Attachment 4.3:

Appropriate Assessment Screening Report

A MISSING-Link between continental shelves and the deep sea: Addressing the overlooked role of land-detached submarine canyons.

Dr Michael Clare, National Oceanography Centre, Southampton

1. Introduction

The proposed application is submitted on behalf of the National Oceanography Centre, Southampton, UK, and was prepared by Dr Michael Clare, Dr Isobel Yeo and Professor Veerle Huvenne, Dr Rob Hall, Mr Alan Evans and Mr Guy Dale-Smith as part of the A MISSING-Link between continental shelves and the deep sea: Addressing the overlooked role of land-detached submarine canyons (hereafter referred to as *MISSING-Link*) Project, funded by the Natural Environmental Research Council in the UK. To acquire project critical data scientific marine survey activities for this offshore scientific campaign are scheduled to take place on the RRS James Cook from 26th June (depart Southampton, UK) to 3rd August 2026 (return to Southampton, UK), which will involve deployment of oceanographic moorings, seafloor and water column surveys and sediment sampling. A subsequent 30 day offshore marine survey is proposed for Summer 2027 to recover the oceanographic moorings and to perform repeat seafloor and water column surveys and sediment sampling. The dates for the second marine survey are not yet scheduled by the UK National Marine Facilities programme (the vessel will either be the RRS James Cook or the RRS Discovery); hence, we have requested a Maritime Usage Licence (MUL) from MARA to cover a time period from June 2026-December 2027 to ensure this captures the planned work in case of schedule changes.

This application is in relation to offshore activities as part of a scientific research project funded by the United Kingdom's Natural Environment Research Council (NERC) to conduct systematic scientific monitoring surveys in the deep-sea Whittard Canyon and Gollum Channel (Figure 1), to perform a first of its kind characterisation of the transport of natural particles, nutrients, organic carbon and pollutants from the continental shelf to the deep-sea. The project will assist with providing a more detailed environmental characterisation in these key deep-sea sites in Irish waters. It will provide significant benefits associated with high level objective "Environmental Ocean Health (Policy1)", which is particularly well-aligned with UN Sustainable Development Goal 14 (Life Below Water) and the Marine Strategy Framework Directive (MSFD) of the European Union (Directive 2008/56/EC) and Commission Decision (ED) 2017/848. These policies, goals and directives underpin implementation of Ireland's MSFD, which aims to determine, achieve and maintain Good Environmental Status (GES) based on 11 qualitative condition descriptors, which in turn inform the environmental aspects of maritime spatial planning under Directive 2014/89/EU. This project will thus provide valuable scientific data to support these initiatives and will increase the understanding of environmental marine conditions within ecologically-important, but poorly understood deep-sea sites, characterise the transport pathways of pollutants such as microplastics into the deep-sea, and will aid in the wider understanding of similar sites that exist worldwide. Collaborating organisations: University of East Anglia (UK), Scottish Association of Marine Science (SAMS), University College Cork (Ireland), University of Galway (Ireland), Manchester University (UK), University of Southampton (UK)

The proposed scope of work for the MISSING-Link expedition, subject to licensing, has seven objectives:

i) temporary deployment of short oceanographic moorings (with no sea surface expression) to monitor near-seafloor currents and sediment transport, which will be recovered after a period of approximately 12 months.

ii) sampling of seafloor sediments using scientific coring equipment.

iii) seafloor video surveys acquired using Modular Platform Underwater System (MPUS).

iv) short-term (3 weeks maximum) deployment of two autonomous underwater oceanographic gliders (Kongsberg Seagliders owned by University of East Anglia) to monitor ocean currents using built in turbulence sensors.

v) short-term (30 hour maximum) deployment of Autonomous Underwater Vehicle (AUV – Autosub5) to map the seafloor and shallow subsurface using multibeam echosounder (Norbit WBMS 400kHz multibeam echosounder), side scan sonar (Edgetech 2205 Dual Frequency Sidescan Sonar - 420 kHz and 120 kHz), sub-bottom profiler (Edgetech 2205 Sub Bottom Profiler, 2-16 kHz), photograph the seafloor using a camera system (AESA 2.5 Camera System), and characterise the water column using a Conductivity, Temperature and Density (CTD) sensor (Seabird CTD9+). The AUV will also characterise suspended sediments using a Hydroptic UPV6 and Fluidion Deep Water Sampler, and is also equipped with an Acoustic Doppler Current (ADCP) profiler to assist with navigation (Syrinx SprintNav, 600 kHz).

vi) measurement of vertical profiles in the water column to characterise temperature, salinity, current velocity and turbulent mixing.

vii) shipboard measurements to be made while vessel is underway, which include single beam echosounding (Kongsberg EA640 10/12 kHz), multi beam echosounding (Kongsberg EM122 12 kHz and EM710 70 to 100 kHz), sub-bottom profiler (Kongsberg SBP27 Sub-bottom profiler 2-9 kHz) and AML Micro-X Sound Velocity probe.

The areas that will be surveyed, the approximate deployment positions of moorings and the sampling locations are showing Figure 2.

To allow the Competent Authority (MARA) to fully assess all potential impacts of the proposed maritime usage, this Appropriate Assessment Screening report has examined relevant designated sites and conservation interests, the potential for project related significant effects on the environment, in-combination or cumulative effets and mitigation measures (as appropriate).

2. Statement of Authority

This report was prepared by Dr Michael Clare, Dr Isobel Yeo, Professor Veerle Huvenne, Dr Rob Hall, Mr Alan Evans and Mr Guy Dale-Smith.

Dr Michael Clare is a Principal Researcher and the Mission Network Lead for Hazards and Pollution at the National Oceanography Centre, Southampton, where he has worked since 2015, before which he was a specialist in Offshore Survey and Marine Geohazards for FUGRO. His work focuses on sediment-transport dynamics, submarine geohazards and deep-sea systems. He has served as Marine Scientific Adviser to the International Cable Protection Committee since 2020. Dr Clare has led and co-led offshore monitoring campaigns in submarine canyon settings, including work in the Congo and Whittard canyons that deployed moorings instrumented with Acoustic Doppler Current Profilers (ADCPs) to record turbidity currents and bottom-current variability. He is an expert in the acquisition, processing and integration of multibeam bathymetry, side-scan–style acoustic seafloor mapping and sub-bottom profiling with moored and seabed sensors to characterise seafloor processes and risks to infrastructure.

Dr Isobel Yeo is a Senior Researcher at the National Oceanography Centre, specialising in Marine Geohazards, with over 15 years experience working in Marine Geology research. Her work has focused on using hydrographic survey methods and bottom sampling to map hazardous phenomena and sampling of rocks and sediments to characterize hazards and recreate timelines. She has extensive experience working with Autonomous Underwater Vehicles (AUVs) and Remotely Operated Vehicles (ROVs) to acquire data and samples across all seafloor depths. She has worked closely with AUV teams, including on mission design and execution. She has been the Chief Scientific Officer on three expeditions (two onboard British Vessels) and has participated in 20 scientific seagoing expeditions.

Professor Veerle Huvenne is a Principal Researcher at the National Oceanography Centre, Southampton. She has over 25 years of experience in marine habitat mapping and benthic ecology, her work spans cold-water corals, submarine canyon systems and deep-sea benthic communities. She has participated in more than 40 international expeditions—often acting as Chief Scientist or scientific lead—and has spent in excess of 900 days at sea. Her work uses multidisciplinary approaches to integrate geological, geophysical and biological methods (e.g., ROV/AUV video imagery, sediment cores, multibeam bathymetry, sidescan sonar and habitat classification) to characterise complex deep-sea ecosystems and the dynamic processes that govern them. She has studied the Whittard Canyon system since 2007, and has extensive expertise of the benthic ecology of the Porcupine Seabight. Prof Huvenne also acts as Chief Scientist of the Marine Autonomous and Robotic Systems facility at NOC, part of the UK's National Marine Facilities. For this, she draws on her extensive expertise working with marine robotic systems (ROVs, AUVs, gliders), often acting as scientific liaison to the technical teams and developing new observing capabilities with them.

Dr Rob Hall, Principal Investigator in Physical Oceanography at the Scottish Association of Marine Science and Scientific Lead of the Scottish Marine Robotics Facility. Dr Hall has 20 years of experience in shelf-sea and deep-ocean fluid dynamics, specifically internal tide and wave processes, sediment transport and mixing, drawing on both observational deployments (including autonomous underwater vehicles and gliders) and numerical modelling. He has expertise in marine hydrodynamics, sediment transport and benthic-habitat interactions in the Celtic Sea. He has participated in more than 10 research expedition including as Chief Scientist for recent survey of hydrodynamic processes at the Celtic Sea shelf break.

Mr Alan Evans serves as Head of Marine Policy at the National Oceanography Centre (NOC) in the UK and acts as a Marine Science Policy Adviser, bringing over two decades of experience in marine science, technology, and policy underpinned by a strong geoscientific background. At NOC, he leads the organisation's engagement with the global marine community through participation in international fora, bilateral partnerships, collaborative projects, and interactions with national governments—including UK Overseas Territories—and regional institutions. His expertise includes extensive application of the United Nations Convention on the Law of the Sea (UNCLOS), covering baseline and maritime-zone definition, continental-shelf delineation beyond 200 nautical miles, the mandate of the International Seabed Authority (ISA), and the enabling of marine scientific research and technology transfer. Internationally, Alan serves as the Alternate Head of the UK delegation to UNESCO's Intergovernmental Oceanographic Commission (IOC-UNESCO), where he chairs the Group of Experts on Capacity Development. He also contributes as a technical expert on the ISA Partnership Fund Board and previously advised the ISA/UN-OHRLLS "Women in Deep-Sea Research" initiative. Additionally, he represents NERC-UKRI at the European Marine Board, where he is vice-Chair.

Mr Guy Dale Smith serves as Head of Research Ship Operations at the National Oceanography Centre (NOC) in the UK, where he leads the planning, execution and oversight of marine research vessel campaigns and associated infrastructure, drawing on extensive maritime and operational experience. With a deep background in ship-based science support, Guy manages not only the logistics and safety of ocean-going missions but also the strategic alignment of NOC's fleet with scientific goals, ensuring that vessel operations maximise research impact while adhering to rigorous standards of marine safety and efficiency. His role spans coordination across multidisciplinary teams, vessels and international collaborations, forging strong relationships with science teams, engineering groups and external stakeholders to support downward-looking research in challenging marine environments.

3. Details of the Proposed Project

3.1 Project Location

The areas of study (Fig 1) include:

- Whittard Canyon area - the proposed study area encompasses 15,054 km^2 within which targeted scientific activities will occur. This area lies 262 km south-south-west of Mizen Head, County Cork.
- Gollum Channel area - the proposed study area encompasses 4765 km^2 within which targeted scientific activities will occur. This areas lies 108 km south-west of Dursey Island, County Cork.
- This is a total area of 19,819 km^2 although it should be noted that survey activities will be locally focused within these broader areas. Water depths range between 170 m and 3500 m in these study areas.

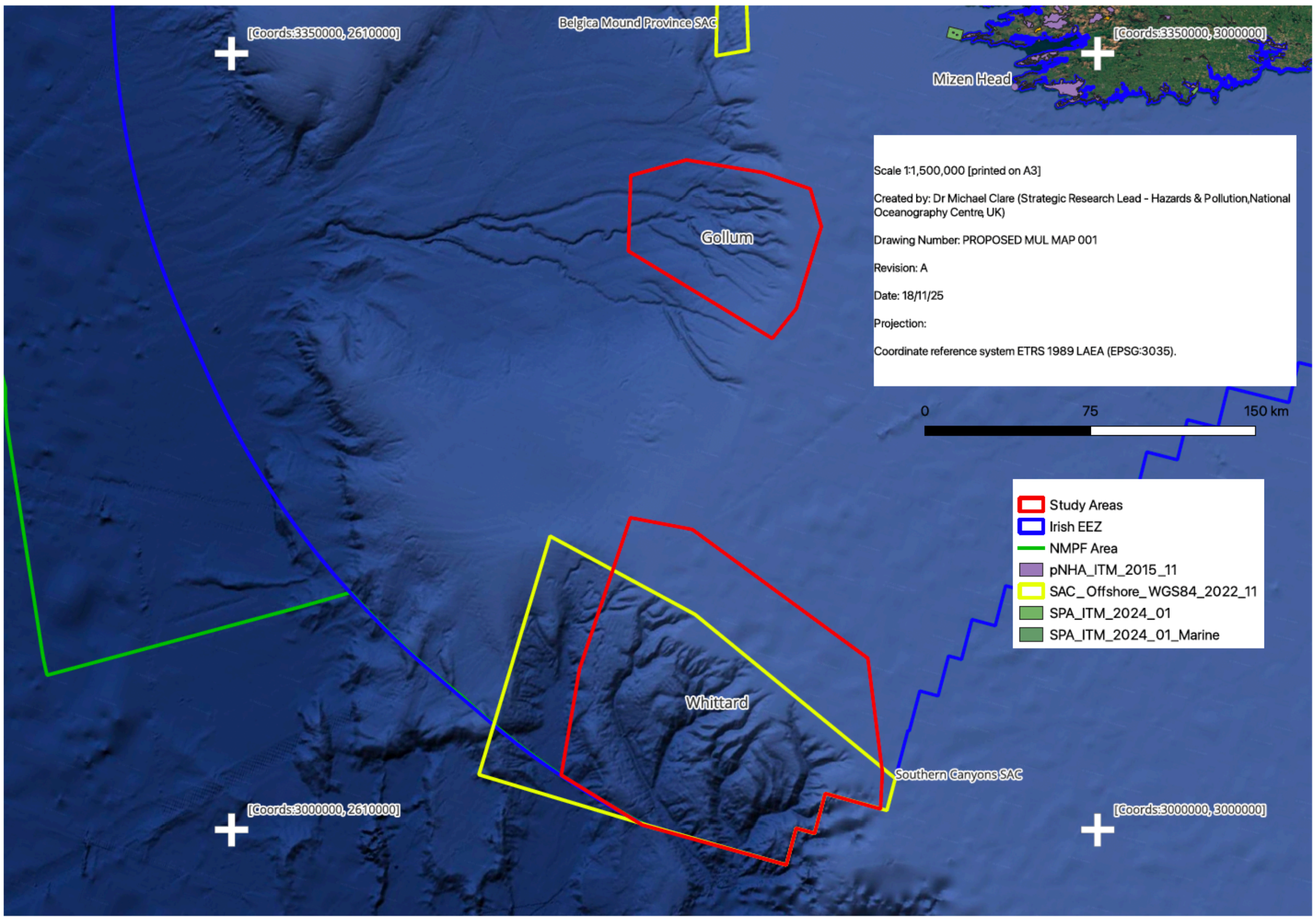


Figure 1: Overview map. Red lines define limits of study areas for the proposed project. Yellow lines indicate locations of SACs and cSACs.

3.2 Scope of works

This application is in relation to offshore activities as part of a scientific research project called MISSING LINK funded by the United Kingdom's Natural Environment Research Council (NERC) to conduct systematic scientific monitoring surveys in the deep-sea Whittard Canyon (which includes work in the Southern Canyon SAC) and Gollum Channel, to perform a first of its kind characterisation of the transport of natural particles, nutrients, organic carbon and pollutants from the continental shelf to the deep-sea. The overarching aim of this proposed work is to acquire new scientific data into better understanding: 1) the natural processes that occur within deep-sea submarine canyons - namely the Whittard Canyon (overlapping with the Southern Canyon cSAC) and Gollum Channel - through detailed monitoring of seafloor currents, characterisation of seafloor sediments, measurement of water column properties, remote mapping of the seafloor; and 2) the distribution of pollutants (particularly litter and microplastics) through video surveys and seafloor sampling.

This project will enable a step change in understanding of the sporadic but large flows of sediment, climatically-important organic carbon, and pollutants through submarine canyons, which connect continental shelves worldwide to the deep-sea. >9000 large submarine canyons occur on all the world's submerged margins, often dwarfing river systems in scale. Such canyons can transfer large quantities of natural sediments, organic carbon and nutrients that sustain important ecosystems, and are increasingly recognised as hotspots for seafloor pollution that threatens the enhanced biodiversity they host. The sediment flows that travel along canyons can be fast and dense, breaking cables that underpin global communications. It is therefore important to understand when and how such flows are triggered, the amount and type of material that is transported, and crucially, how these vary between types of canyon.

Recent measurements in Whittard Canyon (in the Celtic Sea, 250 km from shore) have revealed that such land-detached canyons can feature frequent sediment flows. This project aims to understand how frequent sediment flows can occur if a canyon head lies far from present day sediment supplies. We plan to deploy an array of short moorings within the Whittard Canyon and Gollum Channel, to measure the conditions before and coincident with turbidity currents, and repeatedly map the seafloor to identify how and where sediment is transported to/from the canyon head. We will then make the first source to sink measurements along a land-detached canyon, and the second of any major deep sea canyon worldwide, hence in itself this will represent a significant scientific milestone. Global budgets exist for particulate transport to and across the ocean, but none include land-detached canyons such as these. We will provide a first order calculation to assess the global significance of land-detached canyons, first assessing the contribution to deep sea transport across the Celtic Margin, and then up-scaling our results to determine what is missing from existing global budgets. The project will assist with providing a more detailed environmental characterisation in these key deep-sea sites in Irish waters and will increase the understanding of environmental marine conditions within ecologically-important, but poorly understood deep sea sites, characterise the transport pathways of pollutants such as microplastics into the deep-sea, and will aid in the wider understanding of similar sites that exist worldwide.

The proposed project scope includes:

i) temporary deployment of short oceanographic moorings (with no sea surface expression) to monitor near-seafloor currents and sediment transport, which will be recovered after a period of approximately 12 months. Seafloor moorings to be deployed at five locations in Irish waters between water depths of 1500m and 3400m.

ii) sampling of seafloor sediments using scientific coring equipment. For each offshore campaign we proposed to use an OSIL megacorer (0.5 m deep x 0.06 m diameter cores –30 sampling locations proposed, at each sampling location 4 cores to be acquired, so a potential total of 120 cores), NIOZ box cores (0.5 m deep x 0.5 wide sampler – 15 cores proposed), and Standard Gravity Piston coring (up to 6 m deep x 0.1 m diameter cores – 16 cores proposed) along transects within the canyon systems.

iii) seafloor video surveys acquired using Modular Platform Underwater System (MPUS), which is a modular, versatile, robotic underwater vehicle (RUV) capable of reaching depths of 6,000 metres, developed and operated by the National Oceanography Centre.

iv) short-term (4 weeks maximum) deployment of an autonomous underwater glider (Kongsberg Seaglider owned and operated by the National Oceanography Centre) to monitor ocean currents using an integrated Nortek 1 MHz ADCP and measure temperature and salinity using a SeaBird Electronics CTD sensor.

v) short-term (24 hour maximum) deployment of Autonomous Underwater Vehicle (AUV – Autosub5) to map the seafloor and shallow subsurface using multibeam echosounder (Norbit WBMS 400kHz multibeam echosounder), side scan sonar (Edgetech 2205 Dual Frequency Sidescan Sonar - 420 kHz and 120 kHz), sub-bottom profiler (Edgetech 2205 Sub Bottom Profiler, 2-16 kHz), photograph the seafloor using a camera system (AESA 2.5 Camera System), and characterise the water column using a Conductivity, Temperature and Density (CTD) sensor (Seabird CTD9+), characterise suspended sediments using a Hydroptic UPV6 and Fluidion Deep Water Sampler, and is also equipped with an Acoustic Doppler Current (ADCP) profiler to assist with navigation (Syrinx SprintNav, 600 kHz). The AUV will be deployed and recovered multiple times during the two offshore campaigns, and aside from launch and recovery will move beneath the sea surface with no surface expression and will not involve any contact with the seafloor, instead flying above it for seafloor surveys.

vi) vertical profiling of the water column to characterise temperature, salinity, current velocity and turbulent mixing. This will include vertical profiles made using a CTD package and Lowered ADCP (two RDI 300 kHz Workhorse) mounted on a conventional CTD/Carousel frame. This will be deployed off the side of the vessel using a heave-compensated winch. A Vertical Microstructure Profiler (VMP-2000) will also be used for the measurement of turbulence kinetic energy dissipation rate through the water column. The VMP-2000 is equipped with cm-scale velocity probes (shear probes), high-resolution temperature sensors (fast thermistors), and a high-accuracy Seabird CTD.

vii) shipboard measurements to be made while vessel is underway, which include single beam echosounding (Kongsberg EA640 10/12 kHz), multi beam echosounding (Kongsberg EM122 12 kHz and EM710 70 to 100 kHz), sub-bottom profiler (Kongsberg SBP27 Sub-bottom profiler 2-9 kHz) and AML Micro-X Sound Velocity probe.

See Table 1 for details pertaining to the proposed equipment and specifications.

Table 1: Acoustic and sampling equipment proposed to be operated on board the RRS James Cook during the MISSING-Link expedition. Note: In the event of equipment failure a similar alternative may be used/deployed if available.

Equipment	**Model**	**Deployment**	**Company**	**Sound Pressure Level re 1 µPA in water @ 1m from source**	**Reference**
Acoustic Survey Equipment					
Multibeam Echosounder	Norbit WBMS 400kHz	AUV	Norbit	Typically 200-220	No information from manufacturer – range presented is based on typical values for such systems https://naturalresources.wales/media/694743/underwater-acoustic-survey-evidence-review_nrw-evidence-report-448.pdf
Sidescan Sonar	Edgetech 2205 Dual Frequency (420 kHz and 120 kHz)	AUV	Edgetech	~226	**Geo-matching** (n.d.) *EdgeTech 2205 AUV/ROV/ASV Sonar – Product Specification.*

					Available at: https://geo-matching.com/
Sub Bottom Profiler	Edgetech 2205 (2-16 kHz)	AUV	Edgetech	~226	**Geo-matching** (n.d.) *EdgeTech 2205 AUV/ROV/ASV Sonar – Product Specification*. Available at: https://geo-matching.com/
ADCP	Syrinx SprintNav, 600 kHz	AUV	Syrinx	217	**Sonardyne** https://www.sonardyne.com/product/syrinx-dvl/#:~:text=Need%20help%20with%20your%20product,UI%20for%20setup%20and%20configuration.
ADCP	RDI 300 kHz Workhorse	CTD Frame	Teledyne	~215	**Teledyne RD Instruments** (2011) *Source Level of Teledyne RDI ADCP Transducers (Technical Note FST-054)*. Teledyne Marine. Available at: https://www.teledynemarine.com/
ADCP	RDI 600 kHz Workhorse	Mooring	Teledyne	~217	**Teledyne RD Instruments** (2011) *Source Level of Teledyne RDI ADCP Transducers (Technical Note FST-054)*. Teledyne Marine. Available at: https://www.teledynemarine.com/
ADCP	RDI 75 kHz Ocean Surveyor	Vessel mounted	Teledyne	~227	**Teledyne RD Instruments** (2011) *Source Level of Teledyne RDI ADCP Transducers (Technical Note FST-054)*. Teledyne Marine. Available at: https://www.teledynemarine.com/
ADCP	RDI 150 kHz Ocean Surveyor	Vessel mounted	Teledyne	~226	**Teledyne RD Instruments** (2011) *Source Level of Teledyne RDI ADCP Transducers (Technical Note FST-054)*. Teledyne Marine. Available at:

					https://www.teledynemarine.com/
ADCP	1 MHz AD2CP	Seaglider	Nortek	214-215	
Single Beam Echosounder	Kongsberg EA640 10/12 kHz	Vessel mounted	Kongsberg	~222	**Kongsberg Maritime** (2022) *Sound levels from Kongsberg multibeam systems*. Kongsberg Discovery. Available at: https://www.kongsberg.com/
Multibeam Echosounder	Kongsberg EM122 12 kHz and EM710 70 to 100 kHz	Vessel mounted	Kongsberg	~210 (122) ~210 (710)	**Kongsberg Maritime** (2022) *Sound levels from Kongsberg multibeam systems*. Kongsberg Discovery. Available at: https://www.kongsberg.com/
Sub-bottom profiler	Kongsberg SBP27 (2-9 kHz)	Vessel mounted	Kongsberg	~209	**Kongsberg Maritime** (2022) *Sound levels from Kongsberg multibeam systems*. Kongsberg Discovery. Available at: https://www.kongsberg.com/
Ultra-short baseline (USBL)	Ranger 22-34 kHz	AUV	Sonardyne	187 - 196	**Sonardyne International Ltd** (2021) *Wideband Sub-Mini 6+ (WSM 6+) Type 8370-1111/4112*. Available at: https://www.sonardyne.com/wp-content/uploads/2021/06/Sonardyne_8370_WSM6-1.pdf
Sensors					
CTD	SBE9+	AUV	Seabird Electronics	N/A	
Sound Velocity probe	AML Micro-X	Cable (from Vessel) or CTD frame	Alm Oceanographic	N/A	
Vertical Microstructure Profiler	VMP-2000	Cable (from vessel)	Rockland Scientific International	N/A	
CTD	SBE 37 MicroCAT	Mooring	Seabird Electronics	N/A	
Sampling equipment					

Megacorer	Multi-Corer	Cable (from Vessel)	OSIL	N/A	
Optical Imaging Sensor	Hydroptic UPV6	AUV	Hydroptic	N/A	
Water Sampler	Deep Water Sampler	AUV	Fluidion	N/A	
Rosette Sampler	Niskin Bottles	CTD Frame	N/A	N/A	
Box Core	NIOZ box core	Cable (from Vessel)	N/A	N/A	
Standard Gravity Piston Corer	Standard Gravity Piston coring	Cable (from Vessel)	N/A	N/A	
Sediment Traps	McLane sediment trap	Mooring	McLane	N/A	
Other Survey Equipment					
Camera System	AESA 2.5	AUV	Blackfly, adjusted by NOC	N/A	

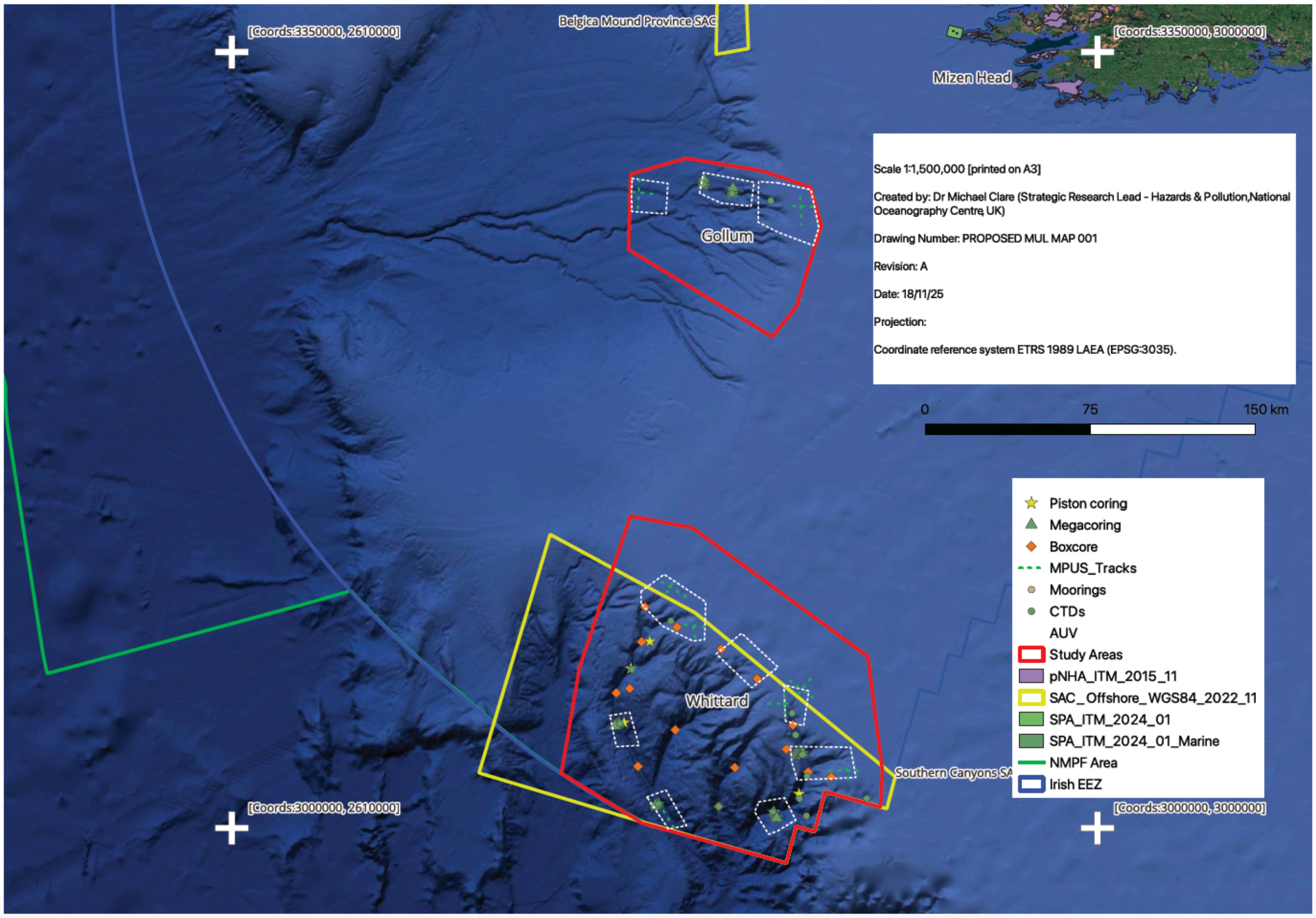


Figure 2: Proposed locations of sampling and survey locations – ship-board equipment will be run while the vessel is underway and glider deployments are planned within the red study areas. White dashed areas represent proposed locations within which AUV dives will be performed but are unlikely to include the full extent of what is presented.

3.2.1 Vessels and Platforms

3.2.1.1 RRS James Cook/RRS Discovery

The expedition in 2026 will be carried out aboard RRS James Cook, however, as the 2027 expedition is not yet scheduled that may occur on either RRS James Cook or RRS Discovery, hence specifications for both vessels are included (Table 2).

The RRS James Cook (2006) and RRS Discovery (2013) are UK global-class oceanographic research vessels with overlapping but distinct technical capabilities. James Cook provides approximately 278 m² of fixed laboratory space supplemented by multiple ISO container laboratories, including facilities for trace-metal–clean sampling. Its deck machinery includes high-capacity stern and mid-ships A-frames and a broad winch suite enabling deep-ocean coring, heavy trawling, towed-instrument operations, and ROV deployment. The vessel carries a comprehensive hydroacoustic system comprising multibeam and single-beam echosounders, ADCPs, and sub-surface positioning sensors for full-ocean-depth water-column and seabed measurements. Discovery incorporates a modular laboratory configuration designed for rapid reconfiguration between cruises, as well as dual deployment stations that allow independent or simultaneous use of winches and handling systems. Its acoustic and geophysical systems include multibeam bathymetry, sub-bottom profiling and seismic capability integrated with precision navigation and timing systems. Both vessels support full-ocean-depth CTD and rosette operations, clean seawater supply, and the deployment and recovery of moorings, landers and autonomous platforms. Together they provide the UK marine science community with capacity for physical, chemical, biological and geological measurements in open-ocean and high-latitude environments under extended-duration operating conditions.

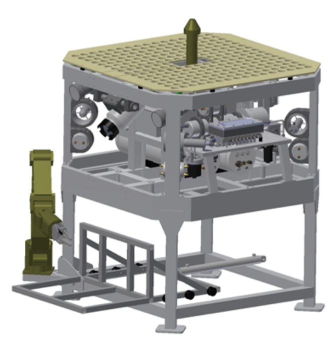
Table 2: Vessel specifications for the RRS James Cook (2026 vessel) and the RRS Discovery (2027 vessel may be either RRS James Cook or RRS Discovery)

	RRS James Cook	**RRS Discovery**
Length	89.20 m	100 m
Beam	18.60 m	18 m
Draught	6.315 m	6.6 m
Displacement	5,800 tonnes	6,075 tonnes
Gross Tonnage	5,401 tonnes	5,952 tonnes
Maximum endurance	50 days	50 days
Year built / delivered	2006 / service 2007	Delivered 2013
Propulsion / Engines	Four Wärtsilä 9L20 diesel engines driving alternators, giving a total available generating capacity of 6,840 kW	Four Wärtsilä 8L20 diesel-generator sets, each rated ~1,770 kW generating capacity ~7,080 kW
Crew / Scientist capacity	22 crew + 32 scientists	24 crew + 28 scientists
Lab & deck space	278 m² labs; 7 containers	389 m² labs; 7 containers
Image		

3.2.1.2 Modular Platform Underwater System (MPUS)

The Modular Platform Underwater System (MPUS) is a deep-rated, highly adaptable tethered underwater vehicle engineered for 6,500-meter operations. Its architecture is based on a modular payload and control framework, enabling rapid reconfiguration between command, imaging, and sampling missions. The system integrates a high-capacity hydraulic actuation suite, vectored thruster arrangement for precise maneuverability, and a multi-camera imaging stack optimized for both scientific observation and pilot situational awareness. With a 12 kVA subsea power system, fiber-optic multiplexed communications, and ROS-based control software with fault-tolerant thrust allocation, MPUS provides a robust and future-proof platform for deep-ocean intervention and research tasks.

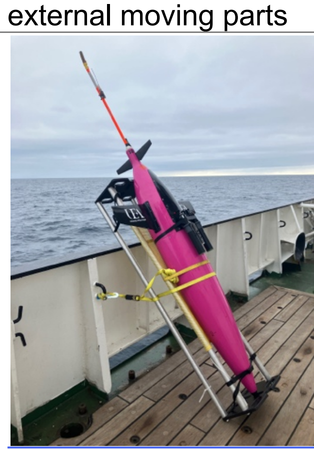
Table 3: Specifications for the Modular Platform Underwater System (MPUS). Note the system is currently under construction at NOC and will be deployed only during the 2027 expedition.

	Specification
General	NOC in-house built; Modular design (Command, Camera, Sampling modules)
Depth Rating	6500 m
Structure	Welded & heat-treated Aluminium Alloy 6082-T6
Payload Capacity	Up to 1200 kg (module & depth dependent)
Hydraulics	12-function bi-directional SubAtlantic hydraulic valve pack (proportional control)
Thrusters	4 × vectored Innerspace 2 HP thrusters
Manipulator	Kraft Predator manipulator (TBC)
Primary Cameras	1 × 1080i HD stills & video camera
Pilot Camera	1 × 1080p HD camera
Additional Cameras	2 × PAL cameras
Power Unit	Jetpower JPT4 Power Unit
Power Input	Three-phase 2800 V, 400 Hz
Power Output	~12 kVA expected
Telemetry / Comms	MOOG Focal Fiber-Optic Mux
Electronics	In-house designed PCBs; EMC compliant
Science Bus	12 V & 24 V
Control Software	In-house developed; ROS-based; node-based modular architecture
Control Features	Fail-safe vectoral thrust distribution algorithm
User Interface	Qt-based responsive GUI
Image	

3.2.1.3 Kongsberg Seagliders

The Seaglider is a buoyancy-driven autonomous glider designed for long-duration, low-power oceanographic missions. It achieves propulsion through controlled buoyancy changes, enabling efficient gliding in a saw-tooth vertical profile with endurance spanning months and ranges of several thousand kilometres. Its modular payload architecture supports physical, chemical, and biological ocean sensors, while satellite telemetry enables remote mission updates and data retrieval. With no external moving parts and a streamlined isopycnic pressure hull, the Seaglider provides a robust, low-logistics platform for sustained open-ocean and boundary-layer observations.

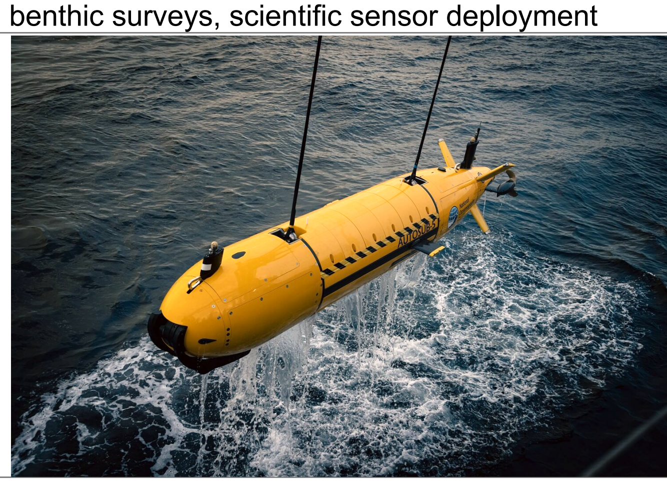
Table 4: Specifications for the Kongsberg Seagliders.

	Specification
Platform class	Buoyancy-driven glider-type AUV
Deployment duration	Up to ~10 months (mission dependent)
Range / travel distance	Up to ~4,600 km (~650 dives to 1 km depth)
Operating depth	50–1000 m (configuration dependent)
Length	1.8–2.0 m (configuration dependent)
Diameter	0.30 m excluding wings
Dry weight	~52 kg
Wing span	1.0 m
Glide / forward speed	Typical ~0.25 m/s (~0.5 kt)
Variable buoyancy volume	~850 cc
Energy store	~17 MJ (Lithium primary batteries)
Sensor payloads	CTD, ADCP, dissolved oxygen, fluorometer/optical backscatter, PAR, active and passive acoustics
Communications	Iridium satellite telemetry when surfaced
Navigation & control	Surface GPS fixes, underwater dead-reckoning, digital compass, Kalman filter
Mechanical design	Isopycnic pressure hull, composite fairing, no external moving parts
Image	

3.2.1.4 Autonomous Underwater Vehicle Autosub 5

The Autosub 5 is a high-power, work-class autonomous underwater vehicle (AUV) developed by the National Oceanography Centre (NOC) for deep-ocean survey, mapping, and under-ice missions. Engineered for operations to depths of up to 6,000 metres, the vehicle integrates a modular payload architecture supporting multibeam sonar, sidescan, sub-bottom profilers, and imaging systems. Its enhanced navigation suite provides high-accuracy dead-reckoning and bottom-lock tracking, while a dual-thruster propulsion system with X-configuration control surfaces offers robust manoeuvrability and redundancy. Designed for deployment using a dual-winch davit LARS system, Autosub 5 delivers a reliable platform for long-range, high-fidelity oceanographic data acquisition.

Table 5: Specifications for the Autosub 5 AUV.

	Specification
Platform class	Work-class AUV, length ~6 m, mass ≈2 tonnes
Maximum depth rating	Up to 6,000 m
Cruise speed	Approx. 1.1–1.4 m/s
Endurance / Sensor range	Typical mission lengths 250–300 km depending on depth and payload
Propulsion / Control surfaces	Dual thrusters; four X-configuration control planes enabling thruster-loss redundancy
Buoyancy / Structure	Syntactic foam centre section (2000 m or 6000 m rated); free-flooded nose and aft sections
Payload architecture	Modular forward and aft payload tubes supporting sonar, cameras, CTD/DO, magnetometer, and scientific sensors
Navigation accuracy	Enhanced navigation package with <0.1% distance-travelled positional error in bottom-lock surveys
Launch & Recovery	Dual-winch davit LARS system; deployable in sea state up to 4
Command & Control	Onboard autonomous mission executive, ROS-based controls, acoustic modem + Iridium comms
Use-cases	High-resolution seabed mapping, under-ice missions, benthic surveys, scientific sensor deployment
Image	

3.2.2 Multibeam echosounders, sidescan sonars and sub-bottom profiling

The project involves multibeam echosounder surveys, sidescan sonar surveys and sub-bottom profiling of the seafloor and sub-seafloor with both the vessel hull-mounted echosounders and with a similar suite of echosounders mounted on the AUV. The details of these surveys are below.

3.2.2.1 Vessel Operations

Shipboard measurements will be made while vessel is underway, including single beam echosounding (Kongsberg EA640 10/12 kHz), multibeam echosounding (Kongsberg EM122 12 kHz and EM710 70 to 100 kHz), sub-bottom profiler (Kongsberg SBP27 Sub-bottom profiler 2-9 kHz) and AML Micro-X Sound Velocity probe, which will be acquired within the proposed study areas, ranging from water depths between 170 and 3400 m.

3.2.2.2 AUV Operations

Short-term (30 hour maximum) deploymenty of Autonomous Underwater Vehicle (AUV – Autosub5) using multibeam echosounder (Norbit WBMS 400kHz multibeam echosounder), side scan sonar (Edgetech 2205 Dual Frequency Sidescan Sonar - 420 kHz and 120 kHz), sub-bottom profiler (Edgetech 2205 Sub Bottom Profiler, 2-16 kHz). The AUV will be deployed and recovered multiple times during the two offshore campaigns, and aside from launch and recovery will move beneath the sea surface with no surface expression and will not involve any contact with the seafloor. The approximate survey altitudes are 50-75 m for multibeam echosounder, and 15 m for sidescan sonar and sub-bottom profiler.

3.2.3 Moorings

The project involves the temporary deployment of short oceanographic moorings (with no sea surface expression) to monitor near-seafloor currents and sediment transport, which will be recovered after a period of approximately 12 months (Figure 3). Seafloor moorings to be deployed at five locations in Irish waters between water depths of 1500m and 3400m. Each mooring will comprise: an anchor (1000 kg weight comprising chain or train wheels) connecting to a vertical wire (approximately 30 m long) that connects to buoyancy (provided by glass spheres and/or syntactic foam buoy). Scientific instruments will be attached to the vertical mooring line as detailed below, and an acoustic release link that will enable recovery of the mooring. These moorings follow a very similar design that has been deployed and recovered previously elsewhere in the Whittard Canyon (as previously agreed with MARA).

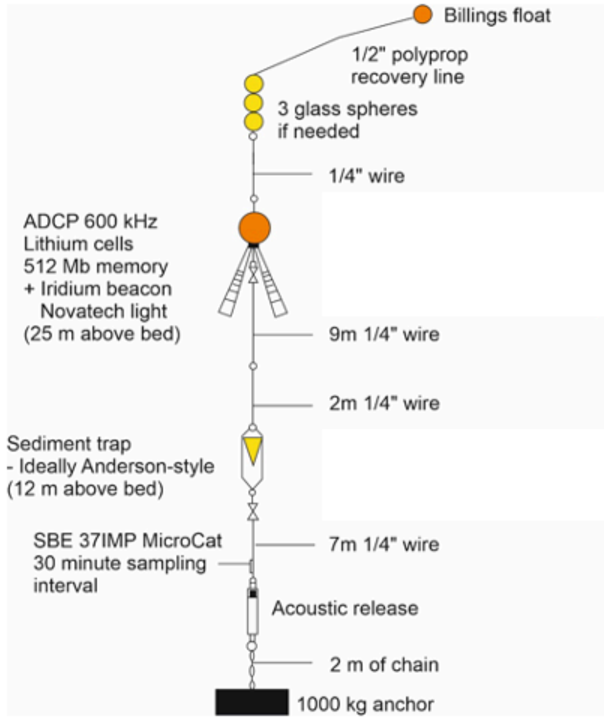


Figure 3: Schematic diagram of the proposed mooring setup.

3.2.3.1 ADCP

The Teledyne RDI Sentinel 600 kHz Acoustic Doppler Current Profiler (ADCP) is used to measure ambient and sediment laden currents. It operates by transmitting acoustic pulses through four slanted beams and measuring the Doppler shift of sound scattered back from particles suspended in the water. By sampling the returning echoes in a series of depth cells, the instrument constructs vertical profiles of current speed and direction throughout the water column. Integrated tilt, compass, and pressure sensors allow the ADCP to correct measurements for its orientation and depth during deployment. Data can be stored internally or transmitted in real time, and the system can operate in various modes, including current profiling, bottom tracking, and directional wave measurement, depending on the platform and mission requirements. The ADCP will be mounted approximately 25 m above the seabed in down-looking configuration.

3.2.3.2 Sediment Trap

The McLane Sediment Trap is deployed on a mooring or vertical array and features a large funnel that captures particles settling through the water column. Prior to deployment the instrument is programmed with a sample schedule, either at fixed intervals or adaptive based on sensors (e.g., pressure or tilt). As particles accumulate in the funnel they are directed into one of a carousel of sample bottles that contain a solution of HgCl, which is dense and the bottle will be sealed when not in use (so will not be released); each bottle is sequentially sealed off once its turn is complete and the mechanism rotates to the next bottle. The instrument logs time, date, battery voltage and optional tilt/pressure data throughout the deployment to support post-recovery analysis. Upon recovery the collected bottles provide discrete time slices of particulate flux, which are then analyzed for sediment composition, organic carbon, radionuclides or other parameters. The sediment trap will be mounted approximately 12 m above the seabed.

3.3.3.2 SBE 37 MicroCAT

The SBE 37 MicroCAT is a compact, low-power oceanographic recorder that measures conductivity, temperature, and pressure to derive high-accuracy temperature, salinity and depth time series. It uses a stable, pumped or unpumped conductivity cell paired with a precision thermistor and a high-resolution pressure sensor to capture seawater properties at user-defined intervals. During deployment, the instrument autonomously logs data to internal memory while maintaining extremely low energy consumption, making it suitable for long-term moorings, gliders, profiling floats, or fixed observatories. Its internal firmware applies calibration coefficients, timestamps each sample, and performs basic quality checks. Once recovered, the recorded dataset is downloaded via serial or inductive modem interface, processed with calibration corrections, and used to derive water column structure, mixing processes, and long-term oceanographic trends. The SBE 37 MicroCAT will be mounted approximately 3-5 m above the seabed.

3.2.4 Sampling

The project involves the sampling of seafloor sediments using scientific coring equipment (Table 6). For each offshore campaign we proposed to use an OSIL megacorer (0.5 m deep x 0.06 m diameter cores –30 sampling locations proposed, at each sampling location 4 cores to be acquired, so a potential total of 120 cores), NIOZ box cores (0.5 m deep x 0.5x 0.5 m wide sampler – 15 cores proposed), and Standard Gravity Piston coring (up to 6 m deep x 0.1 m diameter cores – 16 cores proposed) along transects within the canyon systems. On the basis of this plan, we anticipate a total volume of 0.7 m^3 of megacorer samples, 1.9 m^3 of box cores to be sampled, and 3.0 m^3 of Standard Gravity Piston cores – equating to a total of 5.6 m^3 of seafloor sampling, for each campaign; hence an anticipated recovery of 11.1 m^3 of sediment.

Table 6: Overview of physical sampling requirements for the MISSING-Link expedition.

Type of sample	Type of gear	Water column	On or in seabed	Below seabed	Number Stations	Water depths	Distance from coast
Box core	NIOZ box core	No	Yes	Yes	15	170-3400 m	12-200 NM
Mega-corer	OSIL mega-corer	No	Yes	Yes	30	170-3400 m	12-200 NM
Standard Gravity Piston coring	Standard Gravity Piston coring	No	Yes	Yes	16	170-3400 m	12-200 NM
Water sample	Fluidion Deep Water Sampler and from CTD	Yes	No	No	<100 (sampled while AUV is underway and from	170-3400	12-200 NM

	rosette to calibrate salinity measurements				CTD rosette)		

3.2.4.1 Box Coring

The NIOZ box corer is a seabed sampling instrument designed to collect relatively undisturbed sediment blocks and their overlying bottom water. During deployment, the corer is lowered to the seafloor with its sampling box held open and its spade and doors locked in position. When the frame makes contact with the seabed, the instrument's weight allows the sampling box to penetrate the sediment vertically. As the corer is lifted, a mechanical trigger closes the spade beneath the sample and swings the top doors shut, sealing the sediment and preserving its stratification and water–sediment interface. Once recovered on deck, the box insert is removed for sub-sampling, allowing researchers to extract intact vertical profiles of sediments, pore waters, biological communities, and geochemical gradients with minimal disturbance.

3.2.4.2 Mega Coring

The OSIL Mega-Corer is a multi-core seabed sampling system designed to recover multiple high-quality, undisturbed sediment cores in a single deployment. During descent, each core tube is held open with its core catcher and sealing mechanisms restrained to prevent premature closure. When the frame lands on the seabed, the system's weighted structure allows the core tubes to penetrate vertically into the sediment under their own mass. As the corer is lifted, each tube's core catcher engages to retain the sediment, and an upper sealing valve closes to preserve the overlying water and maintain the sediment–water interface. On deck, the tubes are removed individually for sub-sampling, providing a consistent suite of parallel sediment cores ideal for geochemical, biological, and sedimentological analyses.

3.2.4.3 Gravity Piston Coring

A standard gravity–piston corer is designed to collect long, relatively undisturbed sediment cores from the seabed. During deployment, the core barrel—fitted with a piston and a core catcher at the lower end—is suspended beneath a weighted head that provides the driving force. As the system free-falls through the water, the weight and momentum allow the barrel to penetrate deeply into the sediment. When the barrel enters the seabed, the piston remains at the sediment surface, creating suction that reduces internal friction and allows the sediment column to enter the liner more cleanly. As the corer is retrieved, the core catcher engages to retain the sample, preventing loss from the bottom of the tube. Once on deck, the liner is removed and sectioned for sedimentological, geochemical, and paleoenvironmental analyses, providing a continuous vertical record of seabed deposition.

3.2.4.4 Water Sampling

The Fluidion Deep Water Sampler is an autonomous, pressure-tolerant water sampling system designed to collect discrete seawater samples during underwater missions. When mounted on an AUV, the sampler receives a trigger from the vehicle's mission controller at predefined depths or waypoints. Upon command, the system activates an internal pumping and valve mechanism that draws 100 ml of water into one of its sterile sampling chambers, isolating the sample by sealing the chamber immediately after filling to prevent contamination or mixing. The sampler records metadata such as depth, temperature, time, and system diagnostics for each collection event. Because it is compact and electrically efficient, the unit integrates cleanly with AUV payload power and communication systems, allowing high-quality chemical, biological, or microbiological samples to be captured at targeted locations without interrupting the vehicle's mission. Once the AUV is recovered, the 14 sealed sample cartridges are removed for laboratory analysis.

3.2.5 AUV Camera System

The Autosub 5 camera system is an integrated imaging payload designed to capture high-resolution seabed and mid-water imagery during autonomous missions. The system consists of a downward-looking 20 Mpix digital stills camera paired with a synchronized LED strobe or high-intensity lighting array to ensure consistent illumination under low-light deep-sea conditions. The camera is mounted in a pressure-rated housing and triggered automatically by the vehicle's mission controller at predefined altitudes, waypoints, or time intervals. An onboard altitude sensor, collision avoidance system and navigation data stream allow the vehicle to maintain stable flight height of 3-5 m above the seabed, ensuring uniform image scale and overlap for photogrammetric processing. All imagery is stored to high-capacity solid-state memory within the camera module, along with metadata such as depth, position, pitch, and roll. After recovery, the dataset provides detailed visual records of seabed habitats, geological structures, and anthropogenic features, supporting quantitative analysis and habitat characterization.

3.2.7 Ultra-Short-Baseline (USBL)

A USBL system determines the underwater position of a vehicle or instrument by measuring the travel time and angle of arrival of acoustic signals exchanged between a transceiver mounted on the surface vessel and a transponder or responder mounted on the subsea asset. The Ranger 2–class configuration provides mid-range tracking capability, typically supporting reliable positioning over several kilometres with high update rates. During operation, the vessel-mounted transceiver emits short acoustic interrogation pulses; the subsea transponder receives these pulses and replies with its own acoustic signal. The USBL processor measures the return signal's travel time to determine slant range, while an array of closely spaced hydrophones in the transceiver determines the horizontal and vertical arrival angles through phase-differencing techniques. By combining angle-of-arrival and range information, the system computes a real-time 3D position fix relative to the vessel. Motion sensors and GPS on the surface platform provide corrections for pitch, roll, heave, and heading, ensuring accurate and stable tracking of the underwater target even in dynamic sea states. USBL will be used for positioning of the AUV, gliders and of over-the side sampling deployments.

3.2.8 CTD and turbulence profilers (except mooring mounted, see 3.3.3.2)

3.2.8.1 Sea-Bird 911plus CTD

The Sea-Bird 911plus is a ship-deployed, real-time oceanographic CTD system engineered for high-accuracy profiling from the surface to full ocean depth. It uses a pumped-flow conductivity and temperature measurement path to ensure rapid sensor response and stable alignment between channels, while a precision quartz pressure sensor provides accurate depth determination. The instrument transmits data continuously through a sea cable to the surface, where the deck unit handles power distribution, real-time data acquisition, and system control. Typically integrated with a rosette water sampler, the 9plus supports coordinated bottle firing using auxiliary channels and altimeter input. Its fast sampling rate and robust pump-controlled flow enable the high-resolution vertical structure of temperature, salinity, and density to be measured even in sharp thermohaline gradients. The system is designed for repeatability and long-term calibration stability.

3.2.1.2 Rockland Scientific VMP-2000 Vertical Microstructure Profiler

The Rockland Scientific VMP-2000 is a free-fall, high-resolution microstructure profiler designed to measure small-scale turbulence and mixing processes throughout the water column. During deployment, the instrument is released to descend through the water at a controlled fall speed, typically between 0.5 and 0.8 m/s. Cable is spooled out to ensure that the instrument in freefalling and so unaffected by ship movement. As it falls, the profiler's microstructure sensors—piezoelectric shear probes and fast-response thermistors—capture fine-scale velocity shear and thermal gradients at kilohertz sampling rates. These signals are used to estimate turbulent kinetic energy dissipation and vertical eddy diffusivity with very high spatial resolution. The profiler also carries standard CTD sensors, accelerometers, and tilt sensors to correct for motion and to provide contextual hydrographic data. Data is transmitted up the cable in real time to a logging computer on deck and when the instrument approaches the seabed, it is winched back to the surface. To ensure robust scientific result, profiling is repeated multiple times while the ship is moving slowly through the water.

3.2.9 ADCPs (except mooring mounted, see 3.2.3.1)

3.2.9.1 Teledyne RDI 300 kHz Workhorse ADCP (CTD Mounted)

The Teledyne RDI 300 kHz Workhorse is a mid-frequency Acoustic Doppler Current Profiler designed for versatile oceanographic current measurements from fixed moorings, mobile platforms, or vessel-mounted configurations. Operating at 300 kHz, it provides a balance of profiling range and vertical resolution, making it suitable for shelf-sea deployments, coastal studies, and moderate-depth current surveys. The instrument uses a four-beam Janus configuration to transmit acoustic pulses and measure the Doppler shift of backscattered sound from particles in the water column, generating vertical profiles of current magnitude and direction across user-defined depth cells. Integrated sensors—such as tilt, temperature, and optional pressure—allow the ADCP to correct for instrument orientation and provide context for current structure. The Workhorse series is known for its robust build, low power consumption, and reliable long-term operation, and can store data internally or stream it in real time depending on platform requirements. Two RDI 300 kHz ADCPs will be attached to the CTD rosette, in down-looking and up-looking configurations. They are synced acoustically to avoid cross-contamination of the signals.

3.2.9.2 Syrinx SprintNav 600 kHz (AUV mounted)

The Syrinx SprintNav is a compact, high-frequency 600 kHz Doppler Velocity Log (DVL) and inertial navigation system designed for precise near-bottom and mid-water velocity measurements. Using a four-beam Janus configuration, it transmits short acoustic pulses and measures the Doppler shift of echoes returning from the seabed or suspended particulates, producing high-precision velocity-over-ground or water-tracking data. Its 600 kHz operating frequency provides excellent resolution for low-altitude AUV flight, enabling accurate dead-reckoning and stable control in challenging terrain or during close-proximity survey operations. The SprintNav integrates the acoustic DVL with an onboard high-grade IMU, allowing tightly coupled inertial–acoustic navigation that maintains accurate state estimates even during brief periods of acoustic dropout. This makes the system well suited for complex missions such as pipeline inspection, habitat mapping, detailed seabed surveys, and manoeuvring in cluttered or variable environments.

3.2.9.3 Teledyne RDI 75 kHz and 150 kHz Ocean Surveyor ADCP (Vessel Mounted)

The Teledyne RDI 75 kHz and 150 kHz Ocean Surveyor are low-frequency Acoustic Doppler Current Profilers optimised for vessel mounting. They provide real-time profiles of current velocity under the ship down to >700 m (75 kHz) and >400 m (150 kHz). Ship motion is removed from the data using the vessels high-accuracy GPS.

4. Methods

An Annex IV Risk Assessment has also been carried out to support this licence application. This Appropriate Assessment Screening report has been prepared with reference to the following European Directives, national legislation and guidance on the provisions of Article 6(3) and (4) of the EU Habitats Directive 92/43/EE and the Environmental Impact Assessment Directive (2011/92/EU).

- Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU (EIA Directive) (Codified Directive).
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).
- Technical Guidance note: Obtaining a licence to carry out specified maritime usages in the Maritime Area under the Maritime Area Planning Act 2021. MARA, 2024 Ver 5.
- European Communities (Birds and Natural Habitats) Regulations 2011. SI No. 477 of 2011.
- Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. European Commission 2018. 7621 final. Office for Official Publications of the European Communities, Luxembourg.
- Benthic State and Change in UK Marine waters (Barro Froján et al. 2012)
- Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters. Department of Arts, Heritage and the Gaeltacht, 2014.
- A review of the baseline data was carried out by referring to the following reports and datasets:
- National monuments service - wreck inventory of Ireland (National Monuments service 2024)
- Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) 2024. Bathymetry, backscatter, sediment samples and sediment classification layers;
- Marine Institute (2022). Ireland's Marine Atlas: Fishing activity and Fish Species Distribution Layers;
- Irish Ramsar Wetlands Committee. Ramsar sites Ireland;
- EUSeaMap 2023, A European broad-scale seabed habitat map (Vasquez et al. 2023);
- NPWS Designations viewer (SACs, SPAs, NHAs and pNHAs);
- Seabird Populations of Britain and Ireland (Mitchell et al. 2011);
- Biodiversity Data Centre Maps: Habitats and Species;
- Attachment 4.4 - EU Habitats Directive: Annex IV Risk Assessment
- Attachment 4.5: Water Framework Directive

- Attachment 4.6: Consistency of the Proposed Maritime Usage With the Marine Strategy Framework Directive (MSFD) and Ireland's Marine Strategy

- Attachment 4.7: Information for EIA

5. Environmental Report (EIA Directive: not of a class)

5.1 Background

The purpose of Directive 2011/92/EU, which concerns the assessment of environmental effects from certain public and private projects (the Environmental Impact Assessment, or EIA, Directive), is to ensure that any project likely to have a significant environmental impact is properly evaluated before receiving approval. An EIA is mandatory for all projects listed in Annex I of the Directive, and for those in Annex II when the proposed activity is expected to generate significant environmental effects. The proposed project does not fall under any of the categories described in either Annex I or Annex II of the EIA Directive and is therefore not subject to its requirements.

Nevertheless, although an EIA is not compulsory in this case, this Appropriate Assessment Screening report has evaluated the project in relation to its potential to affect the receiving environment, taking into account factors such as its nature, scale, and location.

As such the following elements have been assessed and an analysis of the assessment is given in Table 7 of this report:

- Land & Soils
- Water
- Biodiversity
- Fisheries and Aquaculture
- Air Quality
- Noise & Vibration
- Landscape/Seascape
- Traffic & Transport (including navigation)
- Cultural Heritage (including underwater archaeology
- Population & Human Health
- Major Accidents & Disasters
- Climate
- Waste
- Material Assets
- Interactions

5.2 Identification of Relevant Designated Sites/Conservation Interests and Screening for Likely Significant Effects

No direct or indirect pathway to freshwater, coastal or terrestrial habitats was established in our assessment. For this reason, the baseline of the receiving environment is focused solely on marine habitats, and species including marine mammals and avifauna that utilise the marine environment. The bathymetry and predominant habitat types in the area are known from INFOMAR data and previous scientific studies, including those led by the authors of this report.

Table 7 below provides a summary of the environmental baseline and an assessment of the potential for impact on the environment.

Table 7: Identification of Relevant Designated Sites / Conservation Interests and Screening for Likely significant Effects

1Protected Sites
European sites (SCI, SPA, SAC)

The database of Natura (after Beunen and de Vries 2011 and https://natura2000.eea.europa.eu) sites was compared to the full extents of the working area. There are no overlaps between existing SCIs, SPAs or SACs. However, the Southern Canyons (NPWS 2023) Candidate SAC (cSAC) does overlap with the southern of the two working area blocks. An overview of the Southern Canyons cSAC is provided below. The locations of existing and planned European Sites in the region are shown in Figure 4.

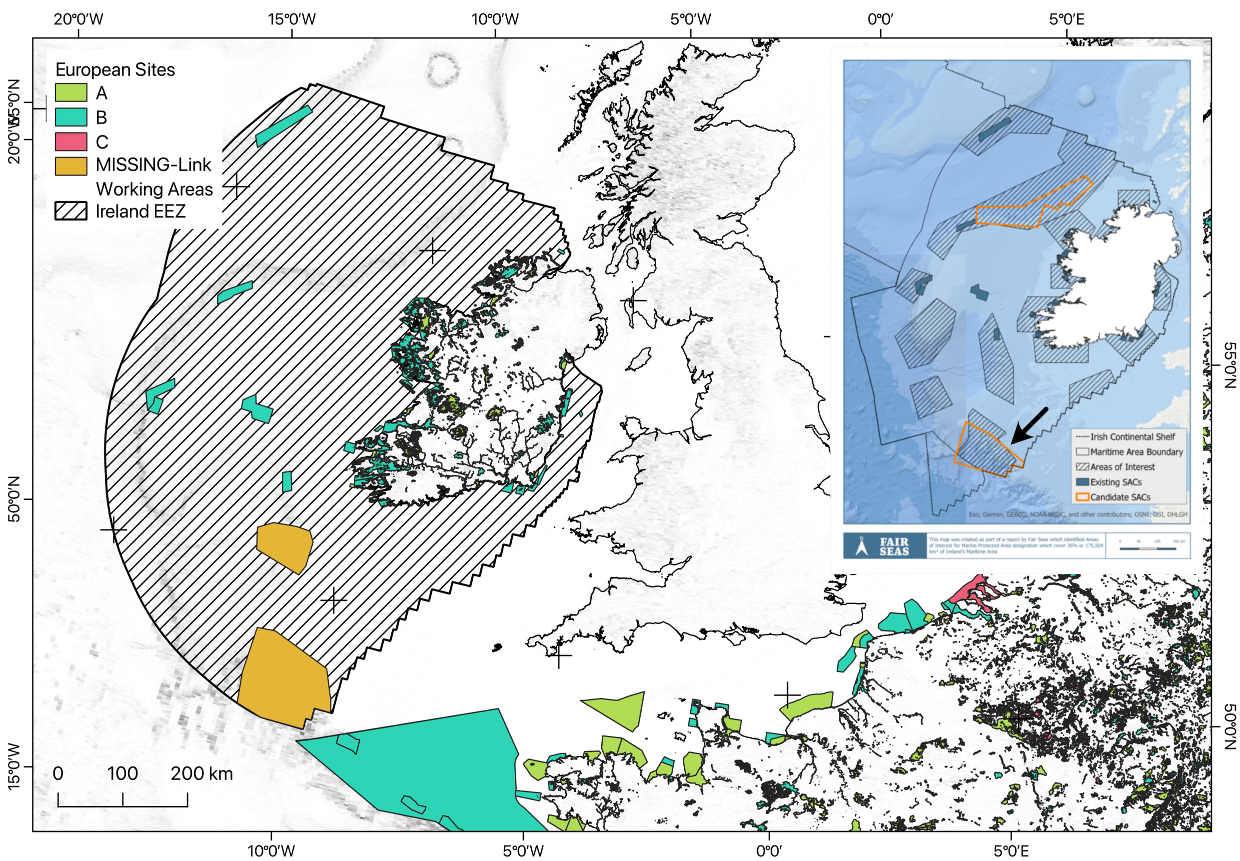


Figure 4: Locations of existing European Sites shown with the Irish EEZ and the planned working locations for this expedition. Inset shows the location of the candidate SAC for the Southern Canyons (https://www.cmscoms.com/?p=33071) - the inset map shows the Maritime Area Boundary extents while the main map shows the mapped EEZ

The Southern Canyons cSAC

The Southern Canyons SAC is a candidate Special Area of Conservation located about 280 kilometres south of Counties Kerry and Cork. It contains a large system of deep-sea canyons, including the Whittard Canyon, which is comparable in scale to the Grand Canyon. The site features a mixture of hard rocky ground and soft sediments, with highly diverse deep-water fauna.

A major survey in 2019 using the RV Celtic Explorer and the Holland I ROV carried out 50 dives and mapped the canyon terrain in great detail. The site is designated for the Annex I habitat "Reefs."

The site is a **candidate Special Area of Conservation** for the **Annex I habitat "Reefs."**

Furthermore, the site is considered of high conservation importance due to its unique deep-sea canyon habitats and diverse benthic communities. The ecology is varied, with hard rocky substrates, soft sediments, and strong influences from bottom currents and marine snow. Species of interest include:

- Sea fans (e.g., *Distichoptilum*)
- Soft corals (e.g., *Anthomastus*, clavulariids, *Acanthogorgia*)
- Sea pens (*Pennatula*, *Kophobelemnon*)
- Bamboo corals (*Acanella*)
- Desmophyllum and Madrepora coral clumps
- Pteropod burrows, echinoids (*Cidaris*), anemones, hermit and galatheid crabs
- Diverse fish including elasmobranchs, grenadiers, orange roughy, and eels

The cSAC boundary is designed to encompass these unique canyon habitats and the site is recognised for its significant conservation value.

Planned activities within the Southern Canyons cSAC and possible impacts

This project will deploy moorings, collect sediment samples, and acquire AUV/Glider and vessel based geophysical and photographic data in this region. The primary potential risks to the listed fauna and habitats arise from localised physical disturbance and temporary acoustic exposure associated with marine research activities. Targeted seabed sampling using corers and grabs may disturb or remove small areas of fragile sessile organisms such as sea fans, soft corals, sea pens, bamboo corals, and coral clumps of Desmophyllum and Madrepora, all of which are highly sensitive to direct contact or substrate disruption. Pteropod burrows and mobile invertebrates such as echinoids, anemones, hermit crabs, and galatheid crabs may experience short-term displacement or habitat alteration where sampling occurs. While fish species including elasmobranchs, grenadiers, orange roughy, and eels are generally mobile and able to avoid sampling gear, they may be exposed to brief behavioural disturbance from echosounder signals.

The proposed survey activities, which includes the use of echosounders, cameras and limited, targeted seabed sampling via coring and the deployment of 5 small moorings, are expected to have only minor and short-term environmental effects within the Candidate EU-designated Special Area of Conservation (cSAC). Echosounders operate at frequencies and intensities that are widely used in marine research and are not known to cause lasting disturbance to benthic habitats or deep-water fauna when deployed responsibly. Seabed sampling will be spatially restricted to the minimum number of stations required to meet scientific objectives, avoiding sensitive features where possible and limiting physical disturbance to very small, localised areas (<1m^2 per coring station). All sampling activities will follow best-practice protocols to prevent unnecessary substrate disruption and to ensure rapid recovery of the seabed. The science team (Huvenne et al., 2005, 2011; Robert et al., 2015; Pearman et al., 2020) have an extensive track record of benthic habitat mapping in the Whittard Canyon and Porcupine Seabight, and have a high awareness of the spatial distribution of sensitive habitats in the study area (e.g. Huvenne et al., 2005) . No extraction beyond small sediment volumes will occur, and all operations will be conducted in compliance with SAC conservation objectives, with real-time environmental awareness guiding site selection. Overall, the activity is assessed as low impact, with no significant adverse effects anticipated on the integrity, structure, or function of the

protected habitats or species within the SAC. Further information on mitigation can be found at the end of this document.
Additional designations (NHAs, pNHAs, Ramsar sites)
The proposed project is entirely marine and we identified no source path receptor link to any terrestrial, coastal or freshwater habitats or species. A review of the Ramsar database (https://www.ramsar.org/country-profile/ireland) indicates that no Ramsar sites overlap with the proposed area or are considered to be within the ZOI of the proposed project.
Non-statutory Environmental Assessment
Population and Human Health
All acoustic survey operations will take place entirely at sea. Fishing vessel operators may experience minor disruption during the survey, but any such inconvenience will be brief and short-lived. There is no risk of pollution, as the survey vessel complies with MARPOL requirements and the hydrocarbon use associated with the survey equipment is minimal.

Biodiversity
Benthic habitats: The two working areas lie on the edge of the shelf, covering a wide range of water depths, from around 150 m to >3000 m. The EUSeaMap 2023 (Vasquez et al. 2023), which is a European broad-scale seabed habitat map reports the primary seabed type in the region to be “seabed” which typically means no classification was possible based on available data. The regions also include patches of sand, sandy-mud and muddy-sand (Figure 5). However, despite not being mapped within EUSeaMap, further contextual information is available in scientific publications e.g (Amaro et al. 2016; Robert et al., 2015; Pearman et al. 2020). The canyon heads are characterised by very steep walls and hard substrates with exposed bedrock, boulders, and cobbles. Mid-canyon sections contain ridges, gullies, and steep to vertical escarpments, especially along the western flank of the Eastern branch in the Whittard Canyon. These features produce complex terrain with high slope and rugosity. The deeper parts of the canyon and the Whittard Channel are dominated by finer sediments including fine sand, silt, and hemipelagic mud. Although located on a passive margin, the canyon experiences active sediment dynamics as previously studied by the project lead Clare, Hall and Huvenne (Aslam et al., 2018; Heijnen et al., 2022). Intensified bottom currents, internal tides, and internal waves interact with the steep topography, causing sediment resuspension and generating nepheloid layers. Finer sediment is redistributed downslope by turbidity currents and mud-rich sediment gravity flows. Steep slopes in the canyon typically indicate harder substrate, because they inhibit sediment deposition. These hard-substrate areas provide attachment surfaces and refuges for benthic organisms and are especially important for sessile species (Huvenne et al., 2011; Johnson et al., 2013). Cold-water corals (CWCs) in Whittard Canyon occur in relation to both topography and hydrodynamics. Corals are most common between about 800 m and 1600 m depth. Probability of occurrence drops sharply below about 2000 m, particularly for reef-building scleractinian species. Corals occur preferentially in areas of high terrain complexity. These include steep or vertical walls, escarpments, ridges, and amphitheatre-like headwall features. These areas provide the hard substrate required for coral attachment. ROV video confirmed corals and coral reefs on vertical walls from 477 m – 1350m water depth and reef-forming *Desmophyllum pertusum*, *Madrepora oculata* and *Solenosmilia variabilis* colonies in smaller clumps down to ~1850 m depth. Areas that experience elevated internal tide current speeds show increased CWC probability. Internal tide energy focuses food delivery by resuspending particulate organic matter and forming nepheloid layers. These conditions create favourable feeding environments for CWCs. The highest likelihood of coral occurrence is on steep escarpments that coincide with strong internal tide currents. Areas with low terrain complexity or deeper than 2000–2500 m show low predicted probability for the presence of reef-building cold-water corals, but can still host soft coral species such as *Anthomastus* or the bamboo coral *Acanella,* and sea pens such as *Kophobelemnon* (Morris et al., 2013). Many of those still prefer locations of increased terrain complexity (e.g. *Anthomastus* has mainly been reported from steep edges of flow channels) or increased slope (e.g. *Acanella. Kophobelemnon*). Morris et al. (2013) noted: “Overall, many areas of the canyon are devoid of coral or have only between 1 and 56 individuals per 100m video transect”. Benthic habitat information for Gollum Channel is more limited, but records of small cold-water coral clusters/mounds have been reported in the literature (Tudhope & Scoffin, 1995; Verweirder, 2025). Overall, the Gollum Channel system is considered more sedimented and less active than the Whittard

Canyon, but steep flanks have still been mapped out (Beyer et al., 2003). The benthic species and their habitat distribution is expected to be similar to that of the Whittard Canyon.

The proposed approach to the seabed operations consists of a phased geophysical survey prior to the deployment of any sampling equipment or moorings. This will include the acquisition of multibeam bathymetry and where necessary sidescan sonar data using the AUV, to identify appropriate sites. This will enable the identification of seabed features such as escarpments and complex terrain which will be avoided for corer and mooring deployments (both for operational and impact mitigation reasons). Where necessary, targeted higher-resolution acoustic data will be collected or visual surveys will be conducted to refine on-board interpretation of habitat and species distributions, before decisions on operations are made. Only after this assessment confirms that proposed sampling stations and mooring sites avoid features of conservation interest, will physical seabed interaction occur.

Where corers and moorings will be deployed, their individual footprints are expected to be less than 1m^2:

- Piston corer: ~0.15 m diameter → disturbance footprint ~0.05 m² per core;
- Box corer: ~0.5 x 0.5 m, plus frame → ~1 m² per core.
- Mega corer: frame diameter ~1m → ~1 m² per core.
- Mooring anchor: max 1m diameter → ~1 m² per core.

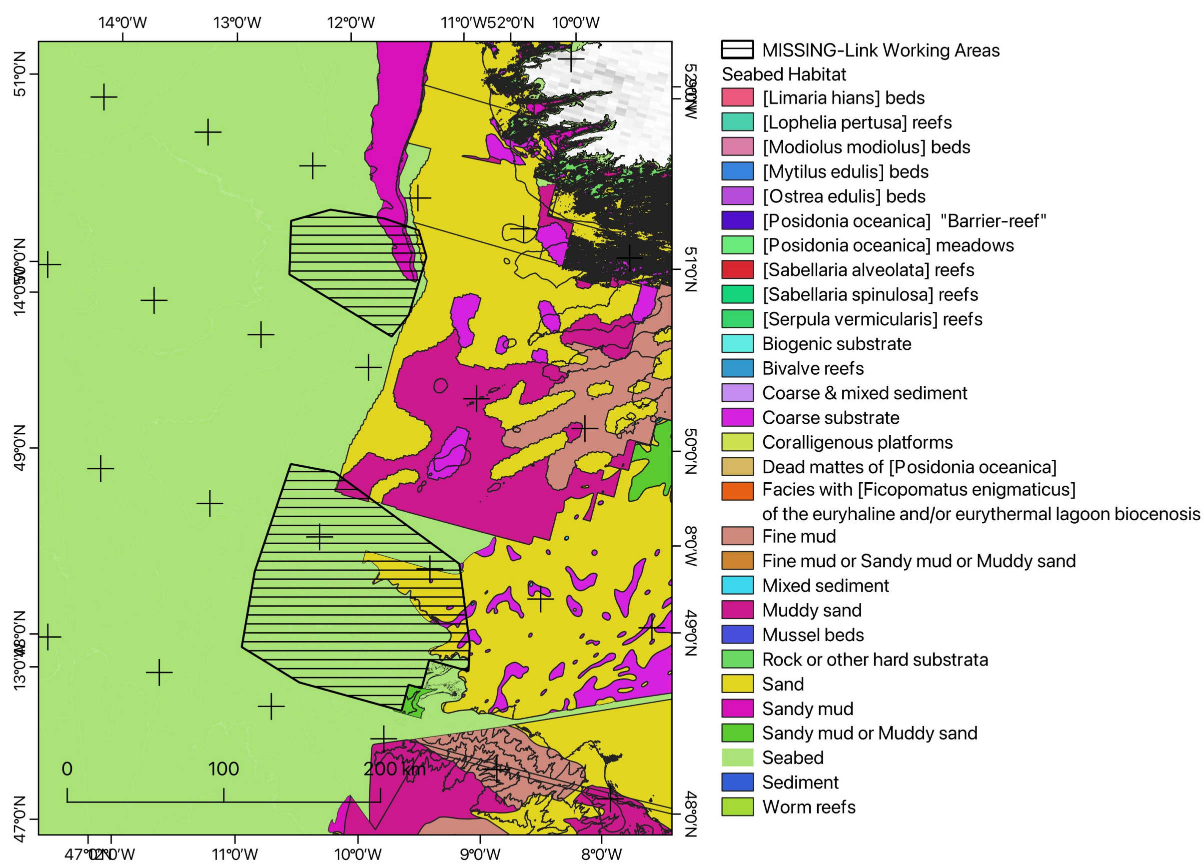


Figure 5: Seabed habitat types from the EUSeaMap (Vasquez et al. 2023)

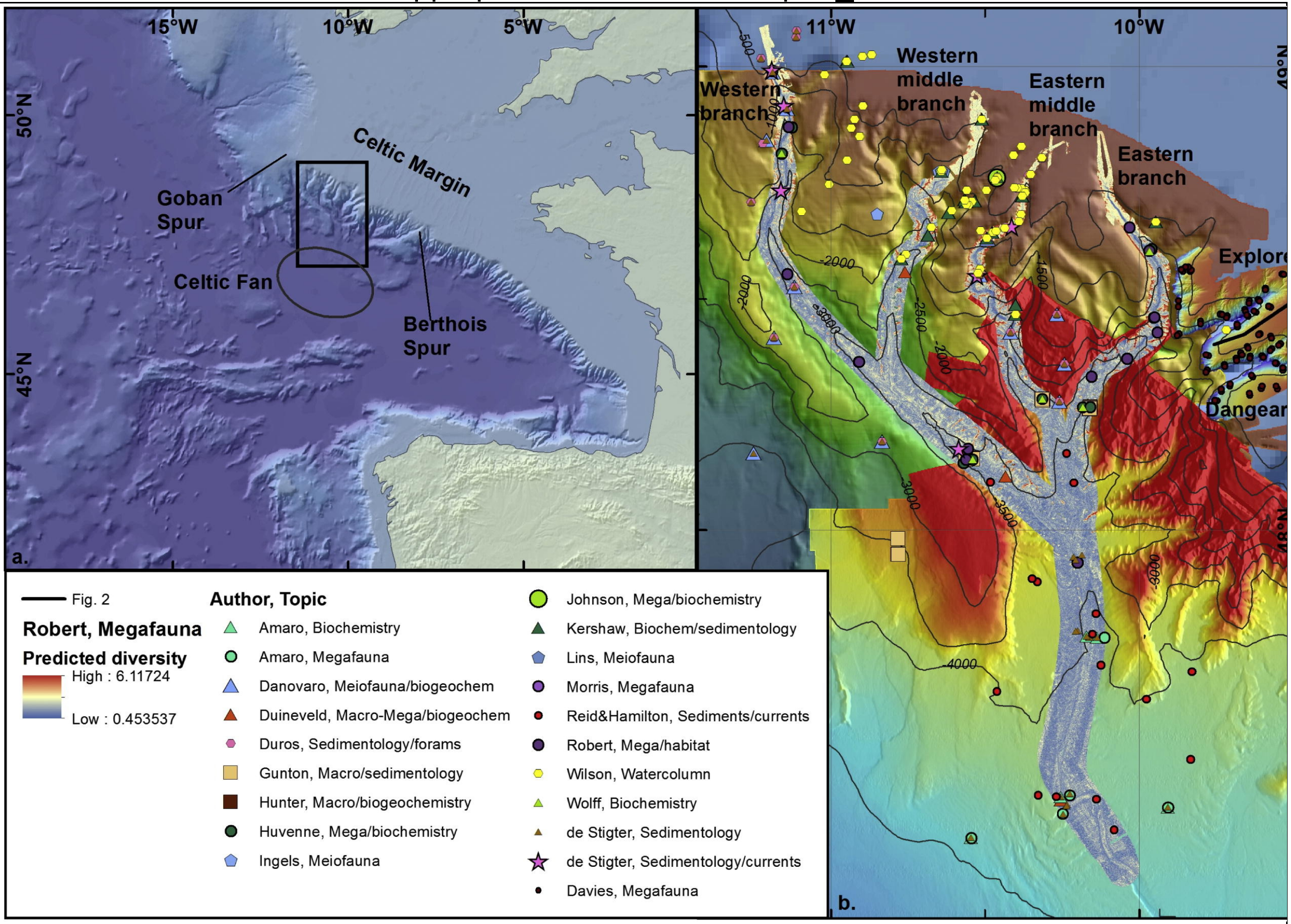


Figure 6: Location map of the Whittard Canyon showing sampling locations listed by author and data type (meio-, macro-, megafauna, biogeochemistry, sedimentology, water column or current measurements). Bathymetry courtesy of the Geological Survey of Ireland (GSI Dublin) for the upper canyon, the HMS Scott for the lower canyon and Whittard Channel, and the MESH project for the Explorer & Dangeard Canyons (Amaro et al. 2016).

Based on the understanding of their benthic ecosystem, in addition to the proposed operational procedures, the proposed echosounder surveys, limited coring operations, and five mooring deployments are considered of very limited and temporary impact on the marine environment of Whittard Canyon and Gollum Channel. The potential impacts are therefore not considered significant. The canyon system is characterised by steep, hard-substrate walls, complex geomorphology and active hydrodynamic processes, including strong internal tides and natural sediment resuspension. These natural dynamics generate frequent disturbance and high levels of suspended material, meaning that the minor, short-term acoustic exposure from echosounders and the small, localized seabed disturbance caused by coring fall well within the range of conditions already experienced by benthic communities. Most cold-water corals and associated fauna are concentrated on steep escarpments and ridge slopes where sediment does not accumulate; these areas will be avoided during coring. Echosounder frequencies used for bathymetric mapping are not known to harm benthic organisms, and physical disturbance from coring and mooring deployment is restricted to a very small footprint (<1m^2 per location), with rapid natural infilling of cored locations expected due to ongoing sediment transport within the canyon. The short moorings will be recovered in full, except for their anchors. Those will be made of materials that naturally dissolve over time in the marine environment and will have a size that does not exceed large boulders (iceberg dropstones or canyon wall collapse fragments) that naturally can be found in the canyon environment. Overall, the activities are unlikely to result in any measurable or lasting ecological impact within this dynamic deep-sea environment.

Coastal and terrestrial habitats:

Not relevant. The proposed project is entirely within the subtidal marine environment and no direct or indirect links to coastal, freshwater or terrestrial habitats are possible.

Avifauna:

The proposed offshore survey operations, located more than 130 km from the Irish coastline, are expected to pose minimal risk to seabird species due to the significant distance from major breeding colonies and coastal foraging areas (Figure 7). At this offshore location, overall seabird density is typically low and largely dominated by wide-ranging pelagic species that are less susceptible to disturbance from vessel activity. The use of echosounders generates underwater acoustic signals that do not affect airborne or surface-resting birds, and no above-water noise or lighting levels beyond normal vessel operations are anticipated. Targeted seabed sampling using corers and grabs is fully submerged and creates no aerial disturbance, food-source disruption, or risk of entanglement. Standard vessel navigation presents a very low collision risk given the absence of dense bird aggregations offshore, and no attraction or disorientation effects are expected. The NERC vessels now have a policy of minimal light pollution, closing all blinds and curtains at night and minimising light on deck (as long as operations are safe) to avoid as much as possible attracting birds. Overall, the planned activities are assessed to have negligible impacts on seabirds, with no significant effects predicted on population levels or the conservation status of offshore-occurring species.

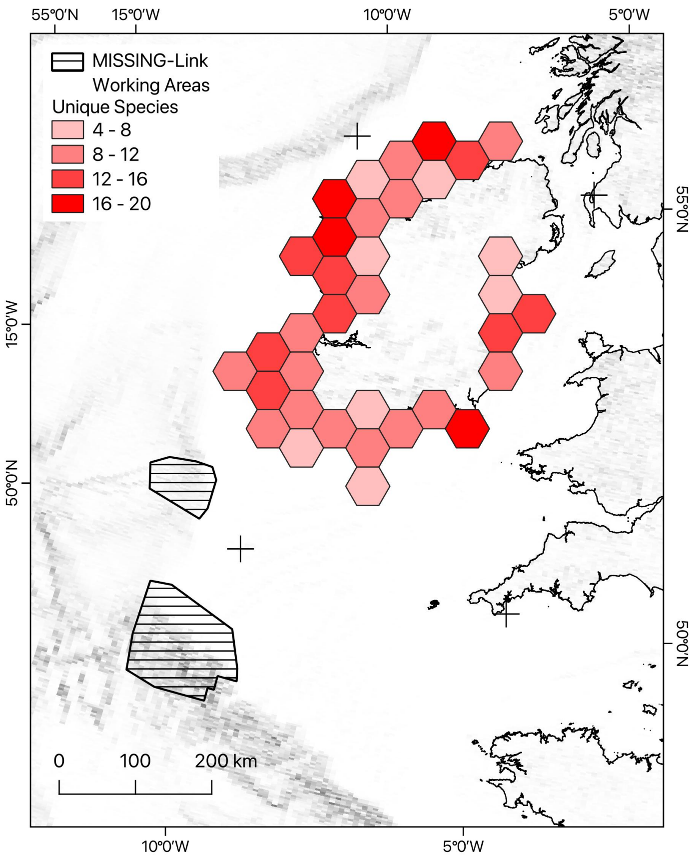


Figure 7: Unique bird species identified by Birdwatch Ireland gridded into 50km polygons (Mitchell et al. 2011).

Marine mammals:

A total of 26 cetacean species have been recorded in Ireland. The National Biodiversity Data Centre manages a Marine Mammal Database using data collected from numerous sources (e.g. Irish Whale and Dolphin Group) regarding the distribution of cetaceans off the coast of Ireland. These distribution data show that the area in and surrounding the proposed project areas are used by a range of cetacean species, the density and distribution of which varies over time and season.

Those that are known to have been sighted in the study areas and associated Zone of Influence include: Common dolphin (*Delphinus delphis*), Common Porpoise (*Phocoena phocoena*), White-beaked Dolphin (*Lagenorhynchus albirostris*), Bottle-nosed Dolphin (*Tursiops truncates*), Risso's Dolphin (*Grampus griseus*), Fin Whale (*Balaenoptera physalus*), Humpback Whale (*Megaptera novaeangliae*), Minke Whale (*Balaenoptera acutorostrata*), Killer Whale (*Orcinus orca*), False Killer Whale (*Pseudorca crassidens*), Blue Whale (*Balaenoptera musculus*), Sperm Whale (*Physeter macrocephalus*).

Based on documents from the National Parks & Wildlife Service (NPWS), we understand that the Belgica Mound Province Special Area of Conservation is designated with respect to two cetacean species — Bottlenose Dolphin (*Tursiops truncatus*) and Harbour Porpoise (*Phocoena phocoena*). Although infrequent, there are live cetacean recordings within the Belgica Mound Province SAC including Common dolphin (*Delphinus delphis*), Common Porpoise (*Phocoena phocoena*), False Killer Whale (*Pseudorca crassidens*), Fin Whale (*Balaenoptera physalus*), White-beaked Dolphin (*Lagenorhynchus albirostris*), and Bottle-nosed Dolphin (*Tursiops truncates*). Regarding cetaceans, this region qualifies as an SAC for Annex II listed species including Bottle-nosed Dolphin (*Tursiops truncates*) and Common Porpoise (*Phocoena phocoena*).

The Southern Canyons cSAC which overlaps with our study area in Whittard Canyon does not formally list cetaceans as Qualifying Interests, however, deep-diving whales and dolphins are known to use the canyon habitat. The NGO Irish Whale & Dolphin Group (IWDG) indicates that the Southern Canyons region (including the off-shelf canyons like the Whittard Canyon) is a suitable habitat for Long-finned pilot whales (*Globicephala melas)* and different species of beaked whales. The IWDG also note a presence of common dolphins and harbour porpoise in wider Irish deep waters. Though not explicitly confirmed for the specific cSAC, they are plausible given the offshore habitat.

The acoustic instruments proposed for the survey—including high-frequency multibeam echosounders, sidescan sonar, ADCPs, USBL positioning systems, and low-power sub-bottom profilers—are expected to pose only a very low risk to cetaceans occurring in and around the study area. Although a wide range of cetacean species may be present seasonally in the Southern Canyons region, including delphinids, fin and minke whales, deep-diving beaked whales, long-finned pilot whales, and occasionally harbour porpoise and bottlenose dolphins, the majority of the planned sensors operate at mid to high frequencies (120–600 kHz) that fall well above the hearing sensitivity range of baleen whales and most odontocetes. These signals attenuate rapidly in deep water and are not known to cause behavioural disturbance at the source levels used in standard oceanographic survey equipment. The low-frequency components of the sub-bottom profilers (2–16 kHz) and the USBL (22-34 kHz) overlap more closely with odontocete hearing, but their duty cycles are short, the sound pulses are narrow-beam, and operational durations are limited; as a result, the potential for disturbance is minor and localised. No injury or population-level effects are anticipated. The deep-sea canyon environment also provides large three-dimensional space for animals to avoid sound fields, and cetaceans utilising the Whittard Canyon are highly mobile. Taken together, the combination of high-frequency instrumentation, short exposure periods, low spatial footprint, and minimum impact operational procedures (see next section) means that only very small, temporary behavioural responses are possible, and the survey is unlikely to have any significant impact on cetacean species or the conservation objectives of the adjacent SACs.

Fish:

The proposed survey locations do not occur within any designated areas of pot fishing or inshore net fishing grounds and there are no licensed aquaculture sites within the proposed project area.

The only Annex II fish species present in Irish waters are:

- Atlantic salmon
- Sea lamprey
- River lamprey
- Brook lamprey
- Allis shad
- Twaite shad

Annex II fish species occurring in Irish waters are all freshwater or diadromous species that rely on rivers, estuaries, and nearshore coastal waters for spawning, migration, and feeding. These species do not use deep offshore environments such as the Southern Canyons or the Gollum Channel, which lie far beyond their known habitat ranges. As a result, there is no ecological pathway by which offshore acoustic surveys, seabed sampling, or vessel operations could impact Annex II fish or the

conservation objectives of SACs designated for them. No interactions are expected, and Annex II fish are considered not relevant to the assessment of offshore impacts for this project.
Water, air and climate
Although small-scale sediment disturbance will occur during the planned coring and seabed sampling operations, this mobilisation will be highly localised, temporary, and rapidly dispersed within the naturally dynamic hydrodynamic regime of the canyon(s). Given the strong background levels of natural sediment resuspension in this environment, the limited quantity of material released during sampling does not have the potential to measurably affect overall water quality. Although exhaust emissions from the survey vessel are unavoidable, the associated contribution to atmospheric pollutants will be minimal, remaining well within the range of existing background levels for this offshore area and with no potential to cause exceedances of applicable Air Quality Standards. Consequently, no likely significant effects on air quality are predicted. The survey vessel will operate in full compliance with MARPOL requirements, which include strict controls on waste, wastewater discharge, and the management of non-indigenous species. Accordingly, no operational waste generation is anticipated as part of the proposed project. The project does not have the potential to negatively impact climate change trends.
Cultural Heritage
A review of the National Monuments service - Wreck Inventory of Ireland identifies approximately 100 known wrecks within the wider study area (Figure 8), reflecting the long maritime history of the region. To ensure that these cultural heritage assets are fully protected, a phased geophysical survey methodology will be implemented prior to the deployment of any sampling equipment or moorings. This will include the acquisition of multibeam bathymetry and sidescan sonar data to identify seabed features and potential wrecks, followed by targeted higher-resolution acoustic imaging where required to refine the location, extent, and condition of any anomalies of archaeological interest. Only after this assessment confirms that proposed sampling stations and mooring sites are clear of cultural heritage constraints will physical seabed interaction occur. Through this systematic approach, the project will avoid impacts on known and previously unrecorded wrecks, ensuring full mitigation of archaeological risk.

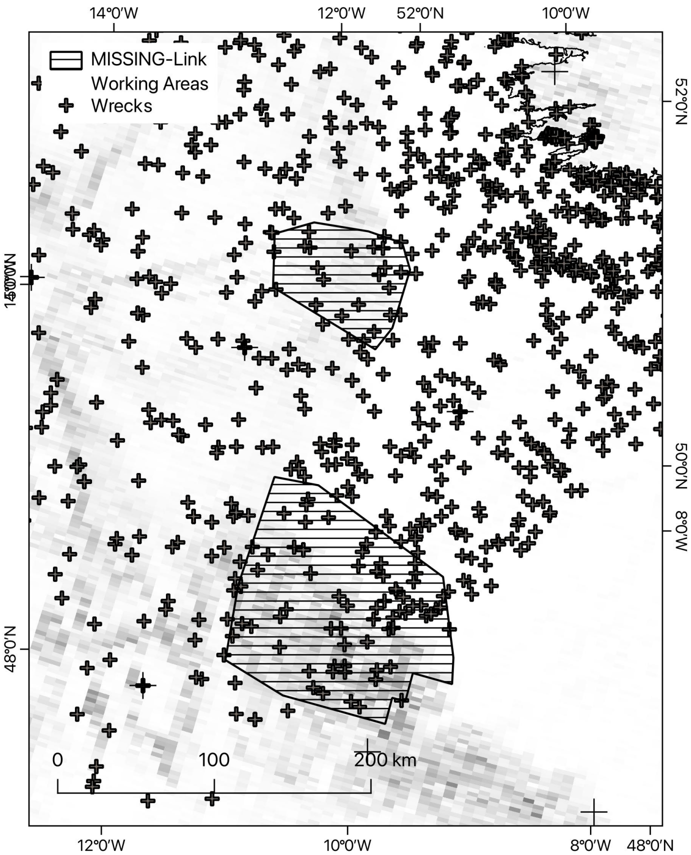


Figure 8: Locations of known wrecks extracted from the National Monuments service - Wreck Inventory of Ireland (National Monuments service 2024).

Material Assets

Several operational subsea telecommunications cables intersect or pass in close proximity to the proposed working areas, as shown Figure 9. These assets are of national and international importance, and all project activities will be undertaken in full accordance with the recommendations of the International Cable Protection Committee (ICPC) to ensure their protection as well as following review of appropriate navigational charts and the KISCORCA database of the European Subsea Cables Association. Prior to the deployment of any sampling equipment, moorings, or towed sensors, cable routes will be reviewed using the most up-to-date spatial data, and geophysical surveys will be used to verify seabed conditions and confirm cable positions where necessary. All sampling stations and mooring sites will be positioned to maintain a safe separation distance from known cable corridors, and no operations involving seabed penetration or anchoring will be conducted within designated cable protection zones. Through adherence to ICPC recommendations and careful operational planning, the project will avoid any risk of damage or interference with subsea cable infrastructure.

No other marine based infrastructure is located within the proposed project area.

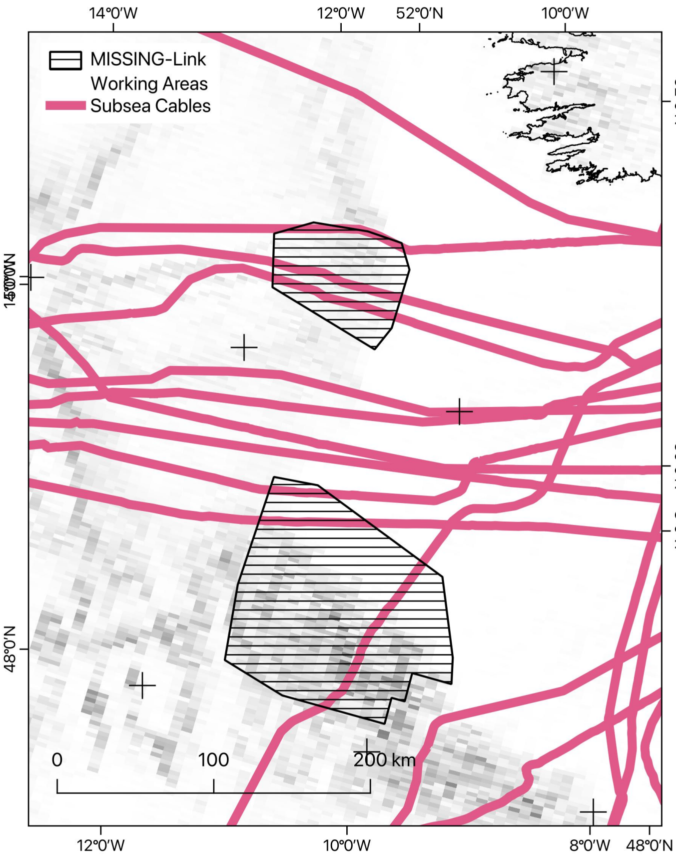


Figure 9: Locations of known in-service subsea cables.

In-Combination / Cumulative Effects
In accordance with EU EIA and Habitats Directive guidance on the assessment of cumulative and in-combination effects, the potential for the proposed project to interact with other existing or planned activities, causing a cumulative environmental effect, has been considered. Owing to the limited spatial extent, short-term duration, and low-impact nature of the survey and sampling operations, no credible pathways for cumulative impacts on environmental receptors outside the Natura 2000 network have been identified. The findings of this Appropriate Assessment Screening report further support the conclusion that the project, when considered alongside other marine activities in the region, does not give rise to the potential for additive, synergistic, or temporal interactions that could affect the receiving environment. Nonetheless, applying the precautionary principle, the mitigation measures set out below are recommended.

5.3. Summary of Mitigation Measures

5.3.1. Mitigation Plan for Marine Mammals (Cetaceans and Pinnipeds)

The proposed project includes the use of multibeam echosounders, sidescan sonar, sub-bottom profilers, ADCPs, USBL systems, and limited seabed sampling operations. Although the acoustic sources involved are of relatively low risk compared to seismic airguns, they nevertheless require mitigation to ensure the protection of marine mammals in accordance with National Parks and Wildlife Service (NPWS 2014) guidance for geophysical acoustic surveys in Irish waters. The following measures outline how the project will avoid and minimise potential noise-related disturbance to cetaceans and pinnipeds within the working areas.

A. General Mitigation to Avoid Noise-Related Disturbance

- Appointment of a Marine Mammal Observer (MMO). A qualified and experienced MMO will be appointed for the survey. The MMO will conduct visual monitoring, maintain standardised NPWS logs, and advise the Chief Scientist or survey lead on start-up permissions for acoustic equipment.
- Establishment of a 500 m Monitored Zone. In the absence of site-specific propagation modelling, a 500 m radial mitigation zone will be applied around each geophysical sound source, as per NPWS (2014). Acoustic equipment will not be started if marine mammals are detected within this zone.

B. Pre-Start Monitoring

- Acoustic surveys may only begin during daylight hours when the MMO confirms effective visibility and the ability to monitor the full mitigation zone.
- Clear Communication Protocol. A defined communication signal will be established between the MMO and the Survey/Operations Lead. Acoustic sources may only be activated following explicit MMO clearance.
- Monitoring Duration (≤200 m water depth). If operations occur in waters shallower than 200 m, the MMO will undertake 30 minutes of continuous pre-start monitoring.
- Monitoring Duration (>200 m water depth). In deeper waters, including the Southern Canyons region and Whittard Canyon, the MMO will conduct 60 minutes of pre-start monitoring with no detections inside the 500 m zone.
- Requirement for Ramp-Up/Soft Start. Once pre-start monitoring indicates the zone is clear, the acoustic source must undergo a Ramp-Up Procedure, with continued MMO observation.

C. Ramp-Up (Soft-Start) Procedure

- Where technically possible, the equipment will begin at the lowest operational power and increase gradually over 20 minutes until reaching full operational output.
- Full operational output will follow immediately after ramp-up to avoid unnecessary sound introduction.
- Once started, ramp-up may continue even if visibility deteriorates or marine mammals subsequently appear within 500 m, as per NPWS guidance.

D. Line Changes and Station Moves

- Long Gaps (>40 minutes). If a survey line or station change takes more than 40 minutes, one of the following must occur:
  - Full shutdown followed by Pre-Start Monitoring and Ramp-Up; or
  - Reduction to low-power (165–170 dB) followed by a full Ramp-Up Procedure.
- Short Gaps (<40 minutes) For shorter line changes, acoustic sources may continue operating at full output.

E. Breaks in Acoustic Output

- Breaks >30 minutes. Any interruption in sound output greater than 30 minutes requires full Pre-Start Monitoring and Ramp-Up before resuming operations.
- Shorter Break Limits for Higher Risk Sources. If any acoustic system is assessed as having higher output (per risk assessment), a shorter 5–10 minute break limit may be applied by the regulatory authority. This will be followed by full mitigation procedures.

F. Reporting

- Full MMO logs, including all marine mammal observations and mitigation actions, will be compiled according to NPWS templates and submitted to the regulatory authority as required.

These NPWS-aligned measures will be applied to all vessel-mounted acoustic systems (e.g., Kongsberg EM710/EM122, EA640, Edgetech 2205 sub-bottom profiler) during start-up. For AUV-mounted systems, acoustic activation will occur only at operational depth, avoiding unnecessary surface exposure. All mitigation will be integrated into cruise planning to minimise unnecessary cumulative sound into the environment.

This mitigation plan ensures that the proposed survey can be undertaken safely, in full compliance with Irish regulatory expectations, while avoiding disturbance to cetaceans and pinnipeds known to occur in the wider study region.

5.3.2. Avoidance of Material Assets

The project area contains several active subsea telecommunications cables that intersect or run adjacent to the designated working areas. These assets are of significant national and international importance, and specific mitigation is required to ensure that all survey operations—including acoustic mapping, AUV deployment, mooring placement, and seabed sampling—avoid any risk of physical interaction or damage. The following measures outline the procedures that will be followed in accordance with ICPC recommendations, industry best practice, and the operational parameters of this research project.

A. General Mitigation to Avoid Damage to Subsea Infrastructure

- Use of Up-to-Date Cable Route Information: The most recent cable route datasets (e.g., ICPC charts, hydrographic office data, commercial cable registers) will be obtained prior to mobilisation. These will be reviewed as part of survey and sample planning.
- Desktop Review and Hazard Assessment: A pre-survey hazard assessment will be completed to identify all cable crossings, near-field interactions, and potential constraints within and around the proposed working areas.

B. Pre-Deployment Geophysical Verification

- Geophysical Survey of Proposed Sampling and Mooring Locations: Prior to the deployment of any seabed-disturbing equipment (coring systems, moorings), the project will complete AUV multibeam bathymetry to confirm: the precise location of known subsea cables; the absence of uncharted or abandoned cables; and adequate buffer distances between cables and planned sampling stations.
- If any anomalies or potential cable signatures are detected the site will be avoided.

C. Operational Avoidance Measures

- Minimum Separation Distance: All sampling equipment, anchors, moorings, and towed systems will be located well outside recognised cable protection zones, maintaining an operational buffer consistent with ICPC recommendations and vessel risk assessments.
- Prohibition of Seabed Penetration Near Cables: No coring, seabed penetration or mooring deployment will occur in proximity to any known or suspected cable corridor.

D. Contingency and Communication Protocols

- Clear Chain of Command for Cable Avoidance: A designated officer/scientist will oversee cable-avoidance compliance during operations. Any concerns identified by the survey team must be communicated immediately to the bridge and survey leads.
- Immediate Stand-Down if Cable Proximity Becomes Uncertain: If at any point the precise position of a cable or asset cannot be confirmed, all seabed operations will be suspended until the hazard is resolved through additional survey or positional verification.

By combining pre-survey analysis, geophysical verification, real-time navigation control, and strict procedural avoidance, the project will avoid any risk of disturbing or damaging subsea telecommunications infrastructure during acoustic surveying, AUV operations, mooring deployment or seabed sampling.

5.3.3. Vessel presence and collision risk

During operations the research vessel operates at very low speed or remains on station. Collision risk is therefore:

- Lower than during transit, because propeller and hull are moving slowly;
- Comparable to that of any stationary or slow-steaming vessel in offshore waters.

Standard marine mammal and turtle mitigation (e.g. maintaining a vigilant watch, adherence to safe vessel speed when animals are observed near the bow) is sufficient to keep collision risk for Annex IV species extremely low.

5.4 Conclusion (Screened Out)

The proposed project does not fall within a category that automatically requires a mandatory Environmental Impact Assessment (EIA). However, projects below the threshold may still need an EIA if they are expected to have significant environmental effects. This Appropriate Assessment Screening report has evaluated the project's potential impacts, both individually and in combination with other developments, on the receiving environment. It concludes that, given the project's scale and nature, along with the mitigation measures outlined, no significant environmental impacts are anticipated.

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