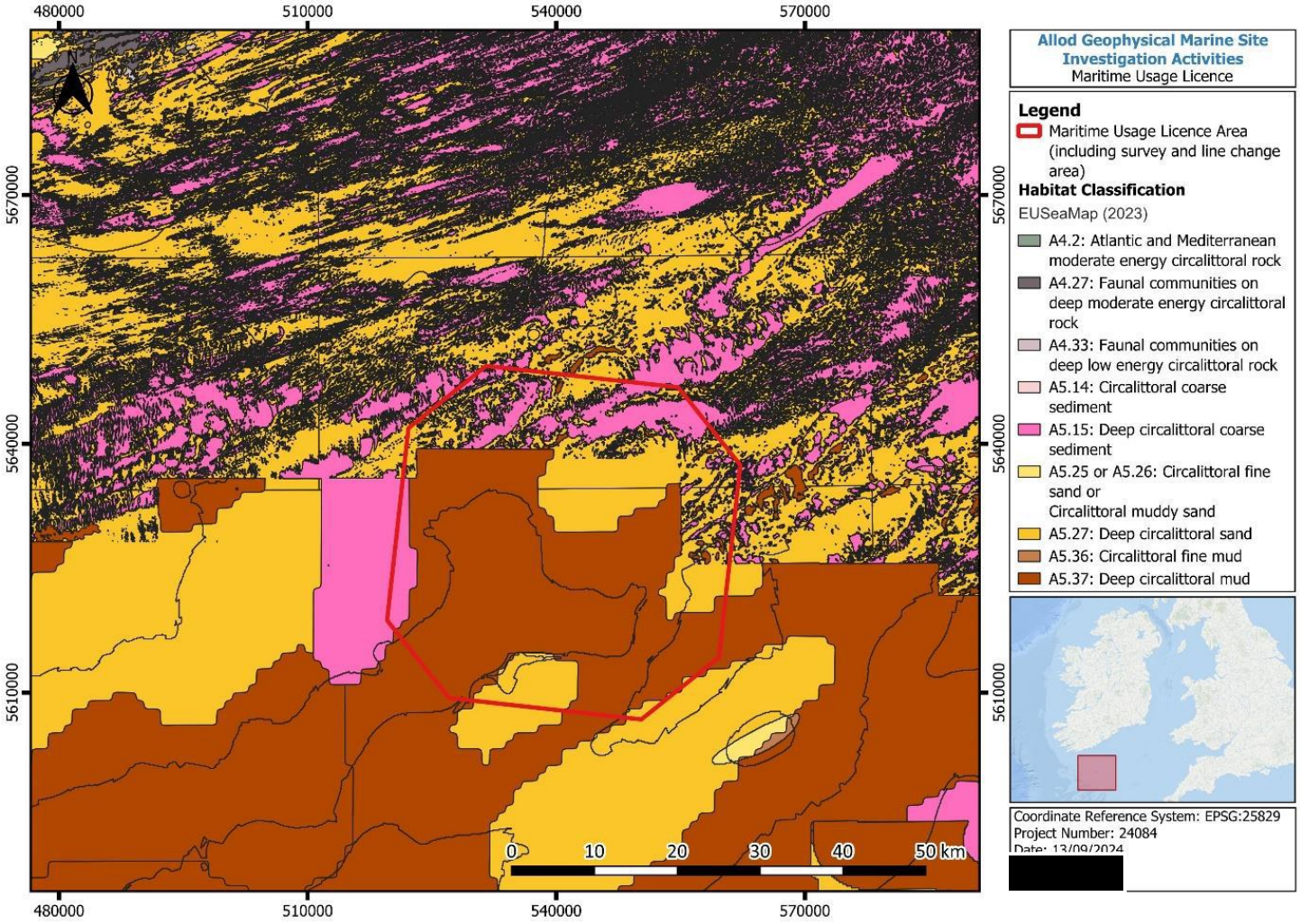

Figure 6-1: Predicted Benthic Habitats in Licence Area as per EUNIS Classification (EUSeaMap, 2023)

Table 6-2: Habitat classification and descriptions

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 Echinocyamus pusillus), polychaetes and bivalves. This habitat is generally more stable than shallower, infralittoral sands and consequently supports a more diverse community.
A5.26 – Circalittoral muddysand	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 Abra alba and Nucula nitidosa,

	andechinoderms such as Amphiura spp. and Ophiura spp., and Astropecten irregularis. These circalittoral habitats tend to be more stable than their infralittoral counterparts and as such support aricher infaunal community.
A5.27 – Deep Circalittoralsand	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 sandymud	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 Virgularia mirabilis and brittlestars such as Amphiura spp. are particularly characteristic of this habitat whilst infaunal species include the tube building polychaetes Lagis koreni and Oweniafusiformis, and deposit feeding bivalves such as Mysella bidentata and Abra spp.

A5.37 – Deep Circalittoral mud	Atlantic sublittoral muds, occurring below moderate depths of 15-20m, either on the open coast or in marine inlets such as sealochs.
High energy circalittoral seabed	General Description 'Circalittoral rock and other hard substrata': 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 (foliosered algae present but not dominant) and lower circalittoral (foliosered 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

6.4.1.2 POSSIBLE IMPACTS ON MARINE BENTHIC HABITATS IN LICENCE AREA

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

- Habitat disturbance and smothering
- Increased suspension of solids in the water column
- Acoustic Disturbance of Macroinvertebrates

The proposed site investigation activities that have the potential to interact with the seabed are the use of OBNs, if deployed, which may result in a small amount of sediment to become suspended. OBNs are compact, self-contained units that can be deployed and retrieved without extensive seabed disruption. When placed on the seabed, each node will only displace a minimal amount of sediment, which quickly resettles around the node. This limited disturbance is localised and temporary. Techniques used for deployment will include the use of remotely operated vehicles (ROVs) to ensure precise placement and collection, reducing the likelihood of disturbing the sediment. OBNs will be deployed for relatively short periods. The temporary nature of the deployment will ensure that any minor disturbance to sediment suspension stops once the nodes are retrieved. Suspended sediments concentrations (SSC) may induce smothering of certain species, especially filter feeding species by blocking their feeding apparatus, smothering sessile species or interfering with respiratory function. In certain strong tidal conditions, scour can occur from an increase in SSC.

No significant impacts are predicted during the deployment of OBN's via ROV on marine benthic communities. One OBN has an area of 0.031m^2 (0.000000031 km^2). The total spatial footprint of 500 OBNs would cover 0.0000155 km^2 and a coverage of 500 OBNs would take up 0.000229555% of the MUL survey area. The nodes would be in place for the duration of the geophysical marine site investigation activities (up to 20 days or approx. 3 weeks). In addition, these site investigation activities are conducted in a dynamic area (within the Celtic Sea, tidal flows are known to interact with and mobilise unconsolidated seabed sediments) so it is considered unlikely that physical disturbance to benthic communities will be above any natural levels experienced.

Habitat disturbance and smothering and increased suspension of solids in the water column impacts are not considered likely as a result of the proposed site investigation activities.

If OBN's are not deployed there will be no survey activities which interact with the seabed and thus no physical impact to the seabed.

Reviews and environmental studies to date on fish and invertebrate species response to and impact of sound has been limited, with reviews focusing mainly on cetaceans and elasmobranchs. Carroll et al. 2017 attempted to create a greater understanding into the impacts of seismic and sound surveys on fish and invertebrates and outline the current knowledge gaps through a review/compilation of the currently available literature or environmental studies conducted in this or similar areas. The limited number of studies involving invertebrates impacts and airguns meant/resulted in some cases drawing impacts where available from other sound sources such as ship noise or pile driving.

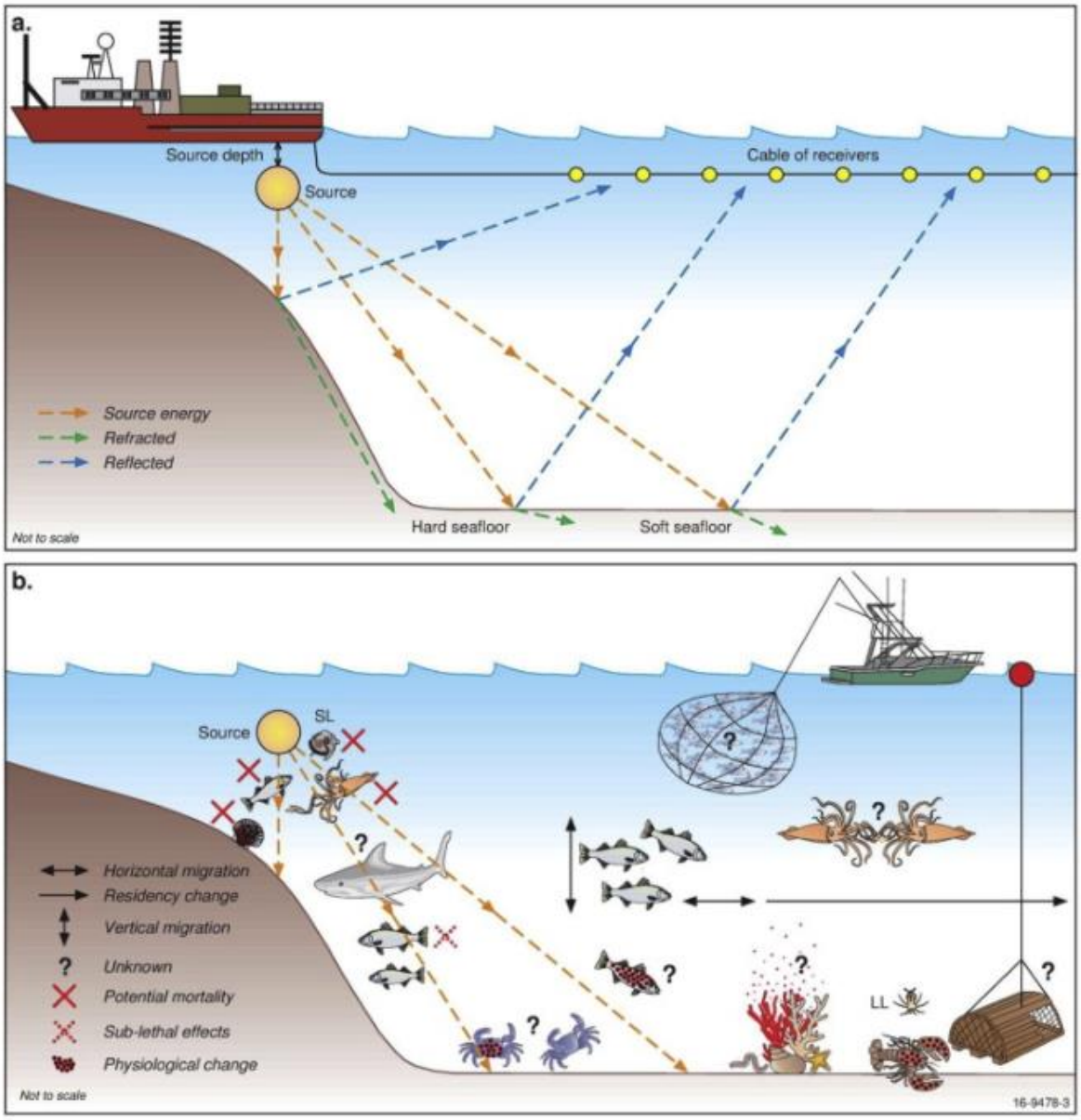

Figure 6-2 Conceptual Model of sound propagation through the water column and seabed (Figure from Carroll et al., 2017)

The characteristics and variation in sound propagating through the water column and into the seabed is dependent on the seabed characteristics and features within and the surrounding environment (depth, seabed features, topography, seabed surface texture (hard or soft)). Marine invertebrates do not have a gas-filled bladders, and so are unable to detect changes in sound pressure from sound waves. However, bivalves, echinoderms, and crustaceans do have sensory hairs which allow them to detect particle motion within the immediate vicinity in order for them to orientate themselves within their environment (Carroll et al., 2017).

Mortality had been identified as the most useful indicator of barotrauma in marine invertebrates (Carroll et al., 2017). Field based-studies on adult marine invertebrates had revealed no evidence or mortality after airgun exposure in scallops up to ten months after exposure, clams two days after

exposure, or lobsters up to eight months after exposure. Larval stages were considered to be more sensitive to pressures/stressor compared to the adult stages. However, the seismic sound sources exposures revealed no difference in the mortality of larval fish, crabs or scallops as an example (Carroll et al., 2017). Effects observed on lobster larvae following intense and long periods of exposure to >185dB re µP airgun shots revealed no effects on mortality or the energy content of the lobster larvae (*Jasus edwardsii*). Experiments conducted in caged conditions of intense and long exposures on scallops had noted an increase in mortality rates suggesting larvae may be vulnerable to near-field airgun shots (3 shot intervals for 90hrs and a 1m distance from the sound source). However, laboratory and caged experiments had their limitations (with experimental conditions or design, artificial tanks, unrealistic or unknown sound exposures) as there is still a lack of information and understanding on how marine invertebrates detect sound/neurological and physiological responses.

Behavioural effects from the exposure to airgun and sound sources varied between species. Some behavioural changes included scallops burrowing more quickly into the sediment following the sound exposure. Rock lobster showed delays in righting themselves from overturning after airgun exposure. Some invertebrates may also become accustomed to the noise exposure, as observed with cuttlefish, crabs and squid who showed fewer responses over the length of the sound exposure trials ([Fewtrell and McCauley, 2012; Samson et al., 2014; Mooney et al., 2016] within Carroll et al., 2017).

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

6.4.2 NATURA 2000 SITES

The marine Special Areas of Conservation for Annex I Habitats and Annex II species and Special Protection Areas in the vicinity of the Licence Area can be seen in Figure 6-3 and Figure 6-4 below, with the proposed MUL area shown in red. The closest site is 68.46 Km from the proposed survey activities.

The SISAA and NIS submitted as part of this Licence Application have considered potential impacts from the proposed site investigation activities on Natura 2000 sites (the closest site being 68.46 Km) and have identified 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 activities, alone or in combination with other activities and developments, would not cause any adverse effects on the integrity of any Natura 2000 site.

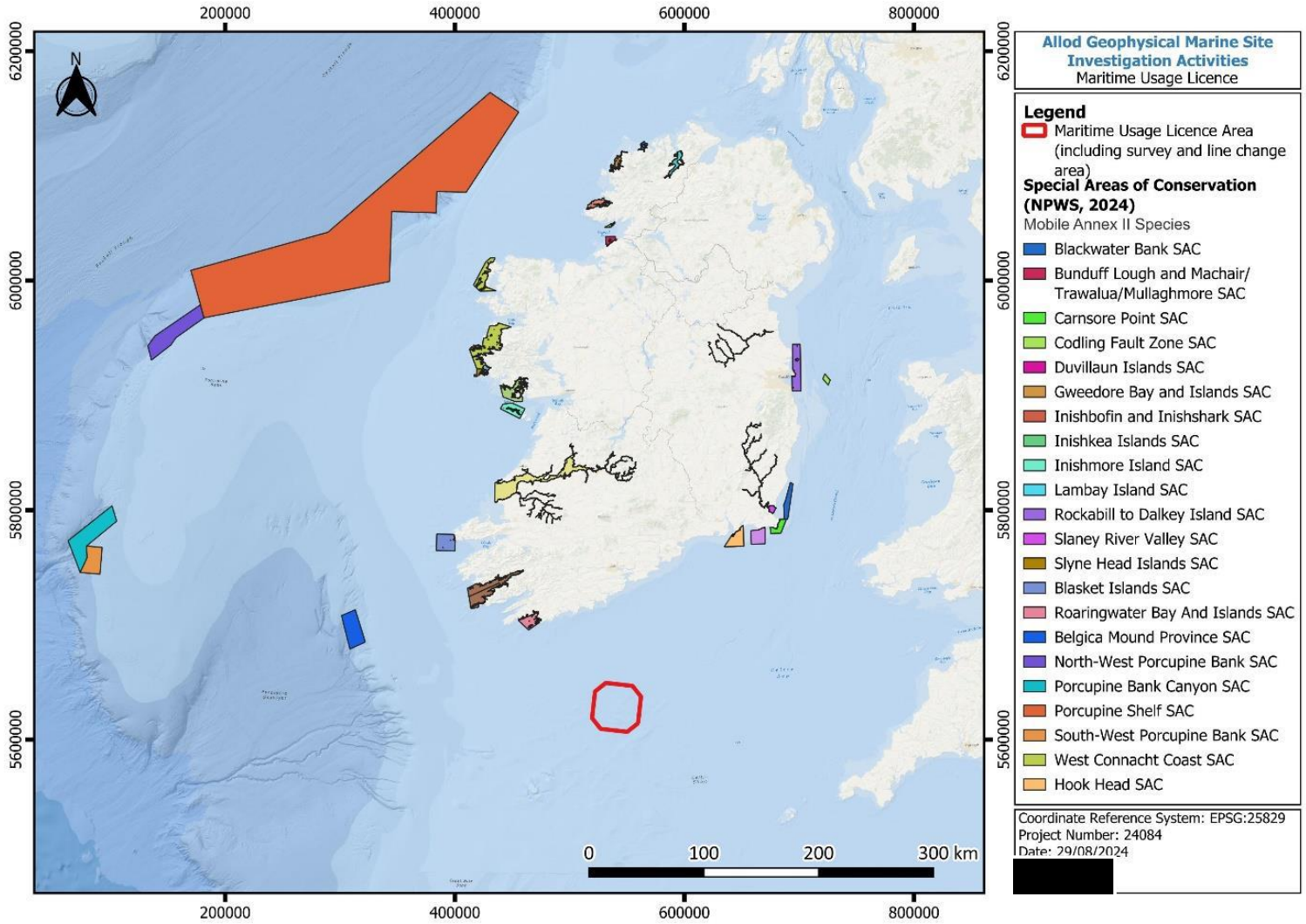

Figure 6-3: SACs around Ireland, MUL area shown in red.

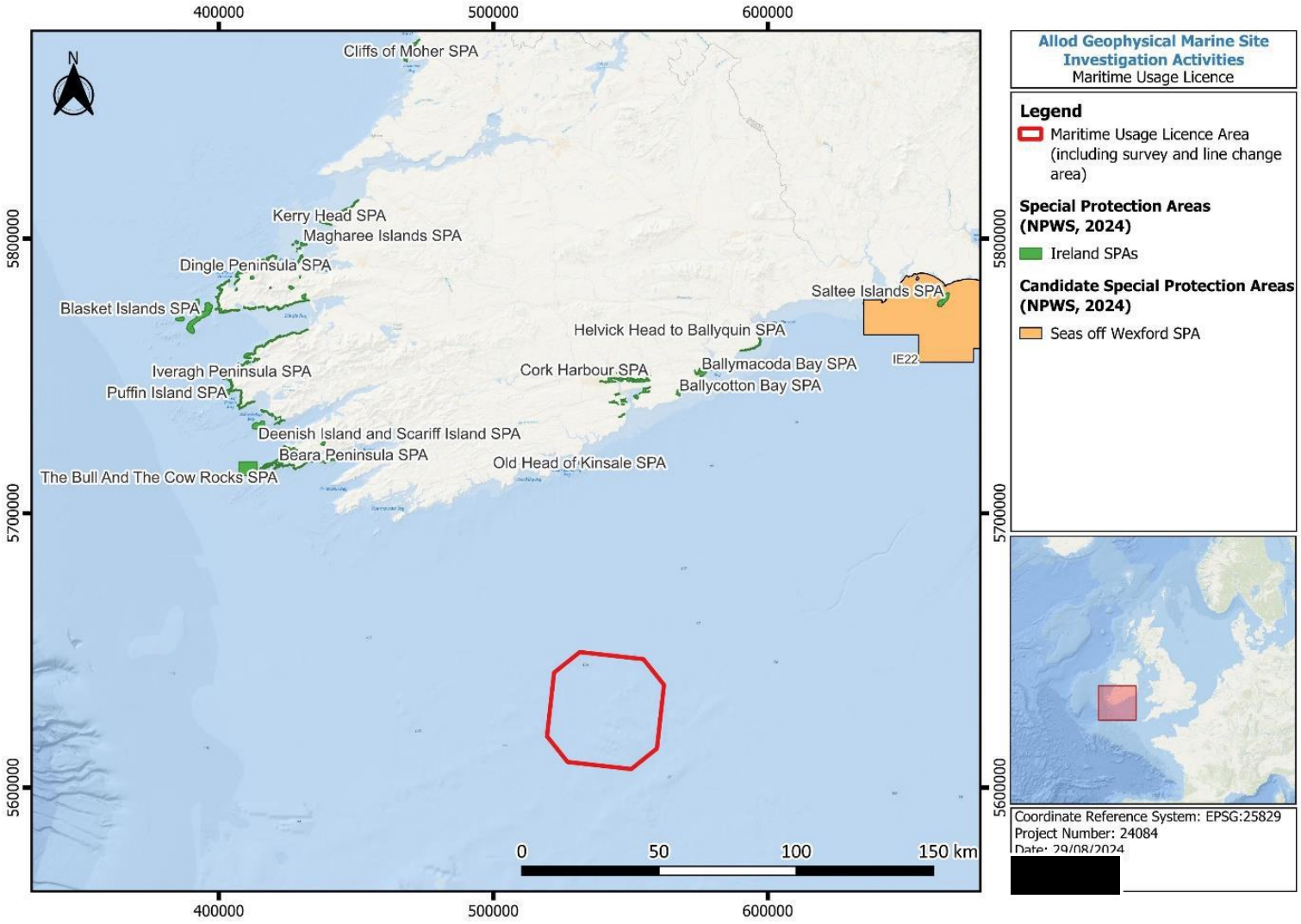

Figure 6-4: SPAs in the vicinity of the Licence Area.

6.4.3 MARINE MAMMALS

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 truncates*), 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 included harbour porpoise (*Phocena phocena*), bottlenose dolphin (*Tursiops truncates*), Risso's dolphin (*Grampus griseus*), common dolphin (*Delphinus delphis*), killer whales (*Ornicus orca*), fin whales (*Balaenoptera* physalus), minke whale (*Balaenoptera acutorostrata*) and humpback whale (*Megaptera novaeangliae*).

Potential effects on prey species of marine mammals include underwater noise, increase suspended sediment concentrations and sediment re-deposition, and physical disturbance to and temporary loss of seabed habitat (e.g. nursery and spawning grounds including reefs).

Cetaceans including the Harbour Porpoise and Bottlenose Dolphin, and pinnipeds, the Grey and Common/Harbour seal, have a wide variety of prey species that vary geographically and seasonally, reflecting availability of food resources. Marine mammals such as the harbour porpoise and bottlenose dolphin have high daily energy requirements, and as a result need to capture enough prey to meet these demands.

As outlined above, the potential for any effects on prey species from physical disturbance and/or temporary loss of seabed habitat or the potential effects of SSC on benthic habitats and fish is unlikely.

Potential for significant effects of underwater noise on prey species is not considered likely as marine mammals are more sensitive to noise than prey species and would also be deterred/disturbed from an area of potential prey displacement.

The vessels undertaking these surveys are likely to be travelling at slow speeds (4 to 5 knots) while engaged in the survey activities, thus allowing both the vessel and any animal in the area time to avoid collision. The predictable trajectory of geophysical survey vessels has an additional benefit of further reducing the risk of collision with marine mammal species. Slower vessels following a consistent trajectory allow cetaceans the opportunity to avoid collisions.

Neutral reactions of marine mammals have been observed with larger, slower moving vessels (e.g. cargo ships) compared to fast, unpredictable boats (e.g. speedboats) where marine mammals exhibit avoidance behaviour.

The species in the area are exposed to marine traffic on a regular basis and should therefore be accustomed to vessel movements. Therefore, the collision risk posed by the proposed survey is likely to be significantly lower than that posed by existing shipping activity. The limited number of vessels (three; a survey vessel and two chase/guard vessels using the area) that will be required for these surveys will not significantly increase vessel traffic in the area.

The RAAIVS included a detailed impact assessment which concluded that given the short duration and temporary nature of the proposed SI activities, combined with the robust mitigation measures proposed, Annex IV species overlapping with the MUL Application Area will not be significantly impacted by the SI activities.

The conclusion drawn from the assessment carried out in the RAAIVS, SISAA and NIS which accompany this document, if the appropriate mitigation measures are implemented as seen in Section 7 below, then the occurrence of significant effects on marine mammals resulting from the proposed SI activities, are not likely to occur.

6.4.4 BIRDS

Ireland is a highly important breeding, wintering and migratory stop-over destination for many species of birds. The estuaries, coastal sea cliffs and offshore islands of Ireland are host to nationally and internationally important assemblage of seabirds (diving and surface feeding spp.), shorebirds (i.e. wader and dabbler spp.) and wildfowl (passerines), and as such many sites are designated as SPAs for these SCI bird species under the terms of the EU Birds Directive (2009/147/EC) and are protected under national legislation (i.e. Wildlife Acts, as amended).

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).

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 6-3 above.

Significant effects on all designated bird species features of Natura 2000 sites due to underwater noise emitted by the proposed SI activities are considered unlikely.

6.4.5 FISH

6.4.5.1 MIGRATORY FISH SPECIES

Relevant migratory fish are described in Table 6-3 below.

Table 6-3: Migratory Fish Species

Species	Description
Atlantic salmon (*Salmo salar*)	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 (*Salmo trutta*)	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 (Lampetra fluviatilis)	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 (Petromyzon marinus)	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 (*Alosa fallax*)	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 (*Alosa alosa*)	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 (Anguilla anguilla)	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 (Cetorhinus maximus)	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 shark are usually present in Irish waters in the summer months and studies of migratory pattens indicate an extensive migration from deep water to coastal waters in April with migrations northwards due to increasing sea surface temperature until August.

6.4.5.2 COMMERCIALLY IMPORTANT FISH SPECIES – SPAWNING AND NURSERY GROUNDS

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

Horse Mackerel and Megrim use the area as a spawning and nursery ground. Haddock also use the area as a spawning ground, whilst Black Belly Angler Monk, Hake and White Belly Angler Monk use this area as a nursery ground. The extent of overlap with the mapped spawning and nursery grounds is shown in Table 6-4.

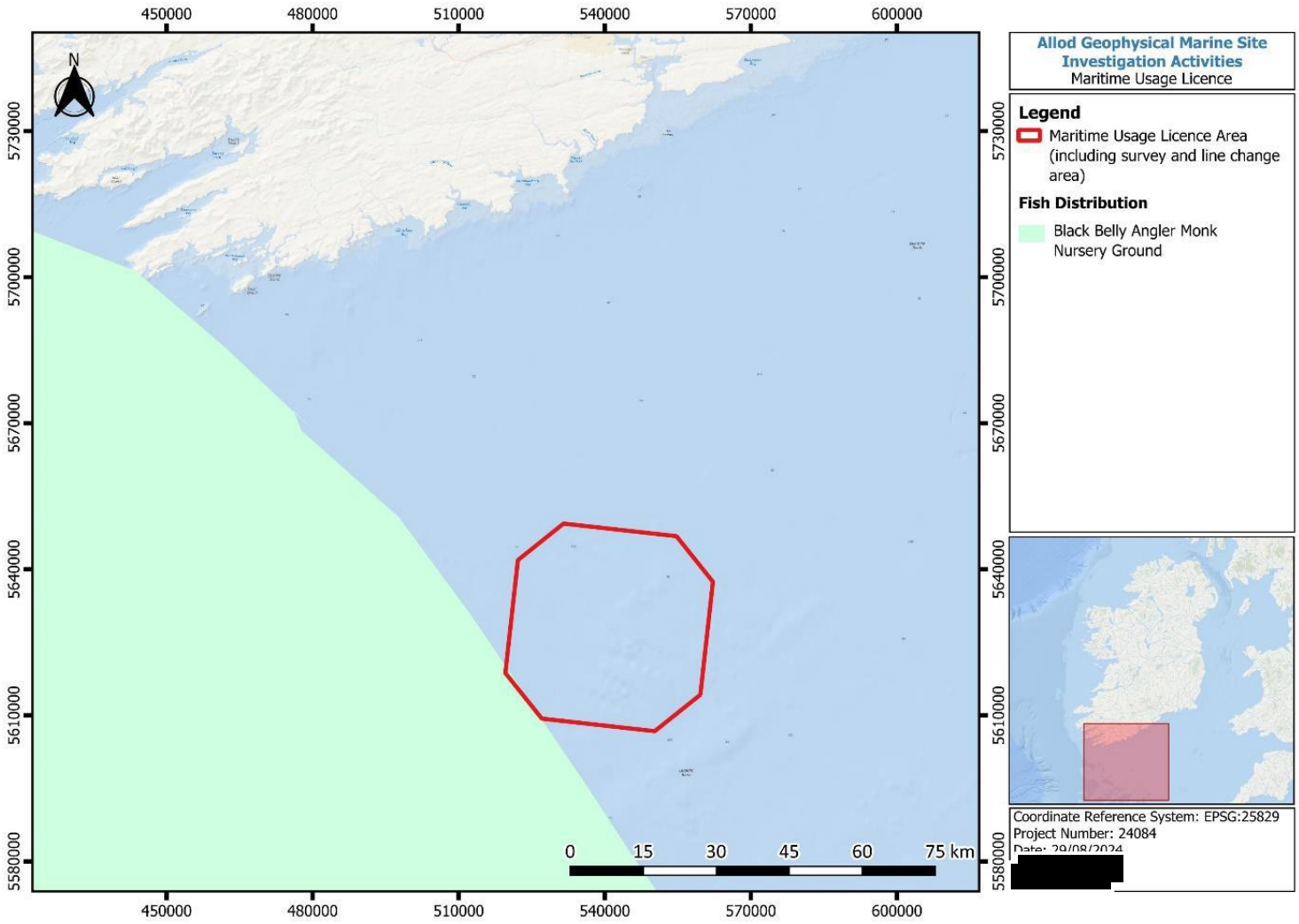

Figure 6-5: Black Belly Angler Monk Nursery Ground

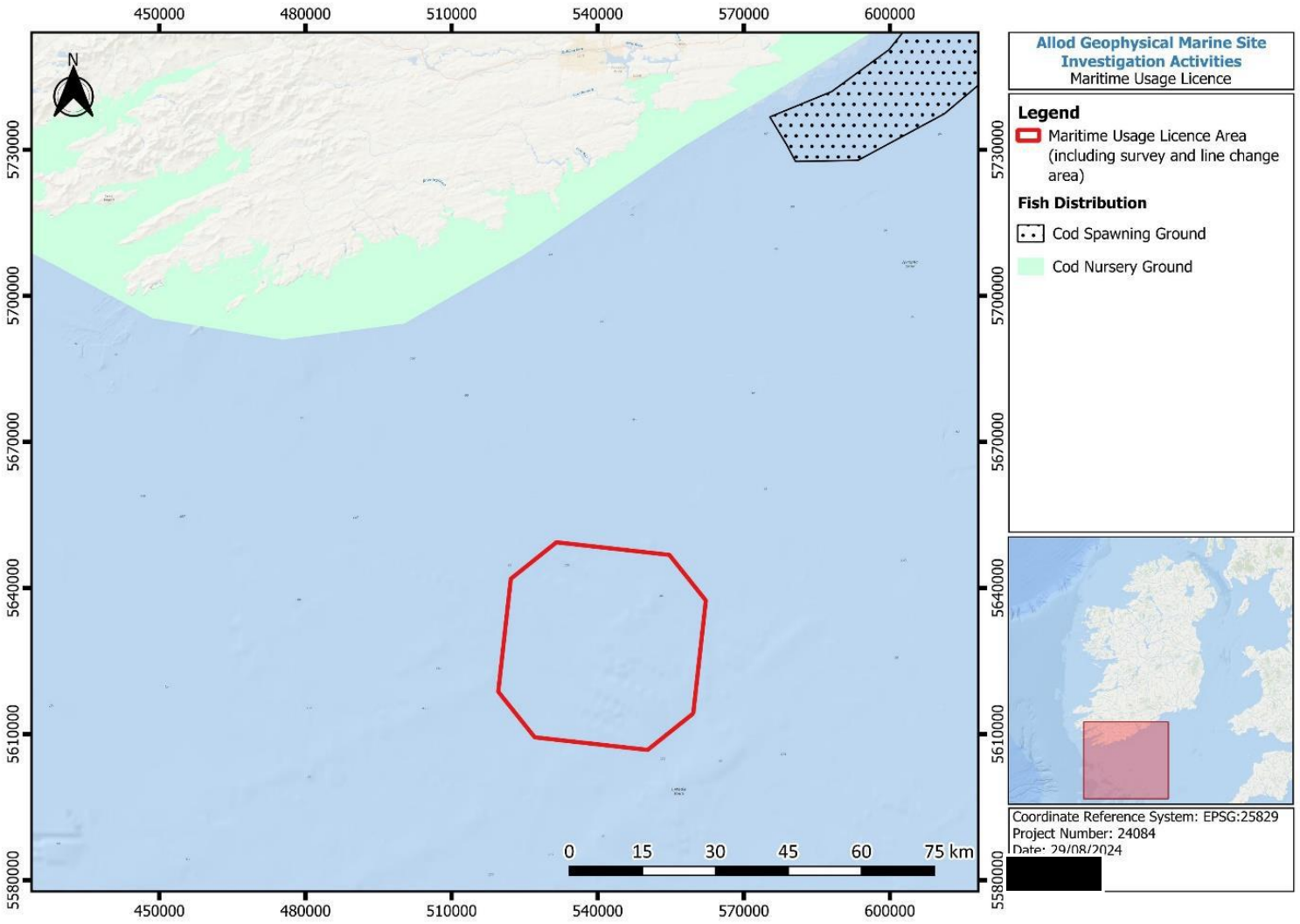

Figure 6-6: Cod Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

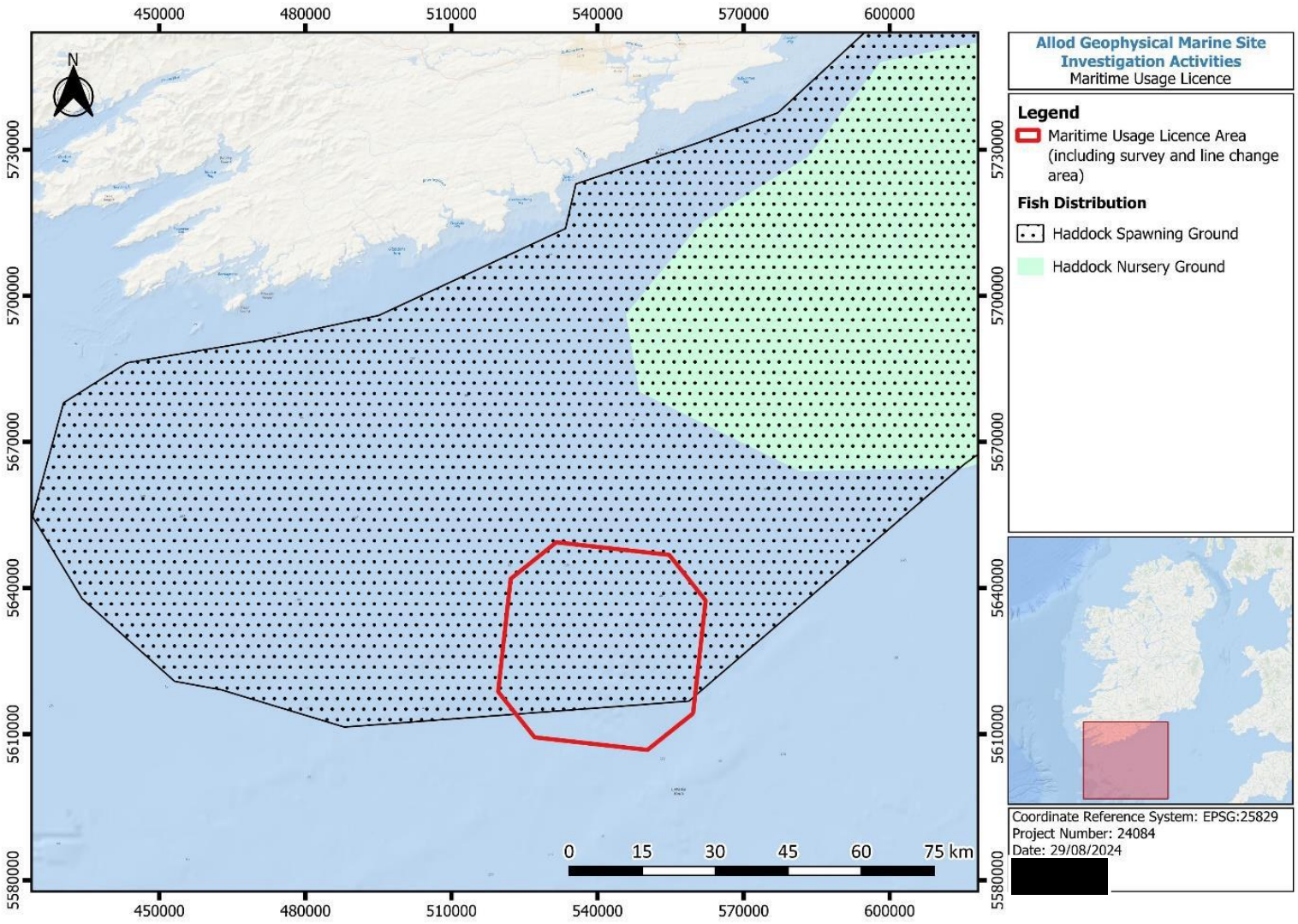

Figure 6-7: Haddock Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

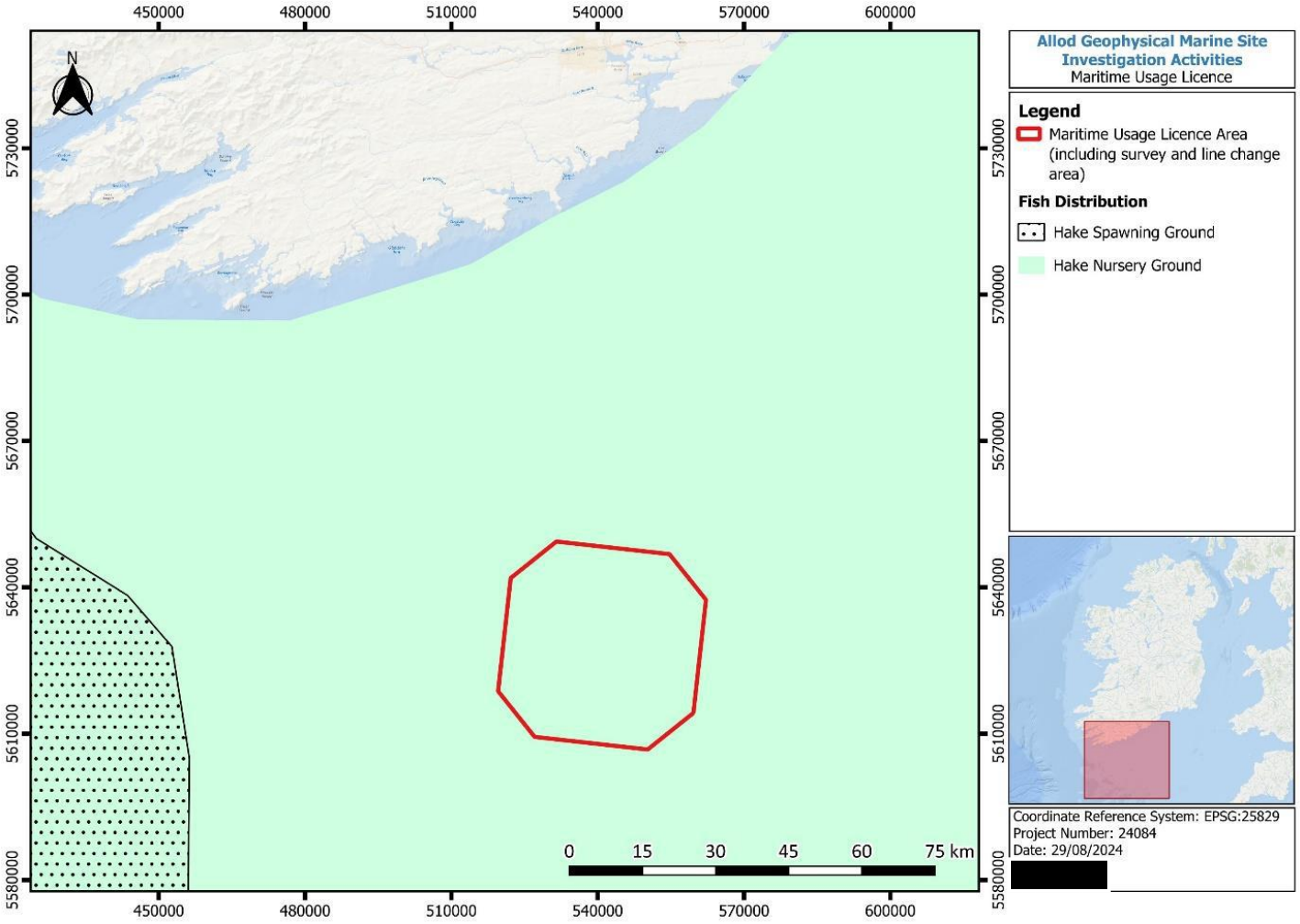

Figure 6-8: Hake Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

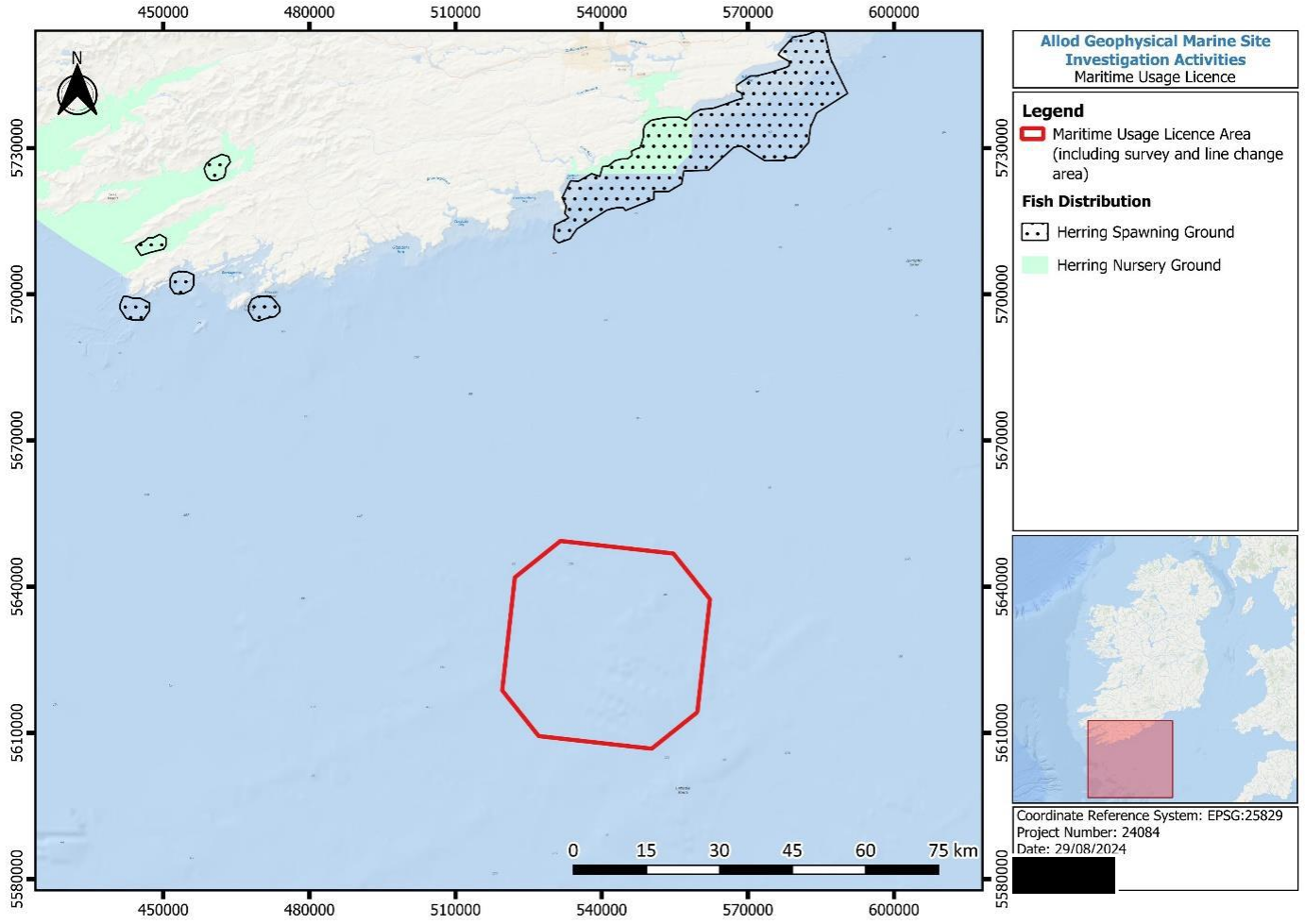

Figure 6-9: Herring Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

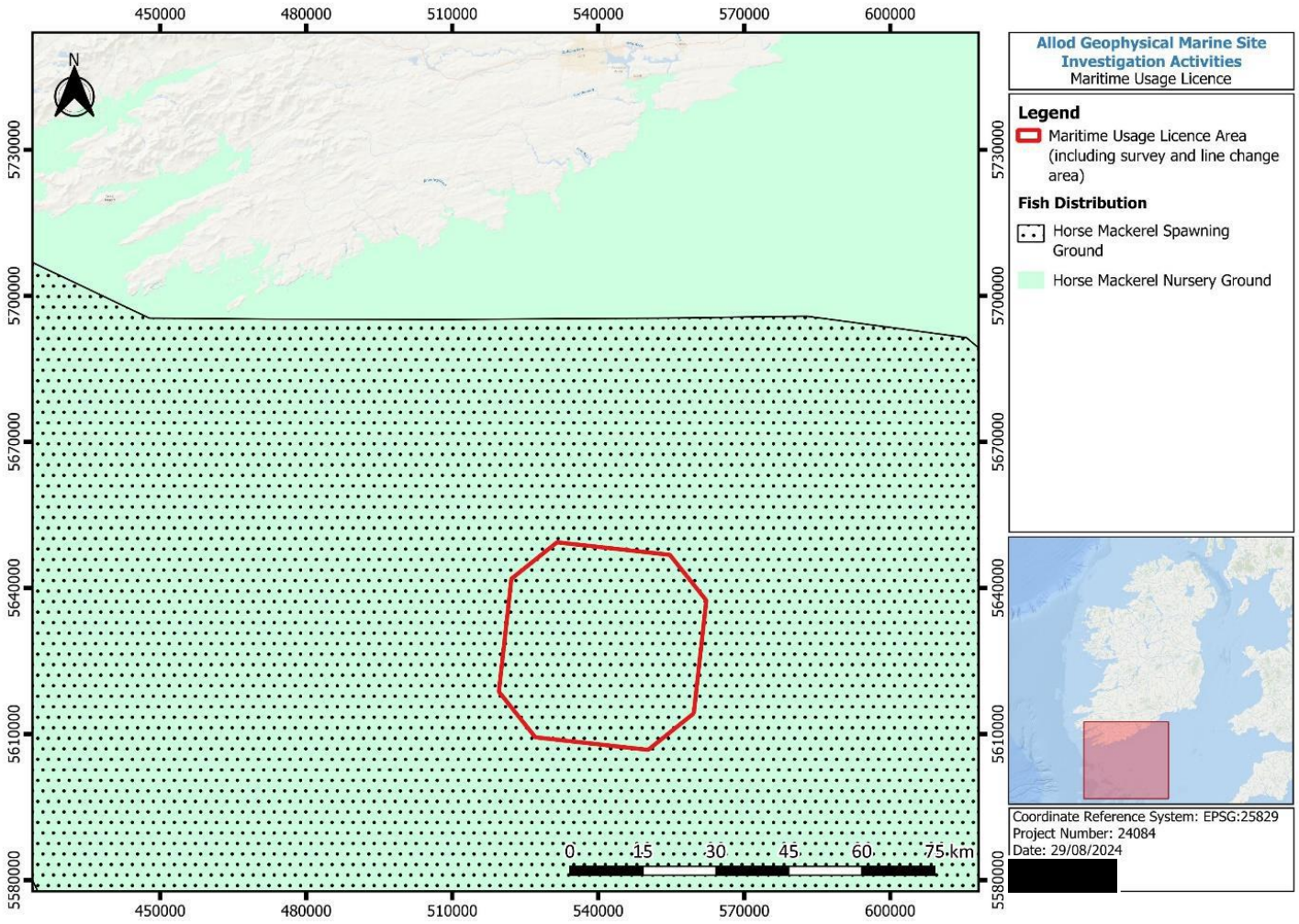

Figure 6-10: Horse Mackerel Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

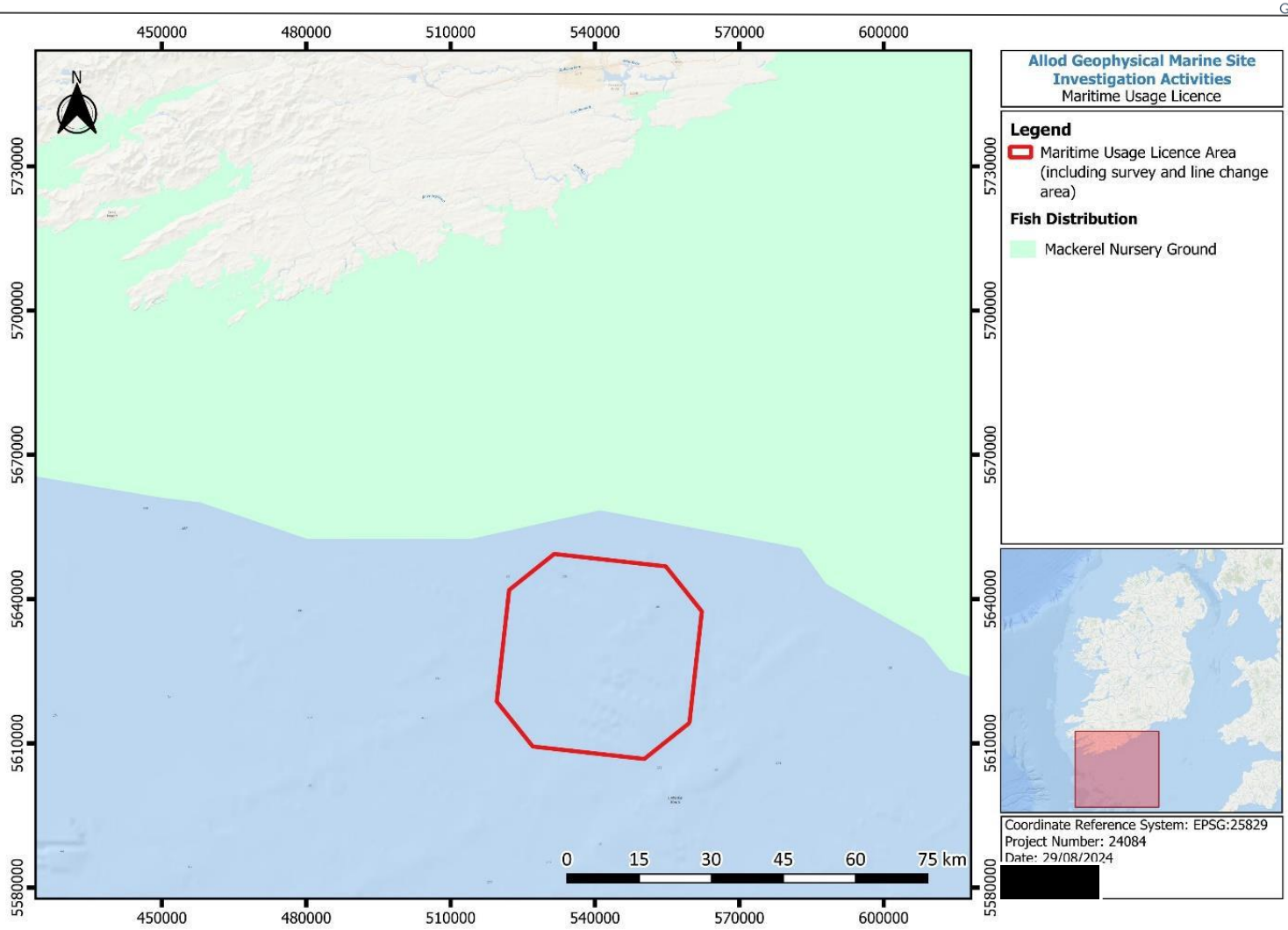

Figure 6-11: Mackerel Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

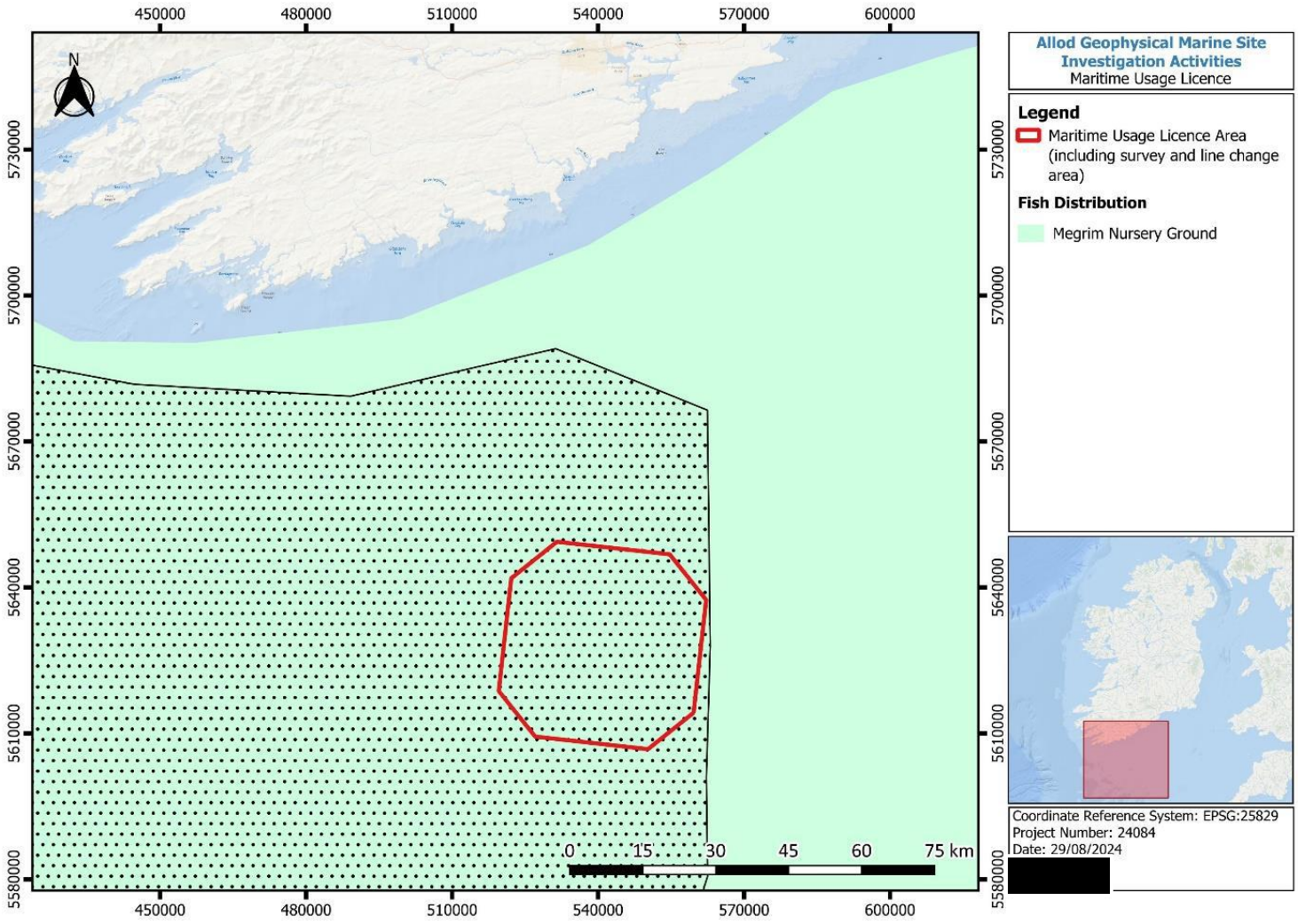

Figure 6-12: Megrim Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

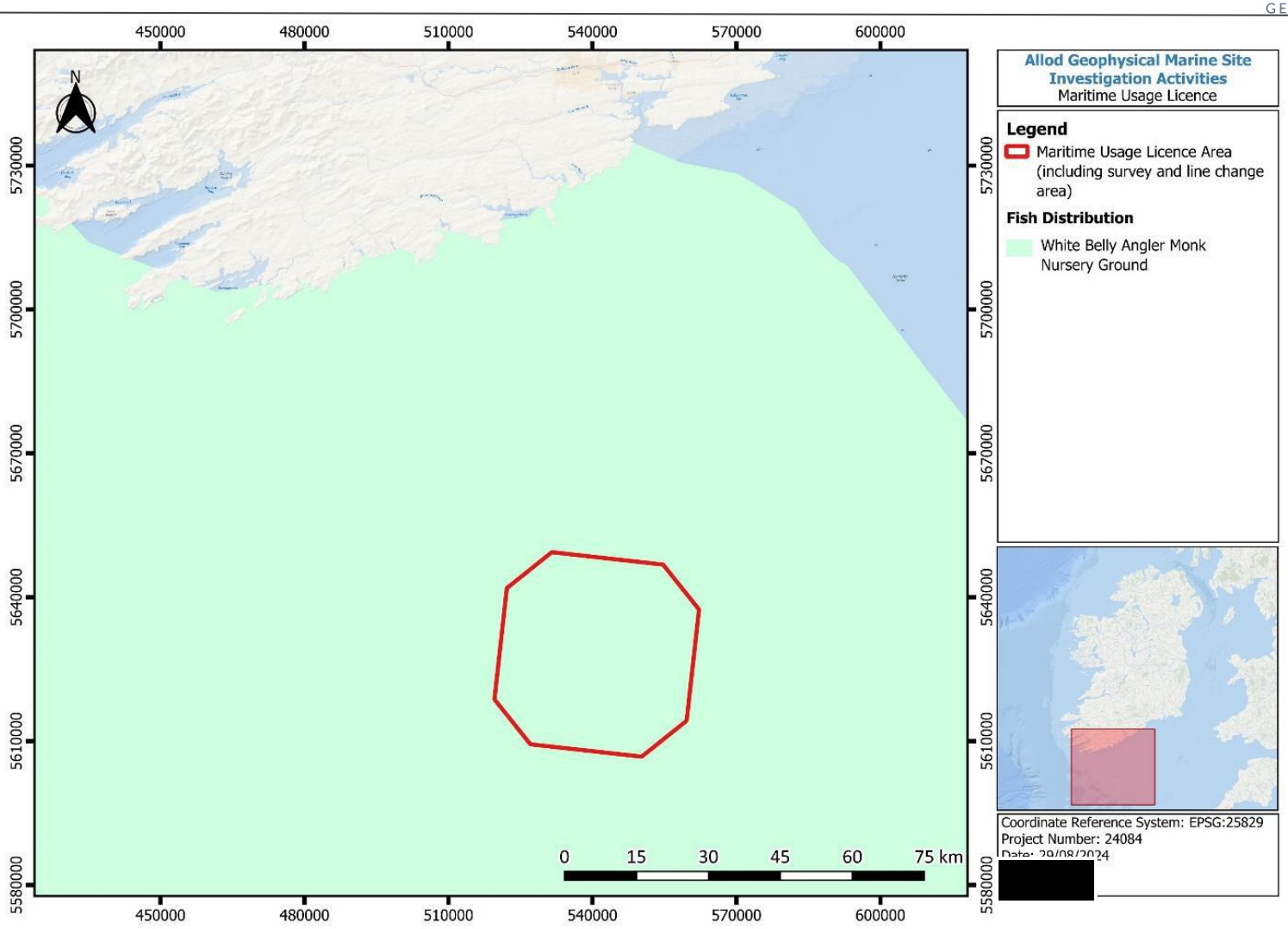

Figure 6-13: White Belly Angler Monk Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

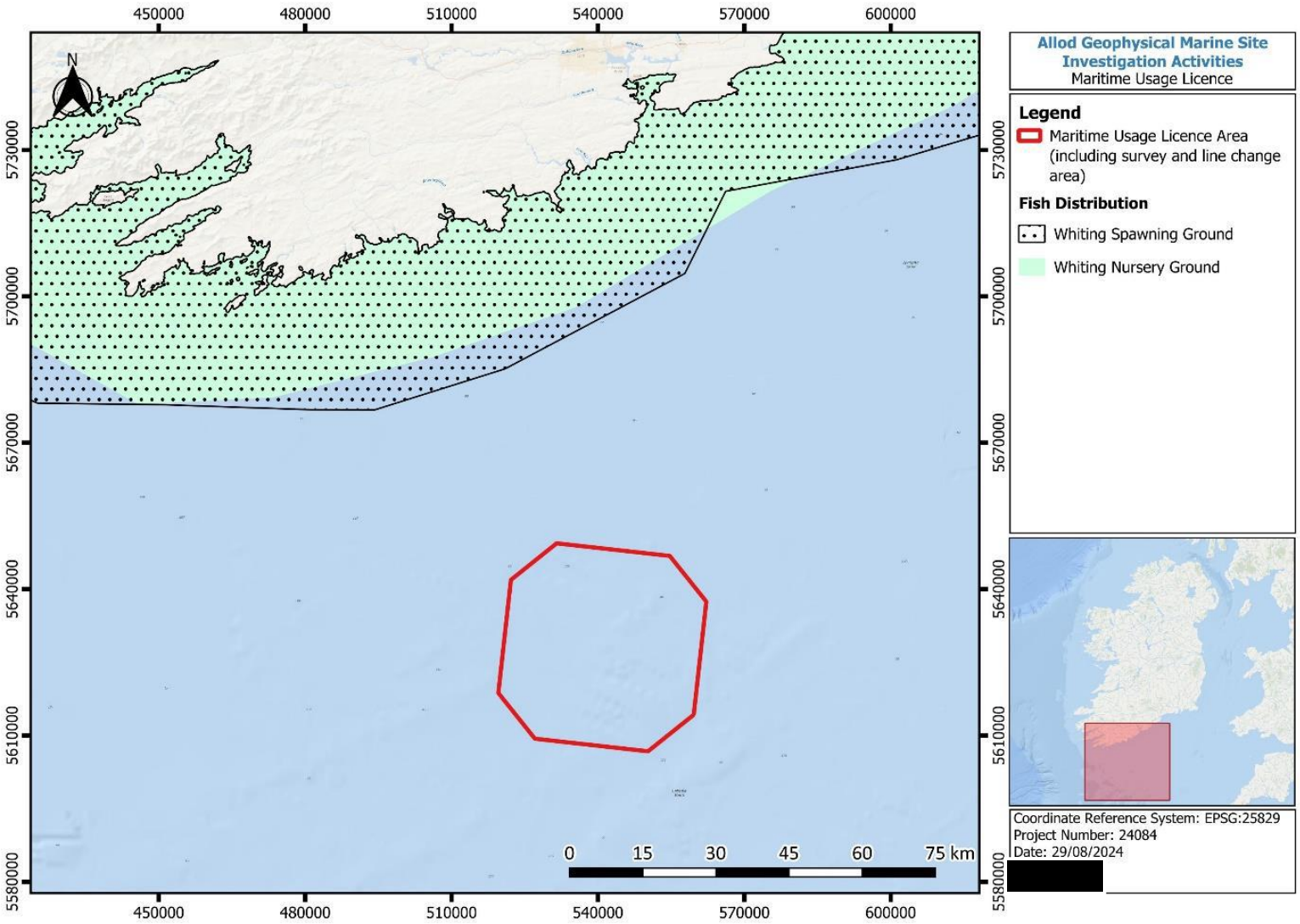

Figure 6-14: Whiting Spawning and Nursery Grounds (Ireland's Marine Atlas, 2021a)

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

Species	Nursery Area	Spawning Area
Black Belly Angler Monk	✓	X
Cod	X	X
Haddock	X	✓
Hake	✓	X
Herring	X	X
Horse Mackerel	✓	✓
Mackerel	X	X
Megrim	✓	✓
White Belly Angler Monk	✓	X
Whiting	X	X

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

Potential impacts to benthic communities are considered in Section 6.4.1.2.

6.5 Commercial Fisheries and Aquaculture

6.5.1 Data Availability

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 (UWTV) 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)

6.5.2 FISHING ACTIVITY

Ireland's Marine Atlas (Ireland's Marine Atlas, 2021) indicates that beam trawls, bottom otter trawls, pelagic trawls and seines areas overlap with the Maritime Usage 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 the data is available from Ireland's Marine Atlas) are presented in the figures below. The Licence Area overlaps with the *Nephrops norvegicus* Functional units 19 and 2021, although most of the commercial fishing activity in the area is focussed on bottom otter trawling for *Nephrops* (Figure 6-20).

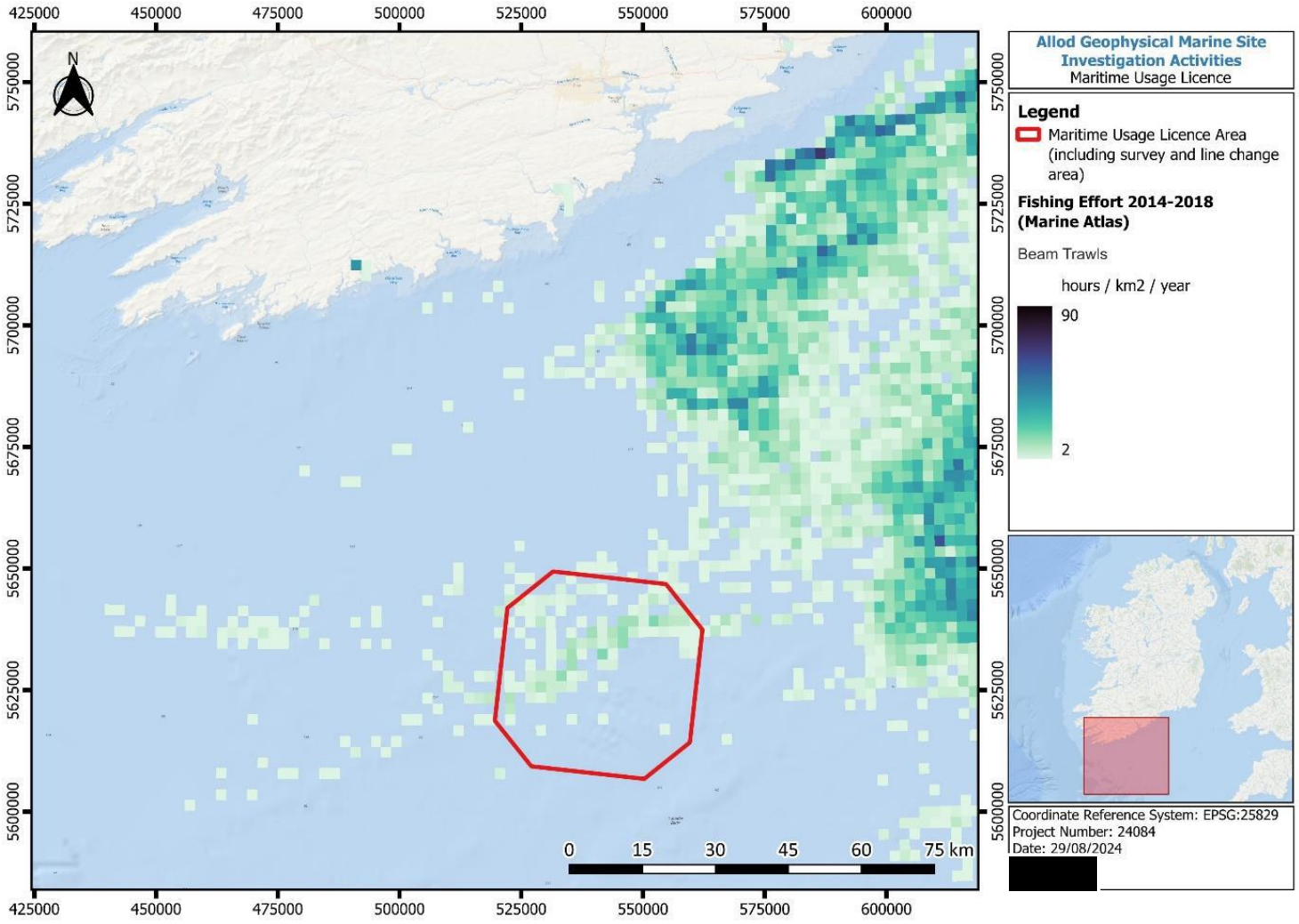

Figure 6-15: Beam Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)

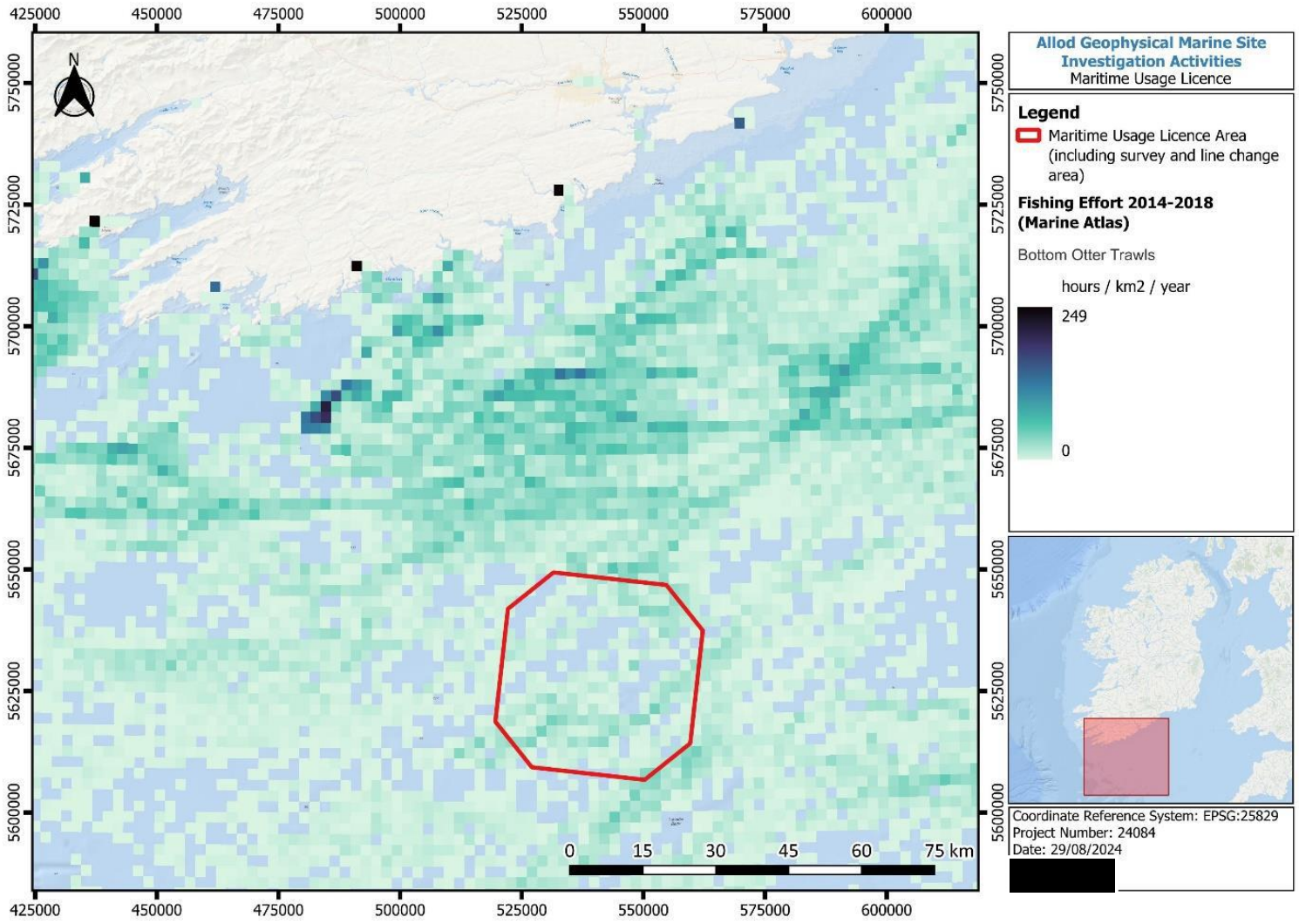

Figure 6-16: Bottom Otter Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)

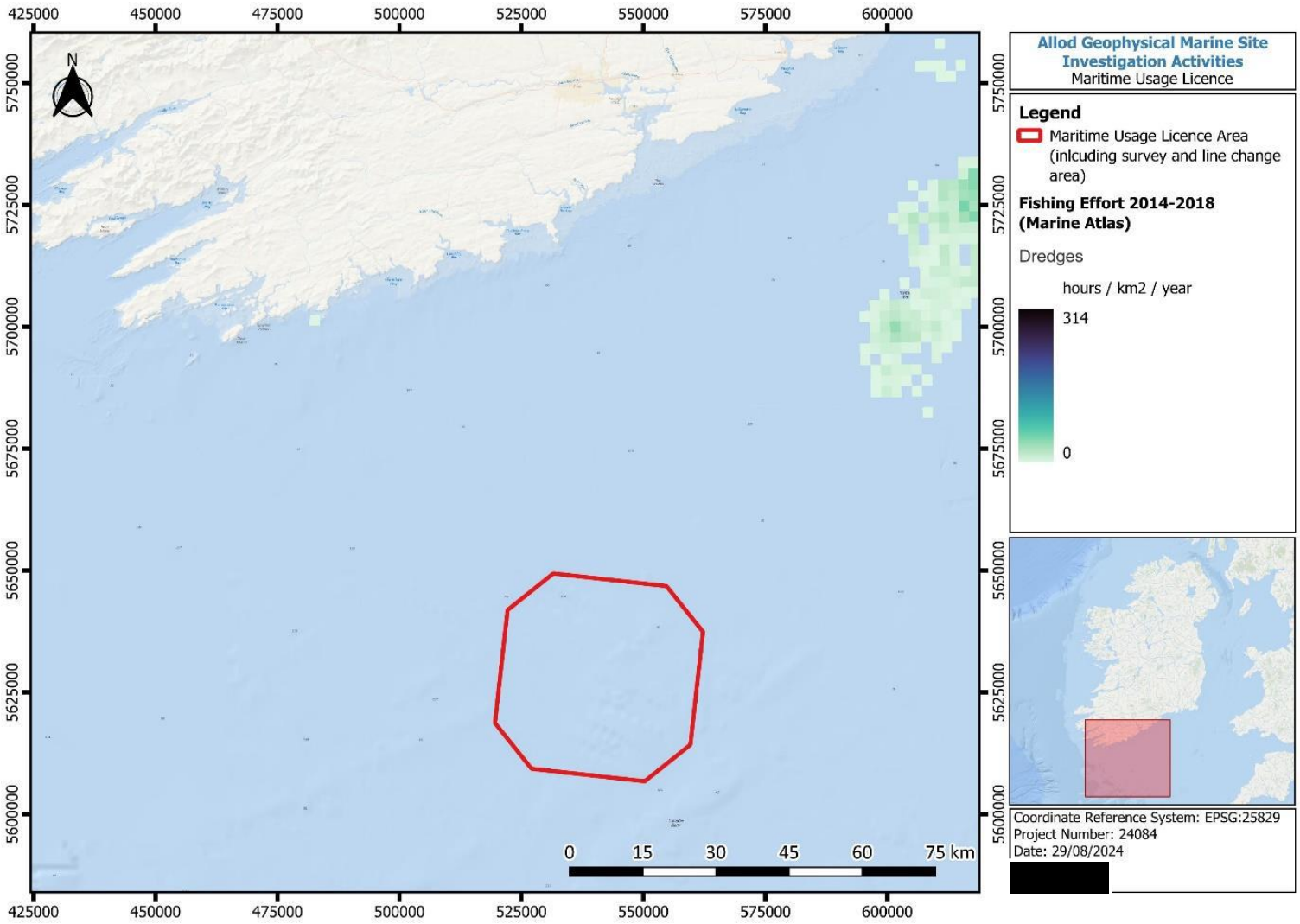

Figure 6-17: Dredge Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)

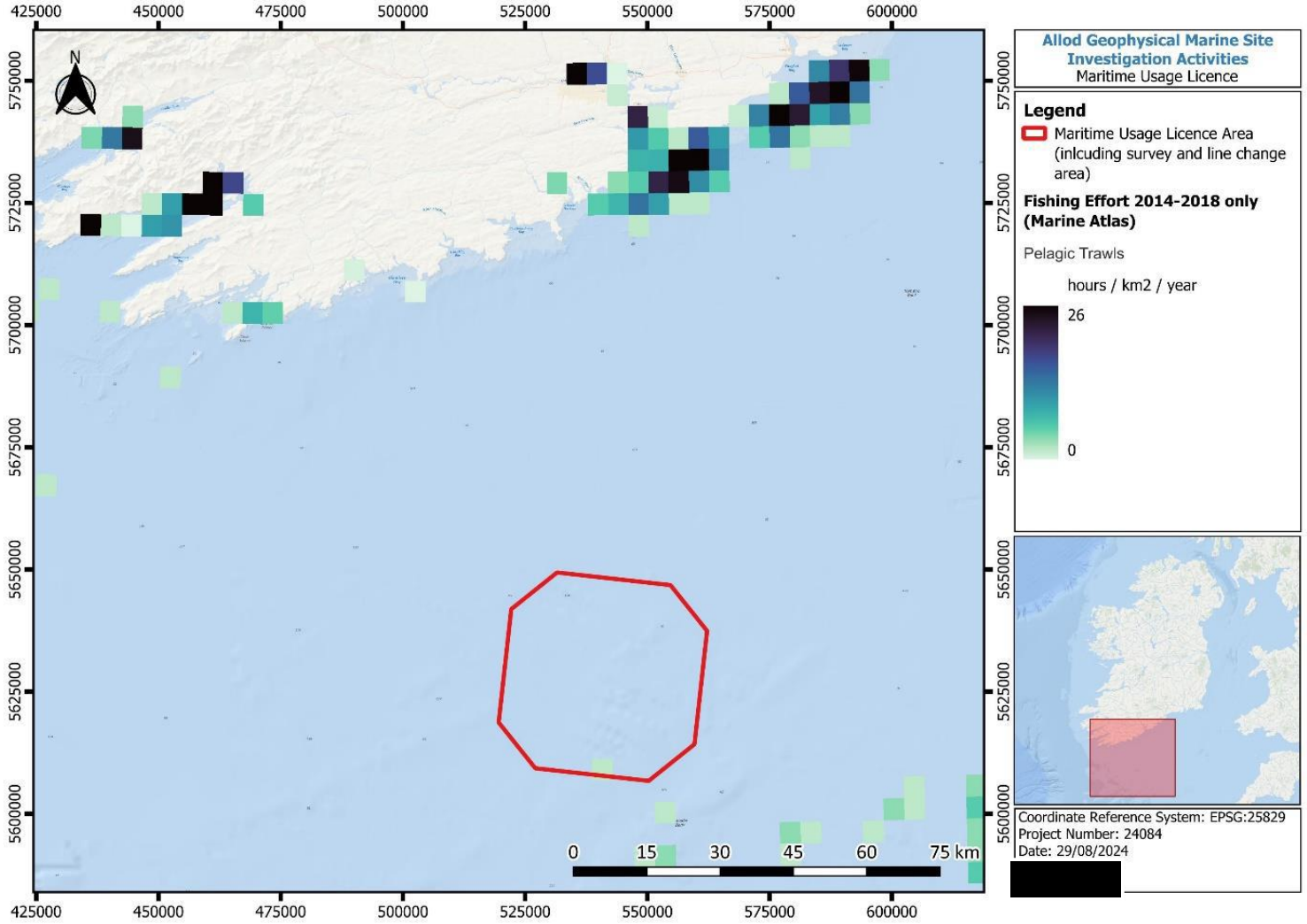

Figure 6-18: Pelagic Trawls Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)

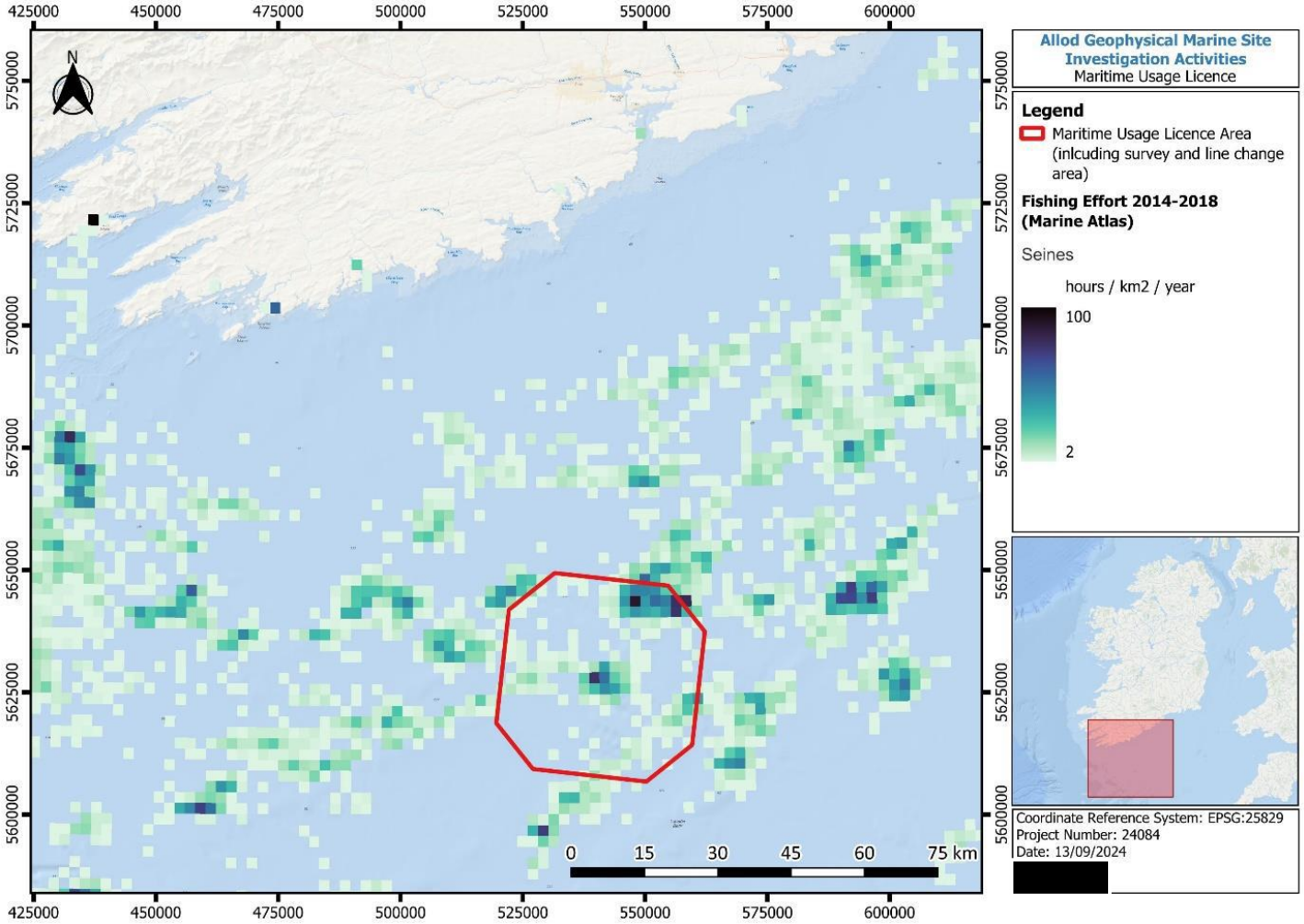

Figure 6-19: Seine Fishing Effort in the vicinity of the Licence Application Area in 2018 (Ireland's Marine Atlas, 2021)

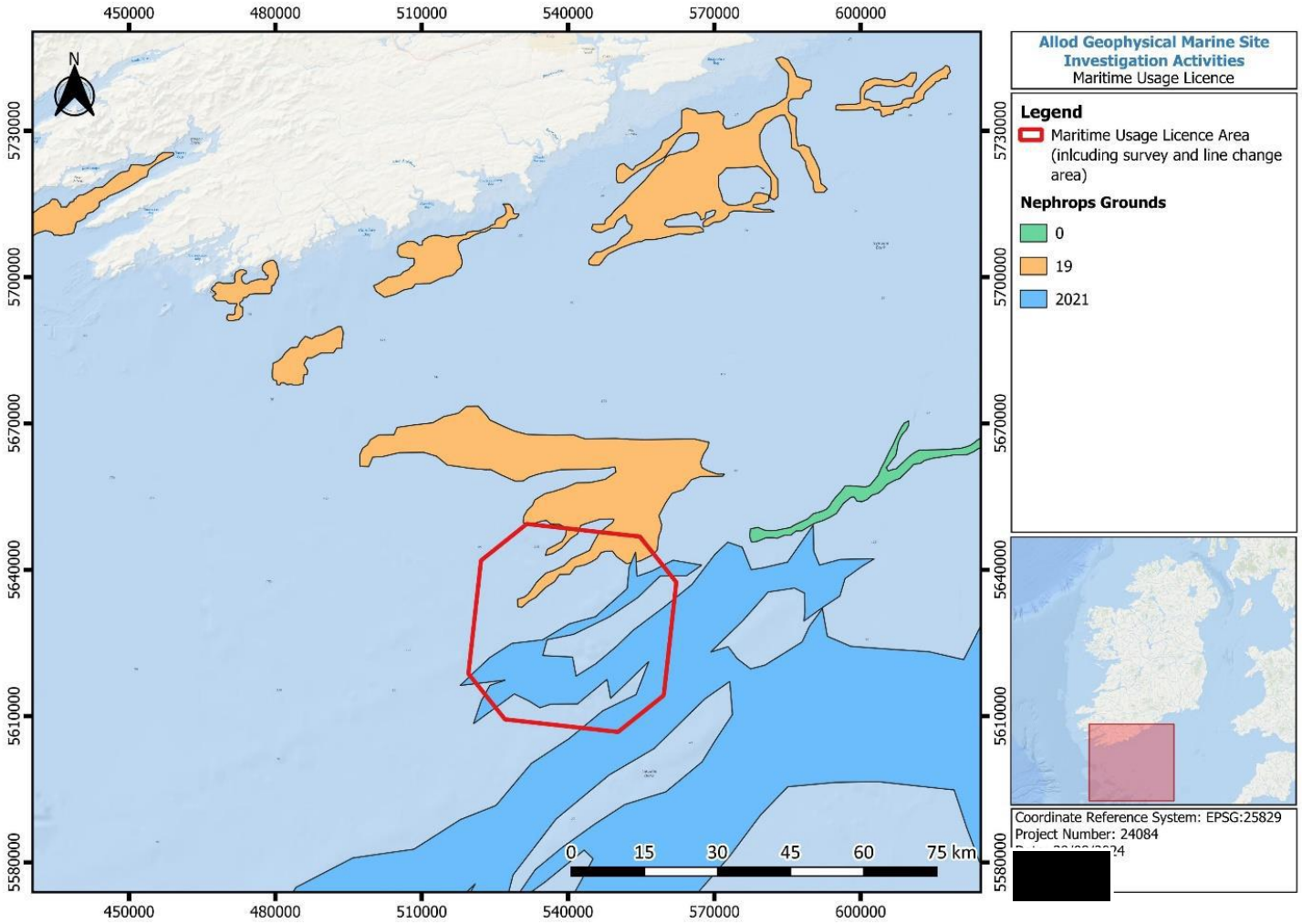

Figure 6-20: *Nephrops norvegicus* grounds in the vicinity of the Licence Area (Ireland's Marine Atlas, 2021)

6.5.2.1 POTENTIAL EFFECTS

Potential effects on commercial fisheries include the temporary disruption to fishing during the surveys and the potential for fishing gear entanglement with survey vessels and equipment. There is the potential for the geophysical SI activities to cause disturbance and displacement to fish populations.

The physical presence of the survey vessel and the site investigation activities may introduce vibration and noise to the underwater environment. Use of geophysical survey and positioning equipment may potentially cause disturbance to certain fish species such as hearing specialists, if the operating frequencies of the sound emitted falls within their hearing range. Therefore, likely or possible effects of underwater noise on Annex II fish species from these activities cannot be excluded.

6.5.2.2 ASSESSMENT OF POTENTIAL EFFECTS

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.. Given the short duration and temporary nature of the proposed site investigation activities, any potential effects on fishing is not expected to be significant.

Allod have also appointed an FLO which will continue to engage with local fishing communities to determine the full extent of fishing effort in the Licence Area, and to minimise any disruption to the activity. The FLO will be onboard the survey vessel throughout the duration of the surveys, the guard vessels will only communicate if a vessel is not answering via radio.

6.5.3 AQUACULTURE

As the Licence Area is 65km from the nearest landfall, the proposed SI activities are not expected to have any potential effects on aquaculture, which tends to be located in sheltered coastal areas. As seen below in Figure 6-21, the Licence Area is a significant distance from Shellfish Waters Directive Areas or Harmful Algal Bloom Inshore Shellfish Production Areas.

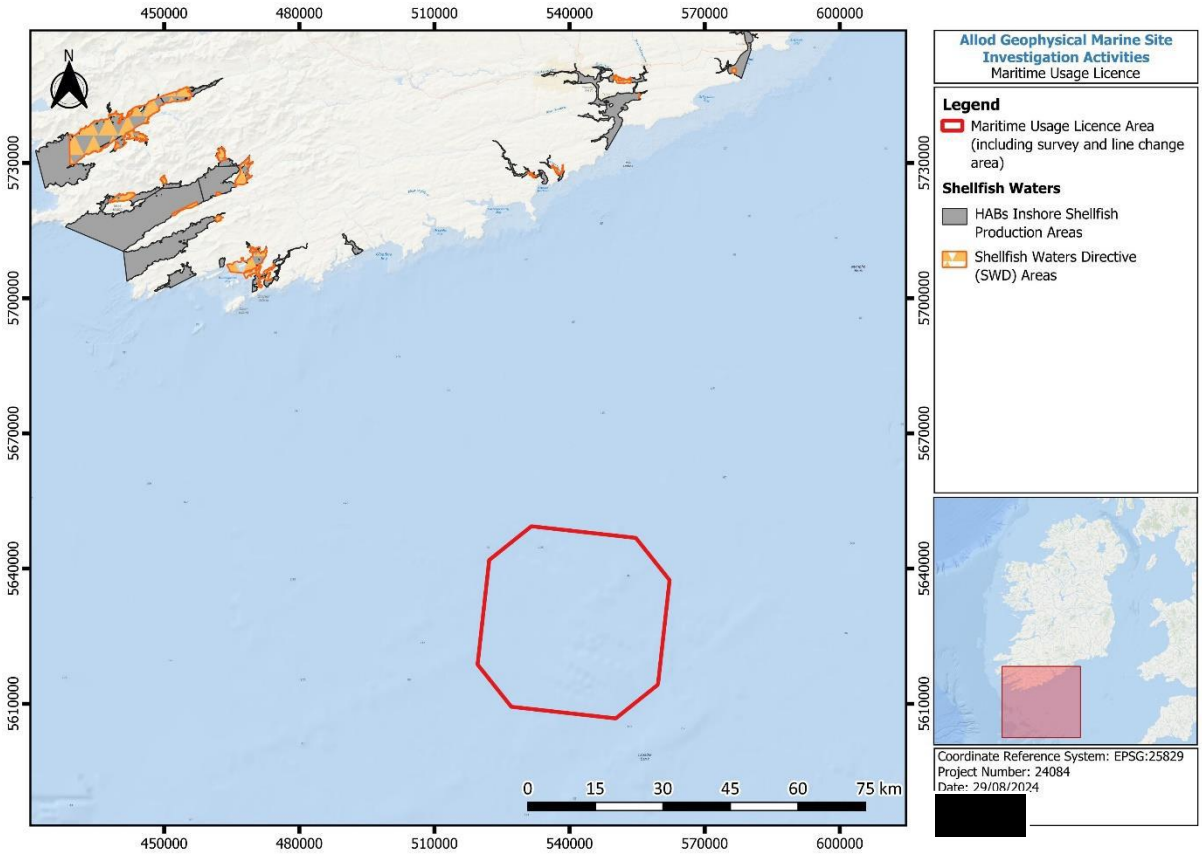

Figure 6-21: Shellfish Waters Directive (SWD) Areas and Harmful Algal Blooms Inshore Shellfish Production Areas (Ireland's Marine Atlas, 2021)

6.6 AIR QUALITY

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

6.7 NOISE & VIBRATION

Geophysical surveys (including vessels) in the marine environment are a potential source of noise and vibration therefore may have an impact on the marine environment. 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. The assessments carried out in the RAAIVS and SISAA concluded that although there is the potential for effects from underwater noise and vibration to occur for benthic communities and marine mammal species, the temporary nature and scale of the planning SI activities, and considering the proposed mitigations measures outlined below, the proposed SI activities will not offend the system of strict protection of cetaceans and marine turtles under Article 12 of the Habitats Directive. In conclusion, the occurrence of significant effects of noise and vibration on qualifying interests resulting from this project are deemed to be not likely to occur due to the mitigation measures proposed in Section 7 of this report.

6.8 LANDSCAPE AND SEASCAPE

The Licence Area is not subject to any designation intended to protect landscape quality. The visual disturbance caused by the SI activities will be limited to one survey vessel and two support vessels on site. Due to the site being located 65 km from the nearest landfall, it is not expected that the vessels will be visible from the nearest point onshore. No significant effects to landscape and seascape receptors are predicted to occur.

6.9 MARINE TRAFFIC

6.9.1 INTRODUCTION

The movement of vessels in Irish waters is tracked via Automatic Identification System (AIS) by the Irish Coastguard for the purpose of maritime transport safety and security. The use of AIS systems is governed by The European Communities (Vessel Traffic Monitoring and Information System) Regulations 2010 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

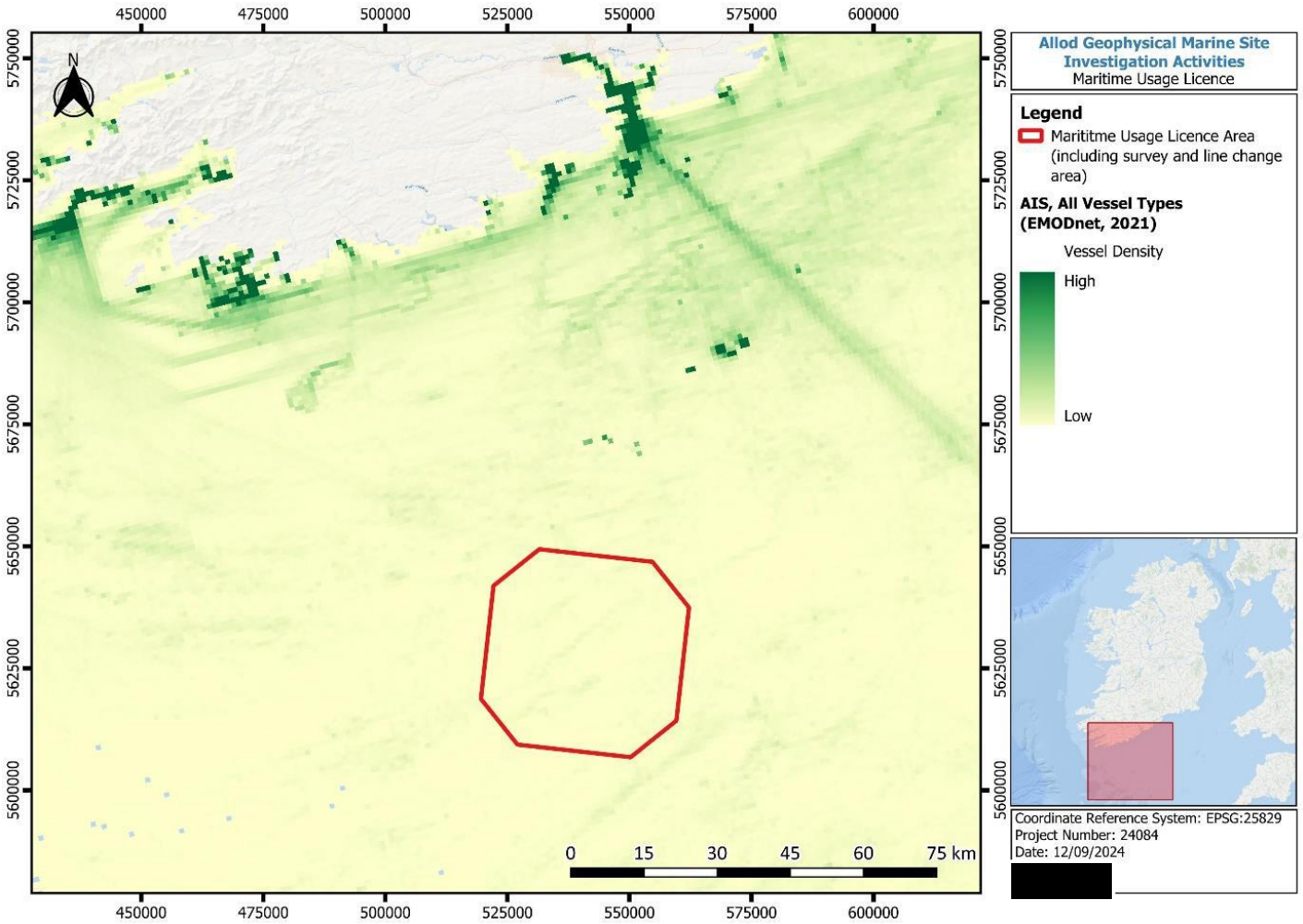

Figure 6-22 All Vessel Density 2021 data (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)

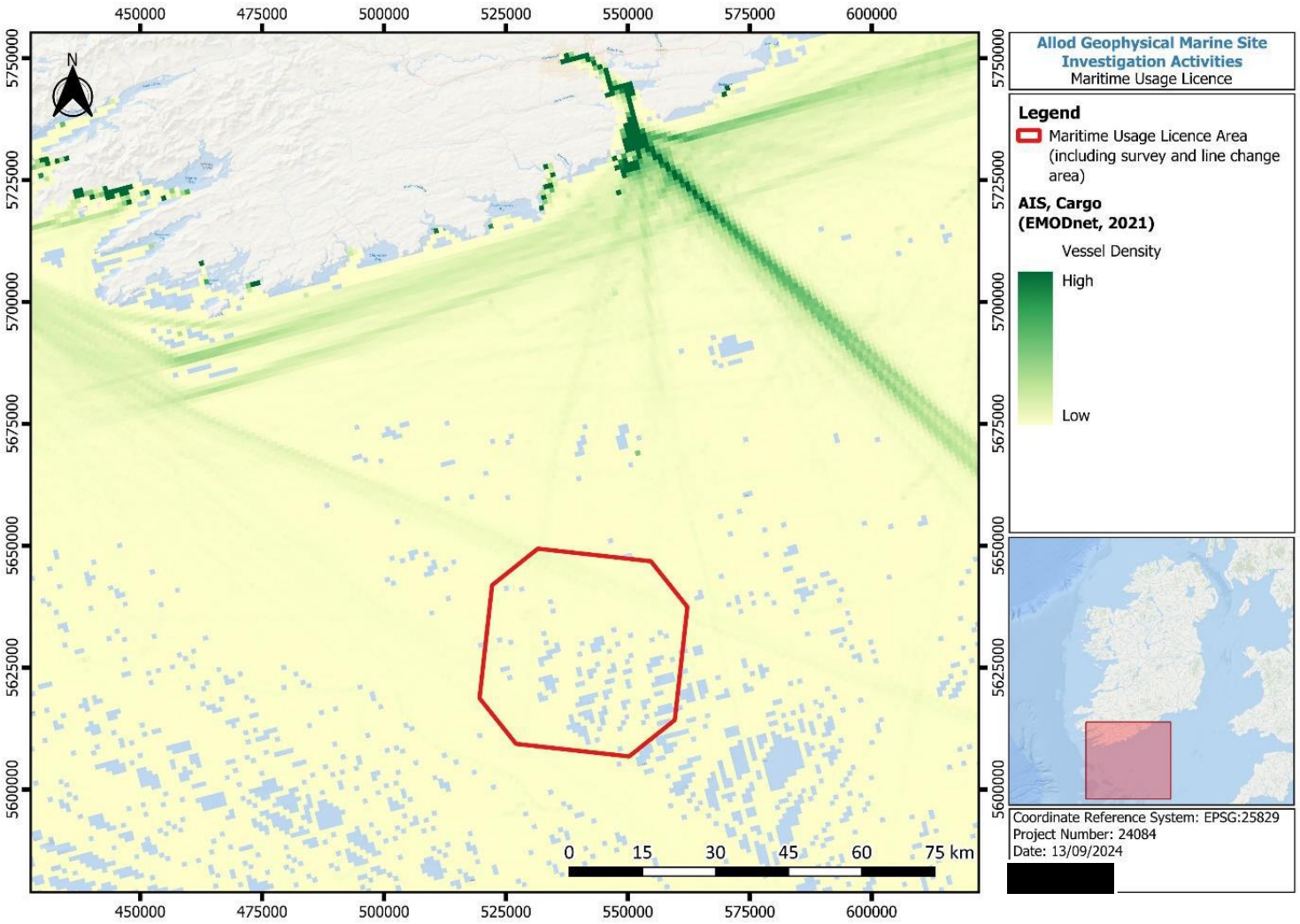

Figure 6-23: AIS Cargo dataset (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)

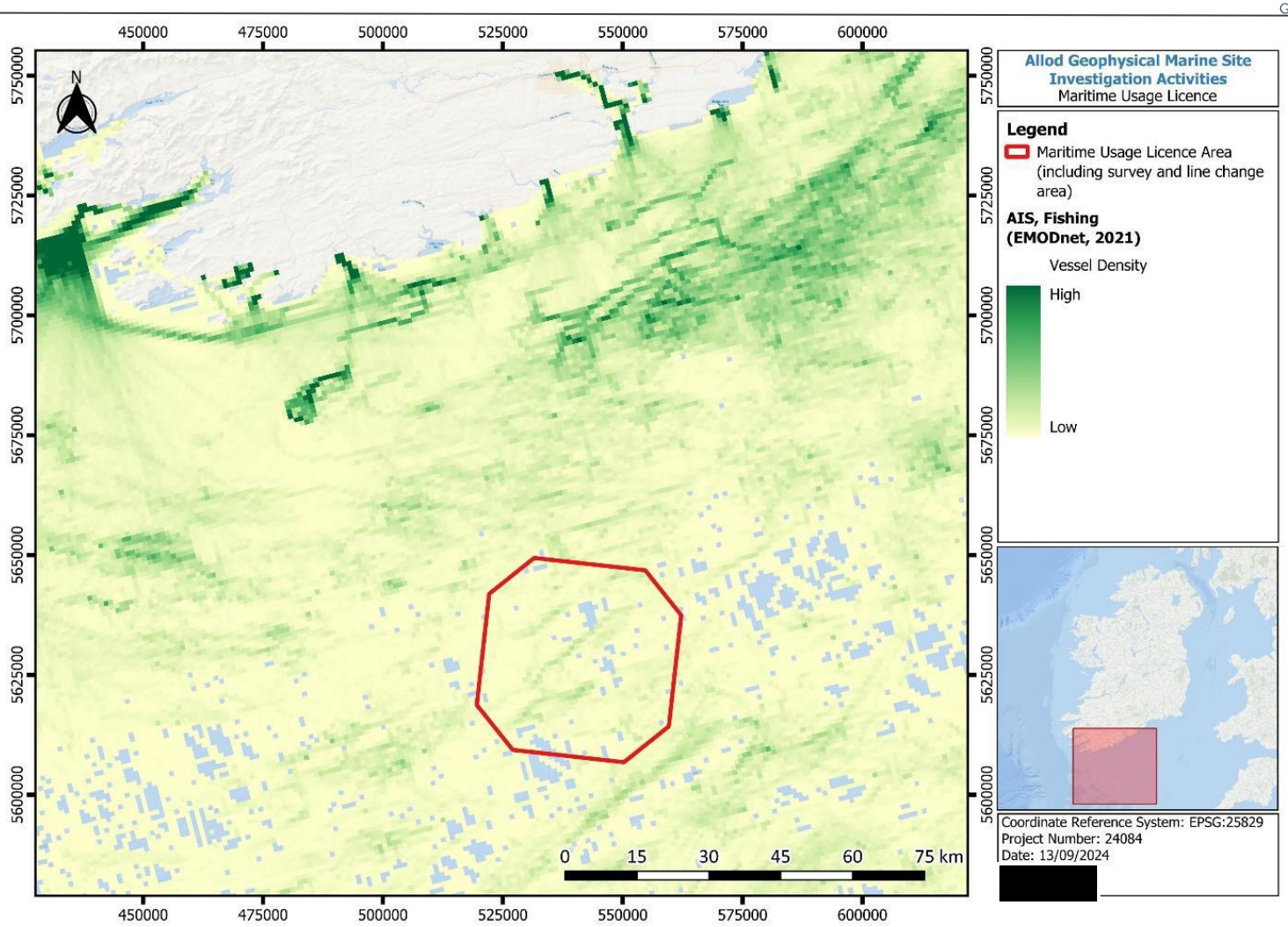

Figure 6-24: AIS Fishing dataset (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)

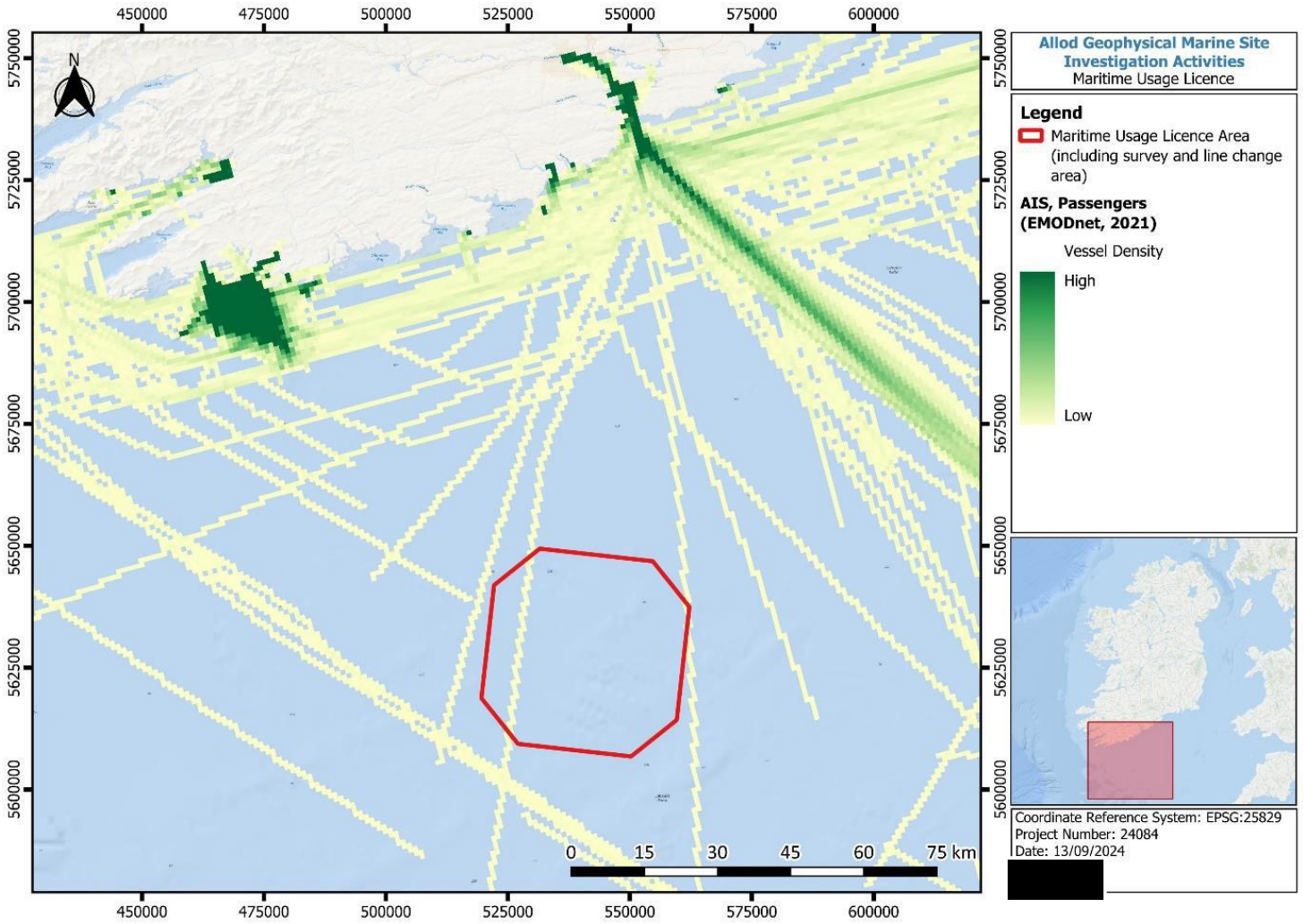

Figure 6-25: AIS Passenger Vessel dataset (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)

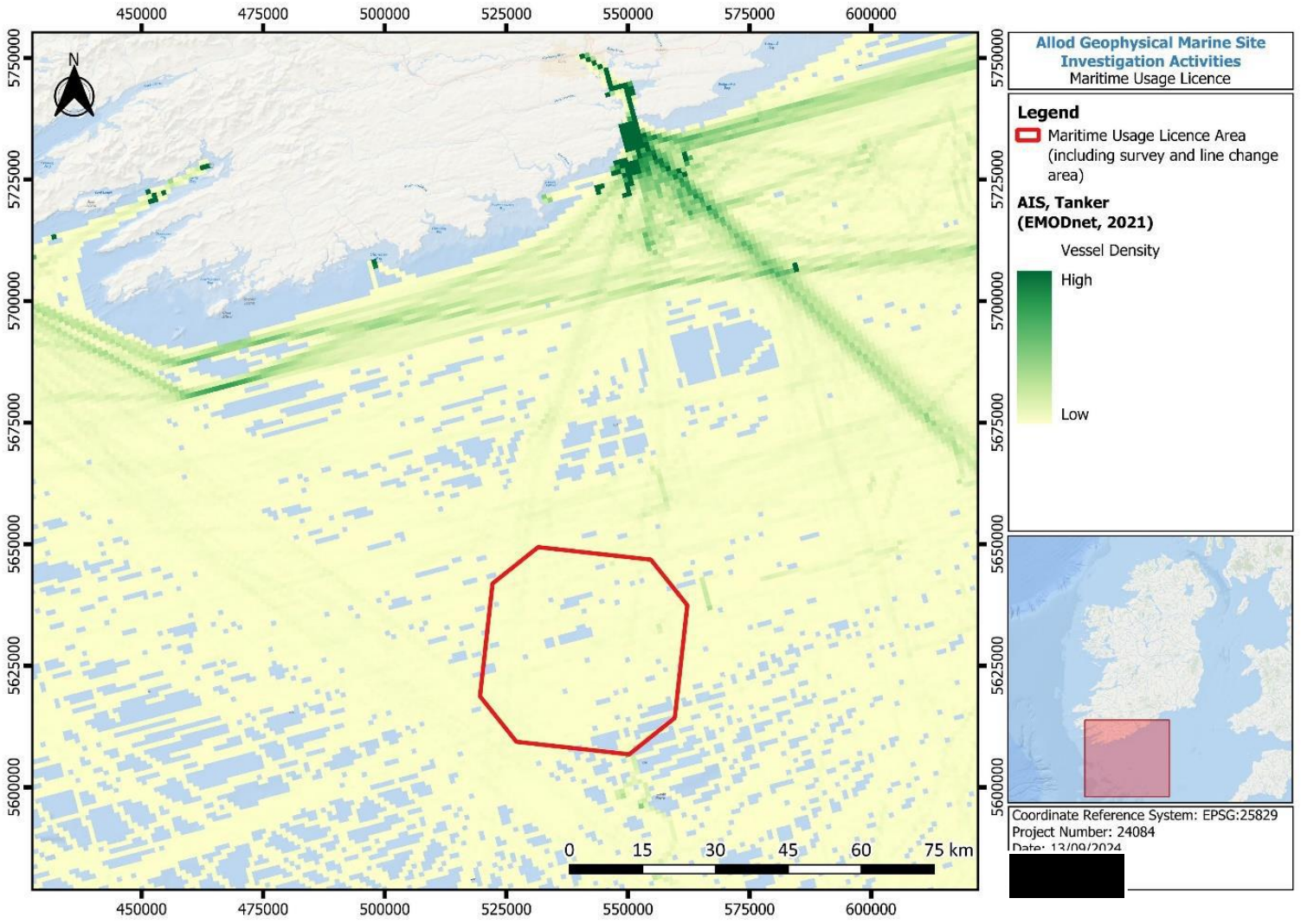

Figure 6-26: AIS Tanker Vessel dataset (hours per square km per year) within and surrounding the Licence Area (EMODnet, 2022)

The main navigation routes within the proposed area are associated with harbour traffic in and out of Cork harbour, which is the busiest port in close proximity to the Licence Area. As seen in Figure 6-22, there is very little overall vessel traffic that occurs within the Licence Area. As seen in Figures 6.22-6.26, a small amount of AIS Cargo, AIS Fishing, AIS Passenger and AIS Tanker Vessel traffic occurs within the Licence Area.

6.9.3 Potential Effects

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

6.9.4 Assessment of Potential Effects

It is expected that one survey vessel and two support vessels will be used to carry out the surveys. They will typically be travelling at slow speeds (< 5 knots) and/or stationary (i.e. when placing and recollecting the ocean bottom nodes, if deployed).

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 SI activities, the survey vessel will be accompanied by two guard vessels who will patrol the waters around the survey vessel to mitigate against collision with other marine traffic.

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.

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, daily radio warnings, appropriate navigation lights and liaison with port authorities to agree the timing of works in the area and to agree a communication protocol.

The proposed site investigation activities duration will be kept to the minimum possible. As the surveys and disruption will be temporary and short term, the effect on commercial shipping is considered not to be significant.

6.10 Archaeology and Cultural Heritage

Shipwreck data available through both the INFOMAR project and National Monuments Database is shown in Figure 6-27.

INFOMAR is a joint venture between the Geological Survey of Ireland and the Marine Institute, with one of the deliverables being details of shipwrecks in Irish waters. The INFOMAR shipwreck data shows 4 no. confirmed shipwrecks within the Licence Area.

The National Monuments Data shipwreck data shows 7 no. 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 the recent survey data associated with them.

If deployed, Ocean Bottom Node deployment locations will be placed at least 250 m from any wrecks or other potential cultural heritage features in the survey area, though given the distance from shore no cultural heritage features beyond wrecks are anticipated.

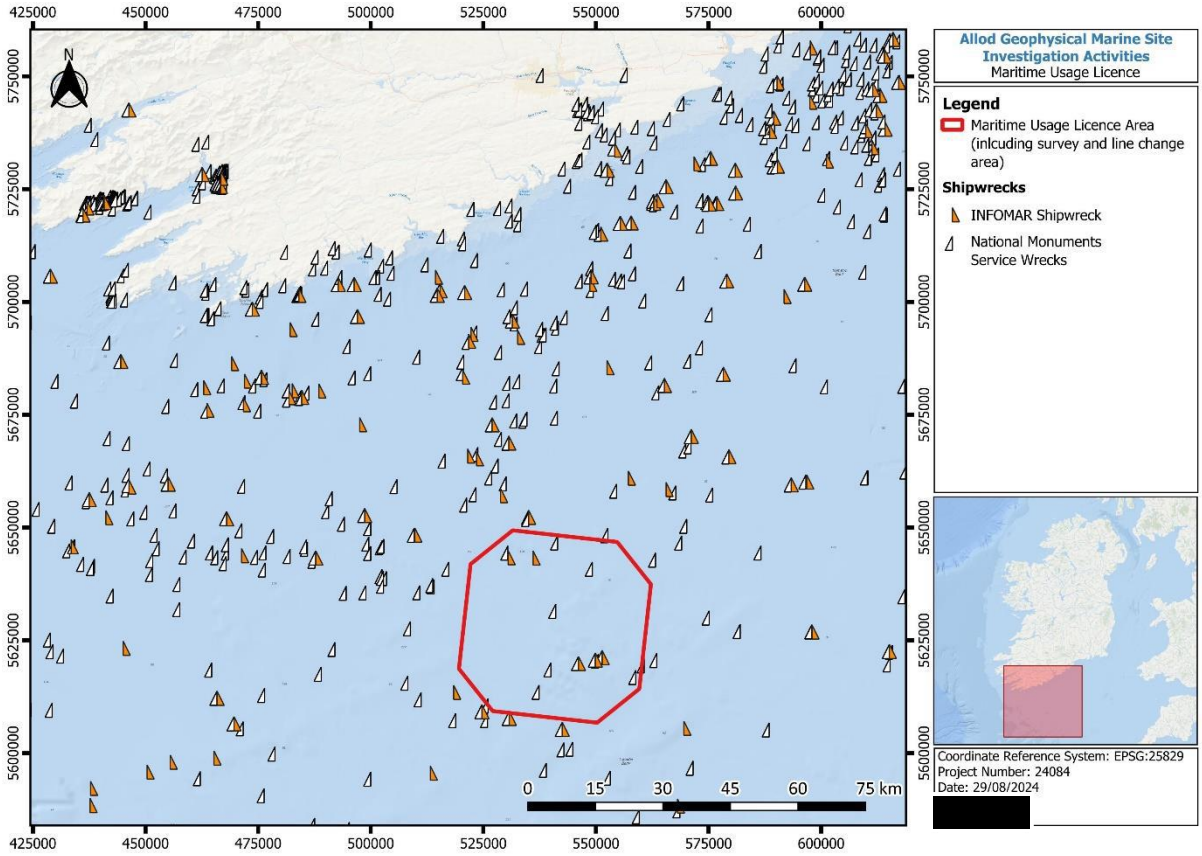

Figure 6-27: National Monument Service (NMS) (DAHG, 2020) and INFOMAR (2020) shipwreck data

6.11 POPULATION AND HUMAN HEALTH

The Allód project wishes to ensure individuals and communities do not experience significant diminution in their quality of life from either direct or indirect effects arising from the proposed site investigation activities.

All of the 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 Labour Organization) concerning maritime safety and pollution prevention. By ensuring these policies and regulations are implemented throughout the duration of the licence, it can be ensured that there will be no impact nor 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 any 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 mitigation measures will ensure that there will be no impact nor any significant negative effects on human health and/or on health and safety during the proposed survey activities. Appropriate actions will be taken to avoid risk of causing negative effects to human health such as those mentioned below in Section 6.12.

6.11.1 Tourism and Recreation

As the proposed survey area is 65 km from the nearest landfall, there is no known tourism and recreational activities that take place within or nearby the proposed survey area. Based on this, it can be concluded that the proposed investigative activities will not have any significant effects on tourism or recreation.

An FLO has been 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 as well as daily radio navigation warnings. No specific exclusion zone will be sought; however, vessels will be asked to maintain a safe distance in keeping with accepted maritime safety practices.

Survey activities will be kept to the minimum time period possible and will be temporary in nature.

6.12 Major Accidents and Disasters

The proposed site investigative activities are not anticipated to exacerbate natural disasters such as earthquakes, subsidence, landslides, erosion or flooding. Any 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, radio warnings, 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 surveys will be conducted over a relatively short period of time, once the vessels enter the survey area, as the surveys will likely be carried out using just one vessel and two support vessels, little-to-no contribution towards climate change will arise as a result of these investigative activities.

6.14 WASTE

Any waste which is generated as a result of this project will be segregated on board and be disposed of appropriately on land. There will be no planned release of potentially harmful substances or waste from the survey vessel. Strict maritime regulations, normal vessel operating standards and precautions, compliant with all International Maritime Law and National Maritime Legislation, will ensure that the risk of a release is kept to a minimum and no significant effects are predicted to occur during the duration of this maritime usage licence.

Any vessel used as part of these investigative surveys will be fully MARPOL compliant and fully certified by the Maritime Safety Office (if required). Therefore, it is considered unlikely 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

The location of infrastructure underlying the Licence Area was determined using the Irish Marine Atlas and the Foreshore Licence database, The review process indicated that the Licence Area overlaps with the Tata TGN-Atlantic subsea cables.

As the proposed geophysical site investigations will not be damaging to the seabed, it is not expected that any potential damage to material assets resulting from these SI activities will occur. If deployed, Ocean Bottom Node deployment locations will be placed at least 250 m from subsea cables in the survey area. It is anticipated that a magnetometer will be deployed for the purposes of defining the precise position of the Tata TGN-Atlantic subsea cables as part of the project scope.

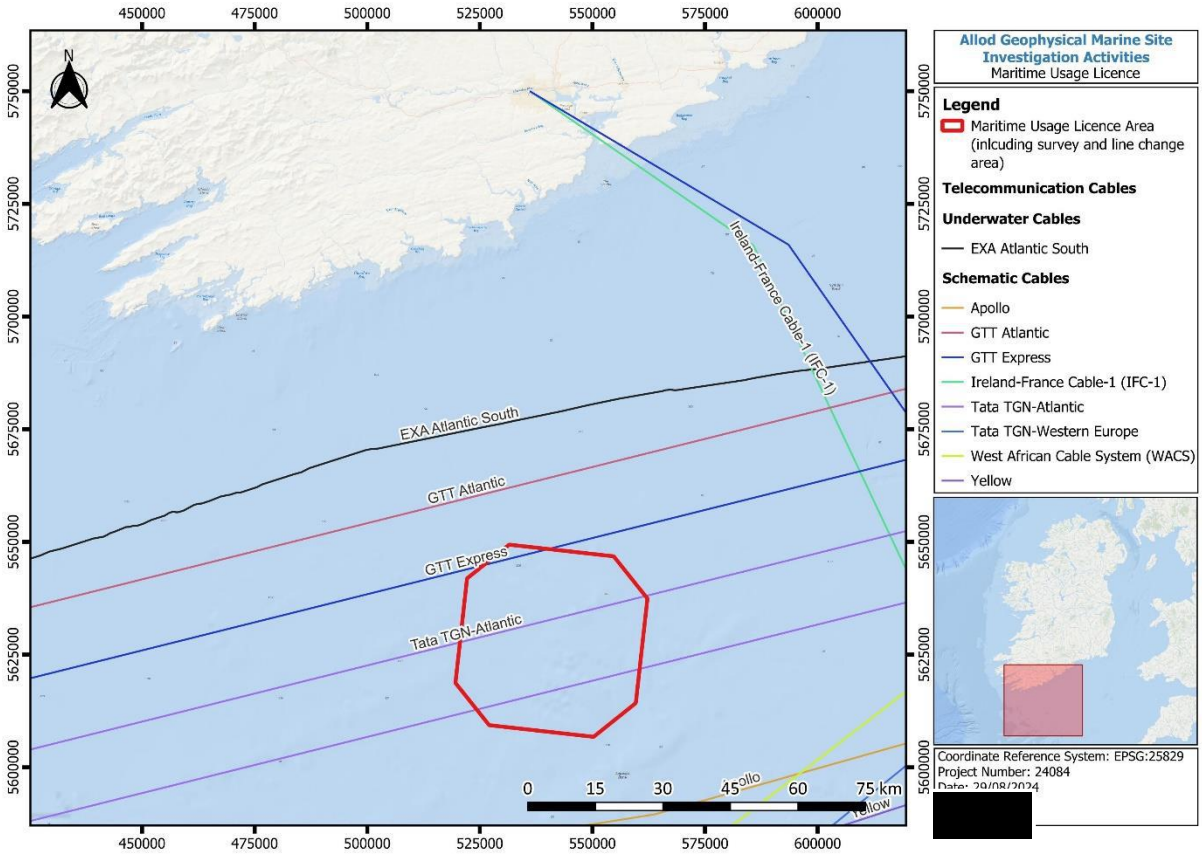

Figure 6-28: Locations of nearby subsea cables in relation to the Licence Area

6.15.1 POTENTIAL EFFECTS

As the proposed SI activities involve little-to-no physical interaction with the seabed, and due to the slight size and weight of the OBN's which may be deployed, it is considered very unlikely that any of the SI activities have the potential to cause damage to existing infrastructure within the Licence Area.

6.16 INTERACTIONS

A review of available information for the area surrounding the Licence Area was undertaken to identity other activities and potential plans in the area. This involved use of tools such as the DHLGH Licence Applications and Determinations search tool (DHLGH, 2021) and the Environmental Protection Agency (EPA) Dumping at Sea Register (EPA, 2022b). A search for the dumping at sea sites in the Celtic Sea showed that no active dumping at sea or chemical monitoring sites were in close proximity to the Licence Area (Figure 6-29) and thus are deemed to not be relevant to this Licence Application.

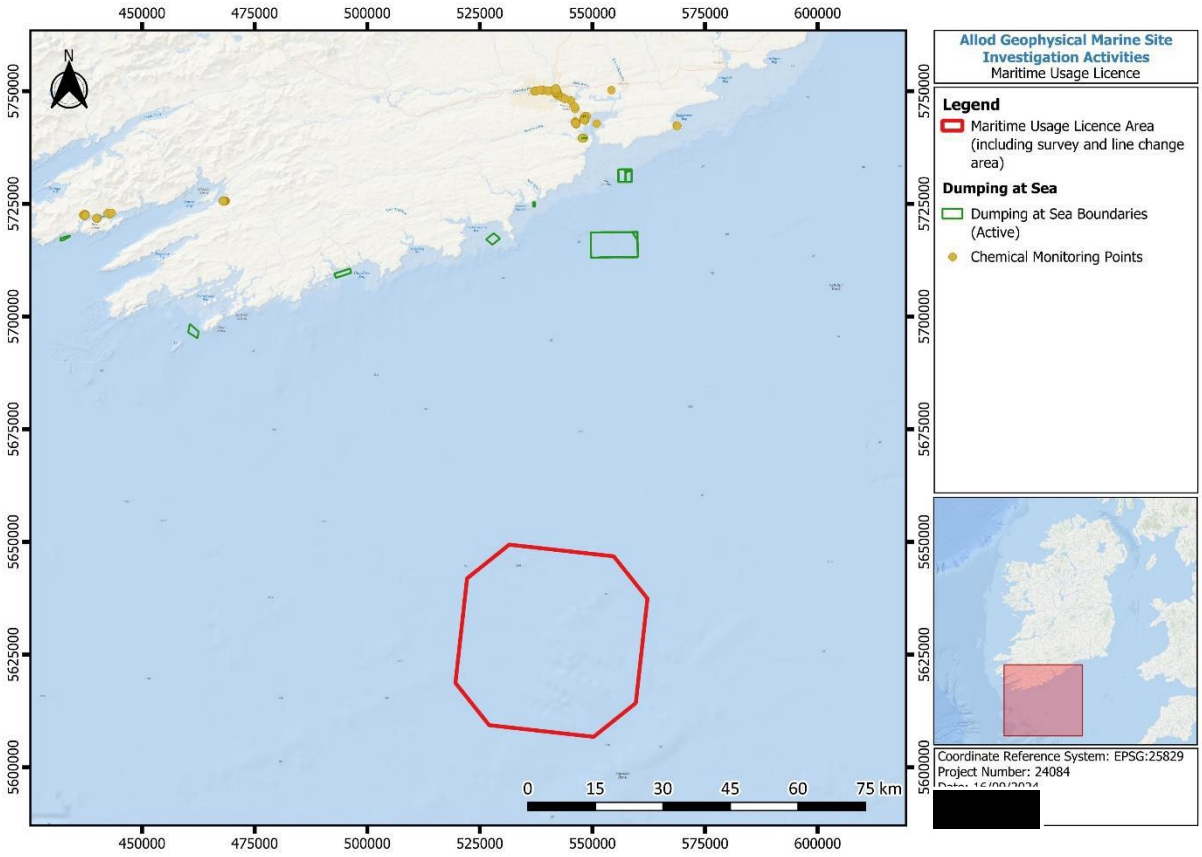

Figure 6-29: Dumping at Sea and Chemical Monitoring sites in the Celtic Sea (EPA, 2022b)

6.17 OTHER DEVELOPMENTS

The SISAA document which accompanies this application has considered the potential for in-combination and transboundary effects.

The below list includes activities and developments identified for consideration as part of the cumulative screening exercise undertaken as part of the SISAA submitted as part of this MUL Application:

- Tulca (FS007431)
- Floating Cork (FS007471)
- Kinsale Offshore Windfarm (FS007354)
- Tulca Cable Corridor (FS007431)
- Emerald FLA (FS007139)
- Eigrid Celtic Interconnector Electricity Cable (FS006916)
- DECC South Coast DMAP (LIC240006)
- Inis Ealga (FS007404)

- Helvic Head ESB FLA (FS007136)
- Celtic One Offshore (FS00718)
- Voyage Offshore Array (FS0073436)
- Port of Cork Site Investigations at Dognose Bank (FS007098)
- Dredging at Haulbowline Naval Base (FS007482)
- Haulbowline Naval Case Dept of Defence (MUL230029)
- Doyle Shipping Group (LIC230019)
- Helvick Head Energia (FS006982)
- Helvic Head ESB Array Area (FS00136)
- Celtic Sea Array Area (FS006983)
- Voyage FLA (FS0073436)
- East Celtic (FS007318)
- Port of Waterford – Waterford Estuary (LIC230025)
- Valentia Island (FS007365)
- APEM Group Blasket Sound (MUL240001)
- Inis Ealga FLA (FS007404)
- EirGrid Site Investigations to inform Offshore Renewable Grid Infrastructure (FS007660)
- University College Cork Cetacean Study within the Irish and Celtic Seas (LIC23006)

Figure 6-30 below provides an indication as to the locations of the some of these projects in relation to the proposed MUL Area.

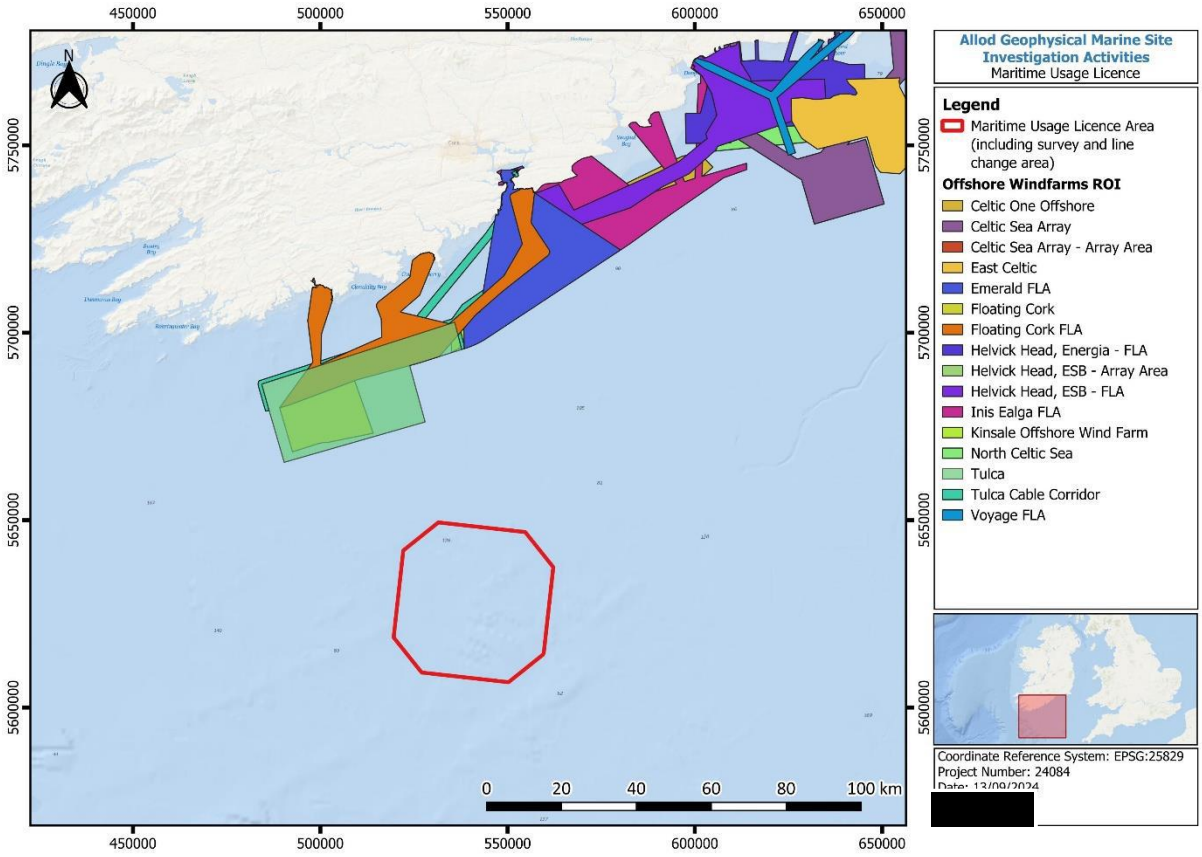

Figure 6-30: Locations of nearby proposed OWF project SI Licence Application Areas relative the Seismic MUL Application Area

No plans or projects assessed were found to be within the spatial scope considered relevant for the proposed site investigation activities (i.e. 24 km).

Potential transboundary effects were also considered, as the MUL application area is 23 km from the UK Exclusive Economic Zone and within the spatial scope considered relevant for the proposed site investigation activities (i.e. 24 km). No UK projects were identified within 24 km of the Proposed Licence Area.

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 the table below.

Table 7-1 Summary of the proposed mitigation measures for the Allód Site Investigation Activities

Proposed Mitigation Measures	
Section	**Mitigation**
Land & Soils	None proposed as all activities are in the marine environment.
Water	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 (if required). Strict protocols will be followed whilst refuelling at sea, including the use of specialized equipment to minimise any potential risk of spills or leaks. All refuelling operations will be supervised by experienced personnel and carried out in favourable weather conditions to reduce the potential occurrence of accidents.
Biodiversity	
Marine Benthos	No significant effects are predicted, and thus no mitigation measures are proposed.
Natura 2000 Sites	**Annex I Habitats** All site investigation activities are located outside of Natura 2000 sites designated for Annex I habitat QIs and no source-pathway-receptor (S-P-R) connection has been identified, therefore there will be no direct effect on any designated Annex I habitat QIs within Natura 2000 sites. Therefore, there is no overlap between the proposed Maritime Usage Licence area and any SACs designated for the protection of the Qualifying Interest Annex I Habitats

Proposed Mitigation Measures	
	Annex II Species See Marine Mammals for proposed mitigations measures for Annex II marine mammal species; see Fish Ecology for proposed mitigation measures for Annex II migratory fish species. **Birds** No significant effects are predicted, and thus no mitigation measures are proposed.
Marine Mammals	Marine Mammal Observers (MMOs) – 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 to completement this, Passive Acoustic Monitoring (PAM) will be utilised to monitor for the presence of vocalising marine mammals.
	Pre-start monitoring – Marine Mammal monitoring will be conducted for a pre-soft start search of 30 minutes i.e., prior to the commencement of acoustic noise.
	Monitored zone – Should any marine mammal species be detected within 1000m of the survey vessel, commencement of soft start 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 20-minute delay from the time of the last sighting within the relevant zone of the survey vessel to the commencement of soft start 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.
	Soft start – 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. 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 NPWS (2014) guidance. 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). This controlled build-up of energy output will occur in consistent stages to provide a steady and gradual

Proposed Mitigation Measures	
	increase over the ramp-up period. 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.
	Line changes – 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. 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 activity will continue as normal (i.e. under full output).
	Breaks in survey periods – If there is a break in sound output from survey equipment for a period greater than 10 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.
	Reporting – All recordings of marine mammals 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.
	Survey vessels speed and course – The project survey vessels will be moving at a maximum speed of approximately 5 knots during survey operation 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 , if possible, slow down or alter course to avoid collision.
Fish Ecology	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) (or the most up-to-date guidance at time of surveying) will be followed to ensure that any adverse effect to fish species due to disturbance caused by underwater noise will be mitigated for.
Commercial Fisheries	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 OBN static survey equipment if it is deployed, which will have a very small footprint. For the duration of the geophysical survey fishermen will be engaged by the fisheries liaison officer 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. Allod Energy Ltd has appointed 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.

Proposed Mitigation Measures	
	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 that will further mitigate for interactions between the survey vessels and fishermen including the various commercial offshore activities within the area. The project fisheries liaisons officer will visit the ports in the area ahead of any surveys being undertaken and discuss in detail the forthcoming survey campaign with fishing industry.
Aquaculture	As no likely significant effects are expected for aquaculture operations or shellfish as a result of the proposed site investigation activities, no mitigation measures are proposed.
Air Quality	No likely significant effects are predicted from the site investigation activities on air or climate, therefore no mitigation measures are proposed.
Noise & Vibration	The proposed mitigation measures for the occurrence of noise and vibrations can be found above in the marine benthos and marine mammals section of this table.
Landscape and Seascape	As no likely significant effects are expected to any landscape or seascape as a result of the proposed site investigation activities, no mitigation measures are proposed.
Marine Traffic	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. During SI activities, the survey vessel will be accompanied by two chase/guard vessels who will patrol the waters around the survey vessel to mitigate against collision with other marine traffic. 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. The proposed site investigation activities will be temporary and have a short duration.

Proposed Mitigation Measures	
Archaeological and Cultural Heritage	Known or suspected wrecks will be avoided during node deployment (if deployed) ensuring they are placed at least 250 m from any wrecks of other potential cultural heritage features in the survey area.
Population and Human Health	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. Appropriate marine notices will be issued in the form of formal marine notices; communications with the relevant harbour masters and engagement with relevant stakeholders will take place.
Tourism and Recreation	An FLO has been 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. Survey activities will be kept to the minimum time period possible and will be temporary in nature.
Major Accidents and Disasters	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.
Climate	No likely significant effects are predicted from the site investigation activities on air or climate, therefore no mitigation measures were proposed.
Waste	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 (if required).
Material Assets	Node locations (if deployed) will be positioned a minimum of 250 m from the as-found position of any cables identified during the non-intrusive surveys. Third party asset owners will be consulted prior to site investigation activities commencing.
Interactions	Adverse in-combination effects of the proposed site investigation activities with the projects identified in Section 6.16 are not considered likely due to the:

Proposed Mitigation Measures	
	• The distance between the proposed SI activities and other proposed developments. No other developments are proposed within the CESS. • Implementation of effective communication between Allod Energy Ltd and those projects listed in Section 6.16; • Likely timing and phased nature of proposed site investigation activities; Temporary nature of proposed site investigation activities; • Very localised and imperceptible effects of proposed site investigation activities; • and Implementation of mitigation measures outlined above;

8 CONCLUSION

The potential effects of the proposed site investigation activities have been assessed throughout this document and the accompanying SISAA and RAAIVS. Upon assessment of the possible effects resulting from the proposed SI activities, it is concluded that once the proposed mitigation measures are implemented, no adverse effects on the environment are anticipated due to these proposed site investigation activities. As outlined in Section 4 of this report, no likely effects are anticipated under the requirements of the WFD and MSFD.

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Appendix A PROGRAMME OF WORKS

The proposed programme of Site Investigations (SI) to be undertaken within the licence area is summarised in Table 2-2 in the body of the report above and discussed in more detail in Section A.1 of this appendix.

The primary site investigation activities to be undertaken are remote sensing activities which do not contact the seabed. A potential secondary site investigation activity could be remote sensing activities with less than 500 sensors resting temporarily on the seabed for a number of days. All Site investigation activities will be undertaken within the MUL 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 3D seismic, multibeam echosounder, side scan sonar, magnetometer and sub-bottom profiler data. The collected data will be used to better image the geological rock strata below the seabed, in particular known halite formations encountered at approximately 1,500m below the seabed in the historical 57/9-1 borehole (within the survey area). The survey will also provide data on the water depths, topography, relief and structure of the seabed and the shallow subsurface to evaluate potential hazards such as shipwrecks, telecommunications cables, glacial boulders, shallow gas and unexploded ordnance.

With the exception of the Ocean Bottom Nodes (if this secondary activity is conducted), which sit 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.

The key objective of these investigative studies is to map the extent of halite rock beneath seafloor up to a depth of up to 2,000m. The equipment will capture detailed three dimensional images of the seafloor and subsea composition, identifying the presence of halite rock formations within the Survey Licence Area.

Other objectives of the survey include:

- 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 and any changes with time since the INFOMAR dataset was acquired, although this INFOMAR dataset is of low resolution and there are gaps within the proposed licence area.
- Identify any shallow geohazards and man-made hazards (including but not limited to outcropping geology, boulders, shallow gas, telecommunications cables, shipwrecks, debris etc.).
- Determine the stratigraphy across the site and quantify the variability in the lateral and vertical extents to depths of up to approximately 1,000-2,000 m below seabed.
- Identify any magnetic anomalies.

A.1.1.1 AIRGUNS

Airguns are by far the most common acoustic source used for marine seismic data acquisition. Their popularity over other acoustic source types is due to several factors such as efficiency, reliability, signal stability, and most importantly safety aspects. Airgun arrays are comprised of metal cylinders which release compressed air into the water. The release of the compressed air creates a bubble, which then collapses (bursts) creating a sound. Typical airgun sizes in use in offshore exploration are 20 in^3 to 800 in^3. These airguns are commonly arranged in a cluster (array) of up to 40 airguns of mixed sizes with a sum of volumes typically in the 1,000 in^3 to 5,500 in^3 range. The SPL range for

these arrays is 240 to 260dB re: 1µPa@1m (Landro & Amundsen, 2010a; NRC, 2003). An example of a 3D seismic airgun is shown in Figure A0-1.

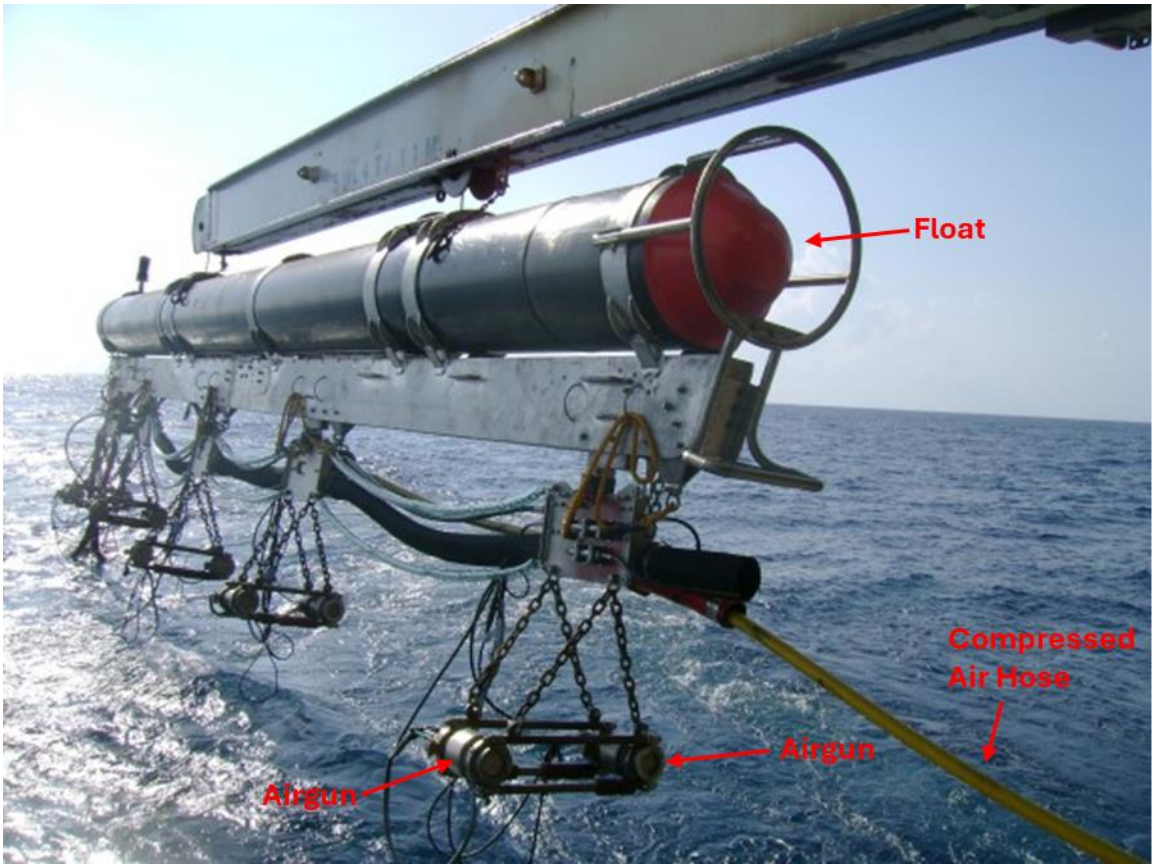

Figure A0-1: Example of 3D Seismic Airgun Array consisting of 10 airguns, air hose and float, being lifted into the water (Sercel, 2024)[4].

A.1.1.2 OCEAN BOTTOM NODES

Ocean bottom nodes (OBNs) are autonomous recording devices which receive and record seismic waves from below the seabed (Figure A-0-2). They are placed on the seafloor by ROV's at predetermined locations, and remain on the seabed whilst a source vessel sails a survey pattern, shooting the sound source. The OBNs record data continuously from node deployment to recovery, thus providing magnitudes more data than conventional towed recording devices (streamers). Use of OBNs also isolates the receiver from the sea surface noise (weather) and allows for the measurement of shear waves as well as primary waves, only the latter is generally possible with towed recording devices.

[4] https://www.sercel.com/en/products/g-source-2

Figure A-0-2: Example of Ocean Bottom Nodes (TGS, 2024)

A.1.1.3 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 Survey Licence Area which will aid with seafloor sediment/bedrock and geomorphology mapping as well as for identifying any shallow geohazards (Figure A-0-3).

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, operators 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.

SSS is non-intrusive therefore does not interact with the seabed. SSS may be undertaken across the Licence Area according to the survey vessel movements.

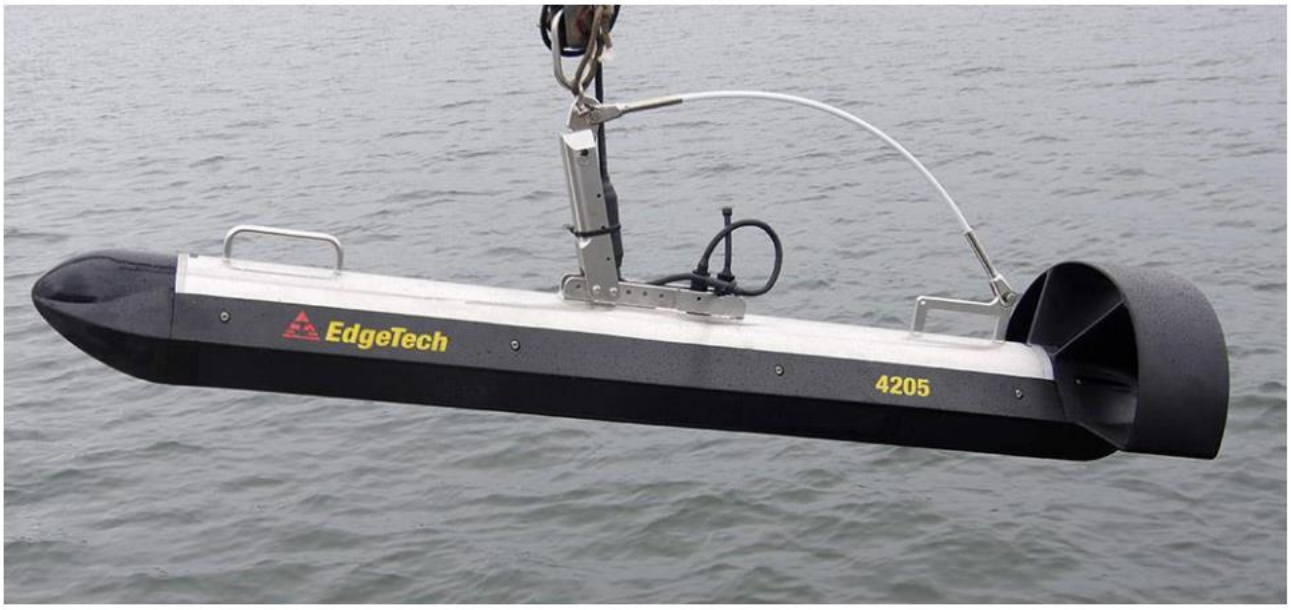

Figure A-0-3: EdgeTech 4205 MP Side Scan Sonar Towfish (EdgeTech)

A.1.1.4 MULTIBEAM ECHOSOUNDER (MBES)

A Multibeam Echosounder (MBES) system will be used to provide detailed bathymetric mapping within the Maritime Usage 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 A-0-4). MBES is non-intrusive therefore does not interact with the seabed.

Figure A-0-4: EM2040 Multibeam Echosounder (Kongsberg)

A.1.1.5 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 further works to highlight any obstruction or potential risk such as existing infrastructure, shipwrecks and unexploded ordnance (Figure A-0-5).

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 ±0.5 nT.

A Magnetometer is non-intrusive therefore does not interact with the seabed. It may be undertaken across the Licence Area.

Figure A-0-5: Magnetometer (Geometrics)

A.1.1.6 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 boomer, pinger, sparker and chirp systems (Figure 6 to Figure 8). The most appropriate system will be decided depending on the equipment available on the contracted vessel.

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, expected to be to a depth of at least 50 m below seabed. This survey is non-intrusive therefore does not interact with the seabed. It may be undertaken across the Maritime Usage Licence Area.

Figure A-0-6: Example of Boomer Sub-Bottom Profiler (INFOMAR, 2023)

Figure A-0-7: Example of Pinger Sub-Bottom Profiler (EdgeTech, 2024)

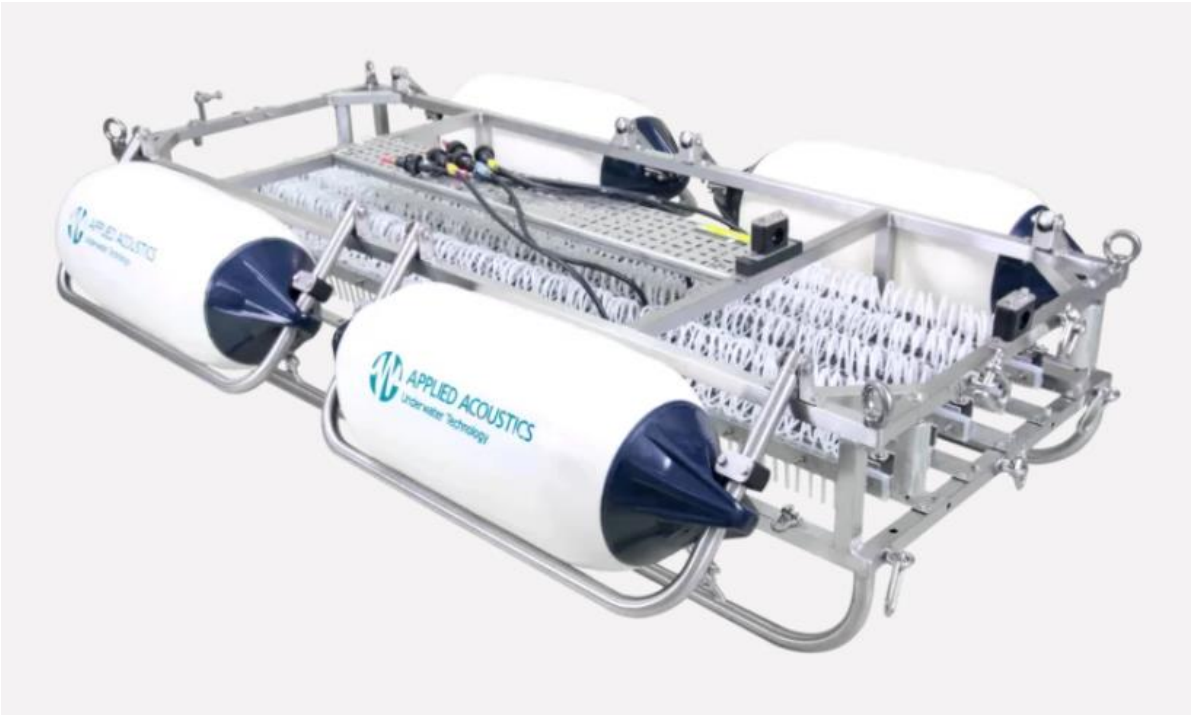

Figure A-0-8: Example of Sparker sub-bottom profiler (Applied Acoustics)

A.1.2 ANCILLARY EQUIPMENT

A.1.2.1 ROV SYSTEMS

Remotely Operated Vehicles (ROVs) are tethered, unoccupied, highly manoeuvrable vehicles controlled by qualified personnel onboard of the ship from which they are deployed.

ROV manoeuvrability and real-time visualisation means that operators can use them effectively to deploy and recover equipment on the seabed with minimal disturbance. If Ocean Bottom Nodes were available on the contracted vessel, and there was a decision to utilise them, they would be positioned and recovered by ROV.

Figure A-0-9: Example of Work Class ROV (Schilling Robotics)

A.1.2.2 ACOUSTIC POSITIONING SYSTEM; ULTRASHORT BASELINE (USBL):

An acoustic positioning system (APS) is a type of navigational system used for underwater equipment and submersibles. One type of APS is the ultrashort baseline (USBL) system, which uses acoustic signals to determine the position of a subsea device relative to a set of fixed beacons.

The USBL system consists of two parts: a transceiver on the vessel and a transponder on a subsea device. The transceiver sends out an acoustic pulse, which is received by the transponder. The transponder then responds with its own acoustic signal, which is picked up by the transceiver. The

time it takes for the signal to travel from the transceiver to the transponder and back again is used to calculate the distance between the two, known as the range. Triangulation is then used to calculate the position of the subsea device, using the range from the transceiver to the transponder at two or more known locations.

One of the main advantages of a USBL system is their high accuracy, which can be as precise as a few centimetres in ideal conditions. This makes them ideal for tasks such as underwater mapping and surveying. They are also relatively easy to set up and operate and can be used in a wide range of underwater environments.

The EasyTrak Nexus EZT-2691 is an example of a USBL system (Figure A-0-10). This equipment can achieve a high range of accuracy with bearing accuracy of up to 0.1 degrees. The system can operate in depths up to 6,000 metres and has a range of up to 7,000 metres. The EasyTrak is compatible with a range of transponders and can display real-time data on the location and movement of subsea vehicles and equipment.

Figure A-0-10: EasyTrak Nexus EZT-2691 topside processing unit (Applied Acoustics, 2023)

A.1.3 SURVEY VESSELS

It is envisaged that one geophysical survey vessel and one or two support vessels will be required for the duration of the survey.

Geophysical survey vessels are typically between 90 m and 130m in length and have an endurance of up to 120 days. These vessels are large and designed to operate all year round. Depending on the previous contract and weather conditions, the survey vessel may use a local port for mobilisation. It will utilise the support vessels for replenishment and support vessels or helicopter for crew transfer if required.

The exact vessels 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.

Geophysical survey vessels will conform to the following minimum requirements as appropriate:

- Sea keeping capabilities required by the specified work at the proposed time of year;

- 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);
- Equipment and spares with necessary tools for all specified works;
- Appropriate accommodation and messing facilities on board; and
- Launch and Recovery System for all equipment.

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.
- Adherence to 'Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters' (DAHG, 2014).

GLOBAL PROJECT REACH

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Gavin & Doherty Geosolutions
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Gavin & Doherty Geosolutions (UK) Limited
[redacted]

Belfast
Gavin & Doherty Geosolutions (UK) Limited
[redacted]

Cork
Gavin & Doherty Geosolutions
[redacted]

Edinburgh
Gavin & Doherty Geosolutions (UK) Limited
[redacted]

London
Gavin & Doherty Geosolutions (UK) Limited
[redacted]

Rhode Island
Gavin & Doherty Geosolutions Inc.
[redacted]

Utrecht
Gavin & Doherty Geosolutions
[redacted]

GDG
GAVIN & DOHERTY
GEOSOLUTIONS

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