



National Oceanography Centre

Natura Impact Statement

MUL250021– MISSING-LINK Offshore Scientific Survey

Prepared by: National Oceanography Centre (NOC)

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Glossary

Term	Definition
Appropriate Assessment (AA)	Assessment required under Article 6(3) of the Habitats Directive
AEOI	Adverse Effect on Site Integrity
European Site	SAC or SPA designated under the Habitats and Birds Directives
SCI	Site of Community Importance
SAC	Special Area of Conservation
SPA	Special Protection Area

Abbreviations and Acronyms

Acronym	Meaning
AA	Appropriate Assessment
ADCP	Acoustic Doppler Current Profiler
AEOI	Adverse Effect on Site Integrity
AIS	Automatic Identification System
AUV	Autonomous Underwater Vehicle
MBES	Multibeam Echosounder
MMO	Marine Mammal Observer
MUL	Maritime Usage Licence
NIS	Natura Impact Statement
NOC	National Oceanography Centre
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SCI	Site of Community Importance
SPA	Special Protection Area
SPL	Sound Pressure Level
USBL	Ultra Short Baseline

1. Introduction

1.1 The Project

This Natura Impact Statement (NIS) has been prepared to inform Appropriate Assessment under Article 6(3) of the European Union Habitats Directive (92/43/EEC), as transposed into Irish law. The document assesses the potential for the proposed MISSING-Link offshore scientific research expedition to result in adverse effects on the integrity of European sites, either alone or in combination with other plans and projects.

The proposed works comprise offshore scientific survey activities within deep-water regions of the Irish Exclusive Economic Zone (EEZ), including geophysical surveys, oceanographic observations, environmental sampling, deployment of autonomous and moored instrumentation, seabed sampling and associated vessel operations.

The project forms part of a wider scientific programme funded through the United Kingdom Natural Environment Research Council (NERC) and associated collaborating institutions to improve understanding of deep-sea sediment transport processes, benthic environments, pollutant pathways and oceanographic connectivity within canyon and continental slope systems offshore Ireland. Associated application documents are hosted online at <https://www.maritimeregulator.ie/application/mul250021/>.

1.2 The Applicant and Project Partners

The project is led by the National Oceanography Centre (NOC), United Kingdom, in collaboration with partner organisations including:

- University of Southampton
- University of East Anglia
- Scottish Association for Marine Science (SAMS)
- University College Cork
- University of Galway
- Manchester University

Additional technical and scientific collaborations may support elements of survey delivery and analysis.

1.3 Purpose and Status of this Natura Impact Statement

This Natura Impact Statement has been prepared to support an application for a Maritime Usage Licence (MUL) and to inform Appropriate Assessment by the competent authority.

The NIS provides a Stage 2 Appropriate Assessment of potential effects on European sites following screening for Appropriate Assessment. The assessment considers:

- qualifying interests and conservation objectives of relevant European sites;

- potential pathways for effect associated with the proposed activities;
- embedded and additional mitigation measures;
- and the potential for adverse effects on site integrity either alone or in combination with other plans and projects.

This NIS should be read alongside the Supporting Information for Screening for Appropriate Assessment, Annex IV Risk Assessment and associated environmental supporting documentation prepared for the application, all of which can be found here: <https://www.maritimeregulator.ie/application/mul250021/>

2. Legislative and Policy Context

2.1 Habitats Directive

This Natura Impact Statement has been prepared in accordance with Article 6(3) of the Habitats Directive (92/43/EEC), which requires that any plan or project likely to have a significant effect on a European site be subject to Appropriate Assessment.

2.2 Birds Directive

The assessment also considers obligations arising under the Birds Directive (2009/147/EC) relating to Special Protection Areas (SPAs) and protected bird species.

2.3 Irish Transposing Legislation

The Habitats and Birds Directives are transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).

2.4 Relevant Policy and Guidance

The assessment additionally considers:

- Marine Strategy Framework Directive (2008/56/EC);
 - Maritime Spatial Planning Directive (2014/89/EU);
 - NPWS guidance relating to Appropriate Assessment and marine mammals;
 - MARPOL requirements;
 - and the precautionary principle and ecosystem-based approach underpinning European marine environmental management.
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3. Findings of the Supporting Information: Screening for Appropriate Assessment

3.1 Introduction

A Supporting Information for Screening for Appropriate Assessment was undertaken to identify European sites and qualifying interests for which likely significant effects could not be excluded.

The screening assessment identified potential impacts associated with:

1. Underwater noise: Possible temporal impacts on marine mammals and birds that are Qualifying Interests from a number of identified European sites from noise generated from a number of proposed activities which will be occurring within their foraging ranges.
2. Physical habitat disturbance or destruction: Possible habitat disturbance or destruction of habitat to protected reef habitat within the Southern Canyons SAC which overlaps with one of the two proposed areas.

In addition to the qualifying interests and Special Conservation Interest (SCI) species formally identified through the Appropriate Assessment screening process (Common bottlenose dolphin (*Tursiops truncatus*), Harbour porpoise (*Phocoena phocoena*), Reefs [1170], Kittiwake (*Rissa tridactyla*), Fulmar (*Fulmarus glacialis*), Storm petrel (*Hydrobates pelagicus*), Lesser black-backed gull (*Larus fuscus*), Puffin (*Fratercula arctica*), Manx shearwater (*Puffinus puffinus*), Gannet (*Morus bassanus*)), this Natura Impact Statement has also considered a limited number of additional species known or considered likely to occur within the wider study area. Whilst these species are not qualifying interests of the European sites progressed to Stage 2 assessment, they represent ecologically relevant receptors that may utilise the waters surrounding the proposed survey areas.

Their inclusion reflects the precautionary principle that underpins the Appropriate Assessment process and provides additional confidence that all relevant ecological pathways have been considered. The assessment of these species does not alter the scope of the Appropriate Assessment, which remains focused on the conservation objectives and qualifying interests of the relevant European sites, but provides supplementary evidence supporting the conclusion that the proposed activities will not adversely affect the integrity of any European site, either alone or in combination with other plans or projects.

3.2 Marine Mammals (Annex II Species)

Likely Significant Effects associated with underwater noise and acoustic disturbance could not be excluded, on a precautionary basis and in the absence of mitigation, for a number of Special Areas of Conservation (SACs) designated for marine mammals.

The principal pathways for effect considered during screening included:

- underwater noise disturbance;
- behavioural disturbance;
- acoustic masking;
- temporary threshold shift (TTS);
- and vessel-related disturbance.

Table 1: Marine mammal European sites and qualifying interests progressed to Stage 2 Appropriate Assessment.

European Site	Distance from Proposed MUL Area	Qualifying Interest	Potential Effect	Screening Justification
<i>Slyne Head Islands SAC (IE000328)</i>	300 km approx.	Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]; Grey seal (<i>Halichoerus grypus</i>) [1364]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS	Yes – possible underwater noise disturbance from proposed activities
<i>Slyne Head Peninsula SAC (IE002074)</i>	300 km approx.	Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS	Yes – possible underwater noise disturbance from proposed activities
<i>West Connacht Coast SAC (IE002998)</i>	300 km approx.	Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]; Harbour porpoise (<i>Phocoena phocoena</i>) [1351]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS; auditory injury	Yes – possible underwater noise disturbance from proposed activities
<i>Duvillaun Islands SAC (IE000495)</i>	380 km approx.	Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS	Yes – possible underwater noise disturbance from proposed activities
<i>Belgica Mound Province SAC (IE002327)</i>	70 km approx.	Harbour porpoise (<i>Phocoena phocoena</i>) [1351]; Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS; auditory injury; temporary habitat disturbance	Yes – possible underwater noise disturbance from proposed activities
<i>Porcupine Bank Canyon SAC (IE003001)</i>	270 km approx.	Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS; temporary habitat disturbance	Yes – possible underwater noise disturbance from proposed activities
<i>South-west Porcupine Bank SAC (IE002329)</i>	250 km approx.	Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS; temporary habitat disturbance	Yes – possible underwater noise disturbance from proposed activities
<i>Mers Celtiques – Talus du golfe de Gascogne (FR5302015)</i>	Offshore regional connectivity	Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]; Harbour porpoise (<i>Phocoena phocoena</i>) [1351]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS; auditory injury	Yes – possible underwater noise disturbance from proposed activities

<i>Récifs du talus du golfe de Gascogne (FR5302016)</i>	Offshore regional connectivity	Common bottlenose dolphin (<i>Tursiops truncatus</i>) [1349]; Harbour porpoise (<i>Phocoena phocoena</i>) [1351]	Underwater noise disturbance; behavioural disturbance; acoustic masking; TTS; auditory injury; temporary habitat disturbance	Yes – possible underwater noise disturbance from proposed activities
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Additional cetacean species including white-beaked dolphin (*Lagenorhynchus albirostris*), killer whale (*Orcinus orca*), false killer whale (*Pseudorca crassidens*) and blue whale (*Balaenoptera musculus*) were also considered within the wider Annex IV Species Risk Assessment (https://www.maritimeregulator.ie/wp-content/uploads/2025/12/MUL250021-Risk_Assessment_for_Annex_IV_Species.pdf) and associated derogation documentation (<https://www.maritimeregulator.ie/wp-content/uploads/2025/12/MUL250021-NPWS-Derogation-Report-Supporting-Information.pdf> and <https://www.maritimeregulator.ie/wp-content/uploads/2025/12/MUL250021-NPWS-Derogation-Licence.pdf>) due to their potential occurrence within the broader offshore environment. However, these species are not qualifying interests of the European sites assessed within this Natura Impact Statement.

3.3 Marine Ornithology (Birds Directive Species)

Significant Effects associated with underwater noise, vessel presence, artificial lighting and temporary disturbance could not be excluded, on a precautionary basis and in the absence of mitigation, for a number of Special Protection Areas (SPAs) designated for seabirds and marine-associated bird species.

- Potential pathways considered included:
- underwater noise disturbance;
- vessel disturbance;
- visual disturbance;
- artificial lighting;
- and temporary interruption to foraging behaviour.

Table 2: Marine ornithology European sites and Special Conservation Interests progressed to Stage 2 Appropriate Assessment.

European Site	Distance from Proposed MUL Area	Special Conservation Interest(s)	Potential Effect	Screening Justification
<i>Inishmore SPA (IE004152)</i>	250 km approx.	Kittiwake (<i>Rissa tridactyla</i>) [A188]	Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance; lighting disturbance	Yes – possible underwater noise disturbance from proposed activities

Cliffs of Moher SPA (IE004005)	250 km approx.	Kittiwake (<i>Rissa tridactyla</i>) [A188]	Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance; lighting disturbance	Yes – possible underwater noise disturbance from proposed activities
Loop Head SPA (IE004119)	200 km approx.	Kittiwake (<i>Rissa tridactyla</i>) [A188];	Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance	Yes – possible underwater noise disturbance from proposed activities
Kerry Head SPA (IE004189)	190 km approx.	Fulmar (<i>Fulmarus glacialis</i>) [A009]	Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance	Yes – possible underwater noise disturbance from proposed activities
Dingle Peninsula SPA (IE004153)	150 km approx.	Fulmar (<i>Fulmarus glacialis</i>) [A009]	Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance	Yes – possible underwater noise disturbance from proposed activities
Blasket Islands SPA (IE004008)	140 km approx.	Storm petrel (<i>Hydrobates pelagicus</i>) [A014]; Lesser black-backed gull (<i>Larus fuscus</i>) [A183]; Kittiwake (<i>Rissa tridactyla</i>) [A188]; Puffin (<i>Fratercula arctica</i>) [A204]; Fulmar (<i>Fulmarus glacialis</i>) [A009]; Manx shearwater (<i>Puffinus puffinus</i>) [A013]	Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance; lighting disturbance	Yes – possible underwater noise disturbance from proposed activities
Puffin Island SPA (IE004003)	120 km approx.	Fulmar (<i>Fulmarus glacialis</i>) [A009]; Manx shearwater (<i>Puffinus puffinus</i>) [A013]; Storm petrel (<i>Hydrobates pelagicus</i>) [A014]; Puffin (<i>Fratercula arctica</i>) [A204]	Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance; lighting disturbance	Yes – possible underwater noise disturbance from proposed activities

3.4 Annex I Habitats and Benthic Features

Likely Significant Effects associated with temporary seabed disturbance, sediment resuspension and physical interaction with reef habitats could not be excluded, on a precautionary basis and in the absence of mitigation, for offshore reef habitats and associated benthic communities.

The Southern Canyons SAC represents the only European site that spatially overlaps the proposed survey area and therefore the only site for which direct physical interaction with Annex I reef habitat could potentially occur. Additional offshore reef SACs, including Belgica Mound Province SAC, Porcupine Bank Canyon SAC, South-west Porcupine Bank SAC and Récifs du talus du golfe de Gascogne, were also progressed to Stage 2 Appropriate

Assessment on a precautionary basis owing to the presence of Annex I reef habitat and potential pathways associated with temporary seabed disturbance and sediment resuspension. The principal pathways for effect considered during screening included:

- physical habitat disturbance;
- habitat destruction;
- sediment mobilisation and redeposition;
- physical interaction with reef habitat;
- and accidental pollution events.

Table 3: Annex I habitat and benthic receptor combinations progressed to Stage 2 Appropriate Assessment.

European Site	Distance from Proposed MUL Area	Qualifying Interest	Potential Effect	Screening Justification
Southern Canyons SAC (IE002278)	Overlaps proposed MUL area	Reefs [1170]	Physical habitat disturbance; habitat destruction; sediment resuspension; sediment deposition; temporary seabed disturbance	Yes – possible physical habitat disturbance or destruction

3.5 Summary of European Sites Progressed to Stage 2 Appropriate Assessment

Table 4: Summary of European sites progressed to Stage 2 Appropriate Assessment.

Receptor Group	European Sites Progressed to Stage 2
Marine mammals	Slyne Head Islands SAC; Slyne Head Peninsula SAC; West Connacht Coast SAC; Duvillaun Islands SAC; Belgica Mound Province SAC; Porcupine Bank Canyon SAC; South-west Porcupine Bank SAC; Mers Celtiques – Talus du golfe de Gascogne; Récifs du talus du golfe de Gascogne
Marine ornithology	Inishmore SPA; Cliffs of Moher SPA; Loop Head SPA; Kerry Head SPA; Dingle Peninsula SPA; Blasket Islands SPA; Puffin Island SPA; Iveragh Peninsula SPA; Skelligs SPA; Deenish Island and Scariff Island SPA; Beara Peninsula SPA; The Bull and the Cow Rocks SPA; Cruagh Island SPA; High Island, Inishshark and Davillaun SPA; Clare Island SPA; Duvillaun Islands SPA
Annex I habitats and benthic features	Southern Canyons SAC

4. Project Description

4.1 Overview of Survey Activities

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, 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 that will provide significant benefits associated 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 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). All activities are temporary and reversible in nature.

4.2 Survey Areas

The proposed survey activities will be undertaken within two principal offshore study areas located in deep-water regions of the Irish Exclusive Economic Zone (EEZ), centred on the Gollum Channel system and the Whittard Canyon system (Figure 1). These areas were selected due to their importance as major sediment transport pathways and deep-sea canyon environments, supporting ongoing scientific investigations into benthic ecosystems, oceanographic processes, sediment dynamics and deep-sea environmental connectivity.

The southern study area partially overlaps the Southern Canyons SAC, designated for Annex I reef habitat [1170], while the northern study area lies in proximity to the Belgica Mound Province SAC. The study areas are located within offshore continental slope and canyon environments characterised by steep bathymetric gradients, complex seabed morphology and locally developed deep-water reef communities.

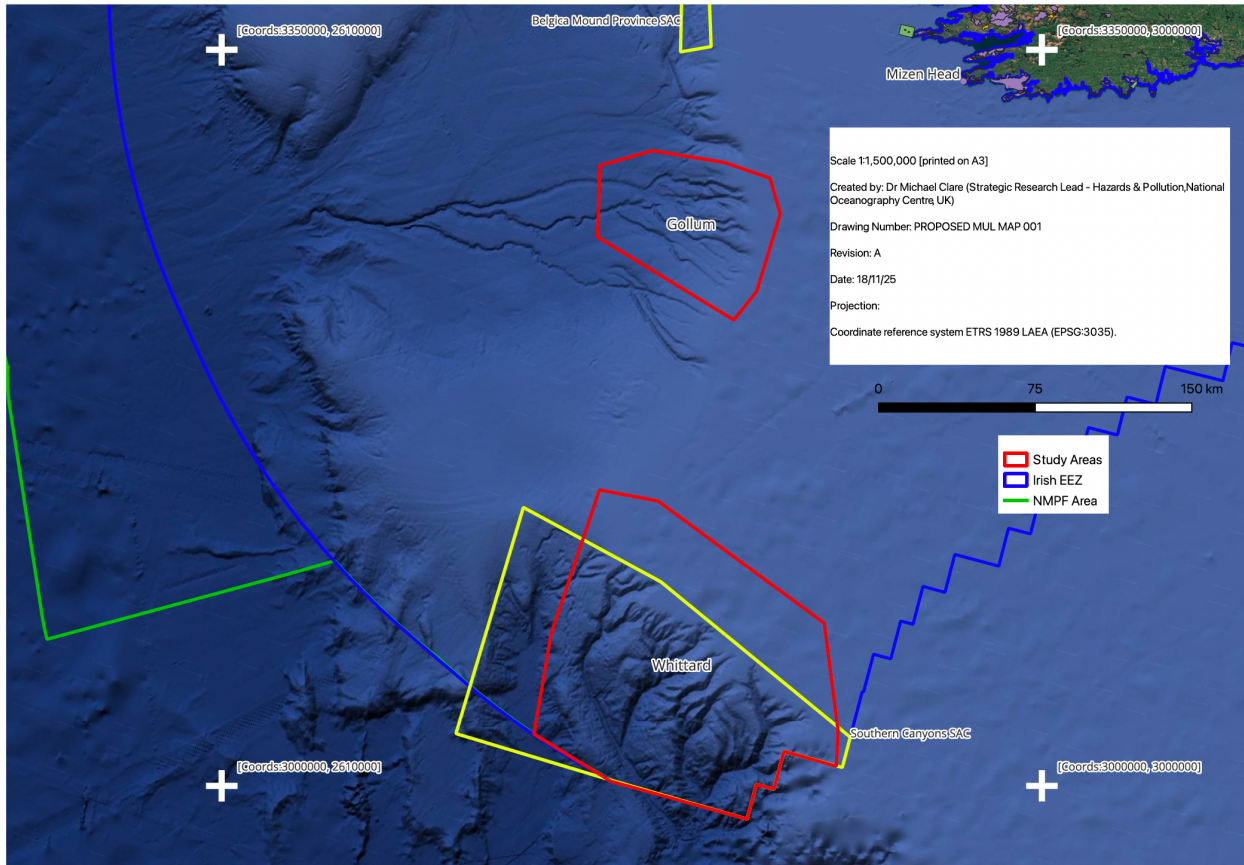


Figure 1: Proposed working areas

4.3 Acoustic and Sampling Equipment

Equipment to be used is summarized in table. A detailed breakdown of deployment positions can be found in Annex MUL250021_NIS_A1.

Table 5: Acoustic and sampling equipment proposed to be operated during the MISSING-Link expeditions. Note: In the event of equipment failure a similar alternative may be used/deployed if available.

Equipment	Model	Deployment	Company	Frequency (kHz)	Sound Pressure Level re 1 μ PA in water @ 1m from source	Reference
Acoustic Survey Equipment						
Multibeam Echosounder	Norbit WBMS 400kHz	AUV	Norbit	400	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	420 120	~226	Geo-matching (n.d.) <i>EdgeTech 2205 AUV/ROV/ASV Sonar – Product Specification.</i> Available at: https://geo-matching.com/
Sub Bottom Profiler	Edgetech 2205 (2-16 kHz)	AUV	Edgetech	2-16	~226	Geo-matching (n.d.) <i>EdgeTech 2205 AUV/ROV/ASV Sonar – Product Specification.</i> Available at: https://geo-matching.com/
ADCP	Syrinx SprintNav, 600 kHz	AUV	Syrinx	600	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	300	~215	Teledyne RD Instruments (2011) <i>Source Level of Teledyne RDI ADCP Transducers (Technical Note FST-054).</i> Teledyne Marine. Available at: https://www.teledyne-marine.com/

ADCP	RDI 600 kHz Workhorse	Mooring	Teledyne	600	~217	Teledyne Instruments (2011) <i>Source Level of Teledyne RDI ADCP Transducers (Technical Note FST-054).</i> Teledyne Marine. Available at: https://www.teledyne-marine.com/
ADCP	RDI 75 kHz Ocean Surveyor	Vessel mounted	Teledyne	75	~227	Teledyne Instruments (2011) <i>Source Level of Teledyne RDI ADCP Transducers (Technical Note FST-054).</i> Teledyne Marine. Available at: https://www.teledyne-marine.com/
ADCP	RDI 150 kHz Ocean Surveyor	Vessel mounted	Teledyne	150	~226	Teledyne Instruments (2011) <i>Source Level of Teledyne RDI ADCP Transducers (Technical Note FST-054).</i> Teledyne Marine. Available at: https://www.teledyne-marine.com/
ADCP	1 MHz AD2CP	Seaglider	Nortek	1000	214-215	
Single Beam Echosounder	Kongsberg EA640 10/12 kHz	Vessel mounted	Kongsberg	10-12	~222	Kongsberg Maritime (2022) <i>Sound levels from Kongsberg multibeam systems.</i> Kongsberg Discovery. Available at: https://www.kongsberg.com/
Multibeam Echosounder	Kongsberg EM122 12 kHz and EM710 70 to 100 kHz	Vessel mounted	Kongsberg	12 70-100	~210 (122) ~210 (710)	Kongsberg Maritime (2022) <i>Sound levels from Kongsberg multibeam systems.</i> Kongsberg Discovery. Available at: https://www.kongsberg.com/
Sub-bottom profiler	Kongsberg SBP27 (2-9 kHz)	Vessel mounted	Kongsberg	2-9	~209	Kongsberg Maritime (2022) <i>Sound levels from Kongsberg multibeam systems.</i> Kongsberg Discovery. Available at: https://www.kongsberg.com/
Ultra-short baseline (USBL)	Ranger 22-34 kHz	AUV	Sonardyne	22-34	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				
<i>CTD</i>	SBE9+	AUV	Seabird Electronics	N/A
<i>Sound Velocity probe</i>	AML Micro-X	Cable (from Vessel) or CTD frame	Alm Oceanographic	N/A
<i>Vertical Microstructure Profiler</i>	VMP-2000	Cable (from vessel)	Rockland Scientific International	N/A
<i>CTD</i>	SBE 37 MicroCAT	Mooring	Seabird Electronics	N/A
Sampling equipment				
<i>Megacorer</i>	Multi-Corer	Cable (from Vessel)	OSIL	N/A
<i>Optical Imaging Sensor</i>	Hydroptic UPV6	AUV	Hydroptic	N/A
<i>Water Sampler</i>	Deep Water Sampler	AUV	Fluidion	N/A
<i>Rosette Sampler</i>	Niskin Bottles	CTD Frame	N/A	N/A
<i>Box Core</i>	NIOZ box core	Cable (from Vessel)	N/A	N/A
<i>Standard Gravity Piston Corer</i>	Standard Gravity Piston coring	Cable (from Vessel)	N/A	N/A
<i>Sediment Traps</i>	McLane sediment trap	Mooring	McLane	N/A
Other Survey Equipment				
<i>Camera System</i>	AESA 2.5	AUV	Blackfly, adjusted by NOC	N/A

4.4 Vessel Specifications

Table 6: Overview of vessel specifications for research vessels. RRS James Cook will be used in 2026.

	<i>RRS James Cook</i>	<i>RRS Discovery</i>
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 m ² labs; 7 containers	389 m ² labs; 7 containers

4.5 Waste Management

Waste generated onboard the UK Research Vessel RRS James Cook is managed in accordance with MARPOL regulations, UK environmental legislation, and the vessel's approved waste management procedures, with the aim of minimising environmental impact during scientific operations. Waste streams are segregated at source into categories including general waste, recyclables, food waste, hazardous waste, and operational wastes associated with scientific activities. Hazardous materials, including chemicals, oils, batteries, contaminated consumables, and laboratory wastes, are stored in designated secure containment areas and returned to shore for disposal by licensed contractors. Food waste discharge is managed in compliance with international regulations, including restrictions on discharge distances from land and designated sensitive areas. Wastewater and sewage are treated using onboard treatment systems prior to discharge where permitted. Scientific operations are planned to minimise waste generation where practicable, including reducing single-use materials and ensuring appropriate storage and manifesting of samples, chemicals, and consumables. All personnel onboard receive induction on waste handling procedures, and waste transfers and disposals are documented within the vessel's environmental management system.

4.6 Operational Vessel Noise and Transit Speeds

Operational vessel noise associated with the survey is expected to be comparable to that generated by normal commercial and research vessel activity within the wider marine environment. The primary sources of sound during transit are propulsion systems, engines, generators and propeller cavitation, producing predominantly low-frequency continuous noise. Transit speeds are typically maintained at approximately 10 knots, representing standard operational speeds for the vessel and reducing the likelihood of excessive

propeller cavitation and elevated noise output associated with higher transit speeds. In accordance with standard marine mammal mitigation procedures and vessel best practice, speeds would be reduced where necessary in response to the presence of marine mammals or other sensitive fauna within the vicinity of operations, particularly where avoidance behaviour or close approaches are observed.

4.7 Lighting

Artificial lighting associated with vessel operations would be limited to standard navigational, safety and working lights required for marine operations in accordance with international maritime regulations. Lighting would primarily be directed toward operational areas of the vessel and maintained at the minimum intensity necessary to ensure safe navigation, deck operations and personnel safety. The vessel is an existing operational research platform and lighting levels are consistent with those routinely associated with commercial and research shipping activity in offshore waters.

4.8 Marine Mammal Observer Procedures

Marine Mammal Observer (MMO) procedures for the proposed survey would follow established mitigation protocols routinely implemented during comparable UK marine research expeditions and in line with guidance from the National Parks and Wildlife Service (2014) as detailed in Derogation Number DER-CETACEAN-2026-02 that is granted under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011, hereinafter referred to as “the Habitats Regulations” (<https://www.maritimeregulator.ie/wp-content/uploads/2025/12/MUL250021-NPWS-Derogation-Licence.pdf>) following the approaches detailed in Derogation application (https://www.maritimeregulator.ie/wp-content/uploads/2025/12/MUL250021-NPWS-Derogation-Application_redacted.pdf) and detailed further in the Derogation supporting information (<https://www.maritimeregulator.ie/wp-content/uploads/2025/12/MUL250021-NPWS-Derogation-Report-Supporting-Information-.pdf>).

Prior to the commencement of acoustic operations, trained personnel would undertake visual monitoring of the surrounding area for the presence of marine mammals and other sensitive fauna. Where marine mammals are observed within or approaching the operational area, commencement of acoustic equipment would be delayed until animals are confirmed to have moved clear of the vicinity or an appropriate observation period has elapsed. During operations, ongoing visual observations will be maintained, with vessel crew and scientific personnel instructed to report sightings immediately to the MMO or designated environmental lead. All marine mammal observations and mitigation actions are formally logged throughout the survey by the designated Marine Mammal Observer Lead (MMO) or trained personnel undertaking MMO duties.

5. Stage 2 Natura Impact Statement (NIS)

5.1 Introduction

This section presents the Stage 2 Appropriate Assessment of European sites for which likely significant effects could not be excluded at screening stage.

The assessment considers:

- conservation objectives;
- qualifying interests;
- potential impact pathways;
- embedded mitigation;
- and the potential for adverse effects on site integrity.

5.2 Marine Mammals

5.2.1 Embedded Mitigation Measures for Marine Mammals

A range of embedded mitigation measures will be implemented throughout the proposed survey to minimise the potential for disturbance to marine mammals arising from vessel operations and acoustic survey activities. These are also detailed within the wider Annex IV Species Risk Assessment and associated derogation documentation (hosted online at <https://www.maritimeregulator.ie/application/mul250021/>).

Marine Mammal Observer (MMO) Coverage

A trained Marine Mammal Observer (MMO) will be present throughout all acoustic survey operations and will follow NPWS protocols (National Parks and Wildlife Service 2014). The MMO will provide continuous visual monitoring of the surrounding area during daylight hours and will maintain a formal record of all marine mammal observations, mitigation actions and operational decisions. Vessel crew and scientific personnel will be briefed to report all marine mammal sightings immediately to the MMO.

Pre-Start Monitoring

Prior to commencement of any acoustic source, a pre-start monitoring period of at least 60 minutes will be completed by the MMO. Acoustic operations will not commence where marine mammals are observed within a 500 m mitigation zone surrounding the vessel. Operations will only begin once the mitigation zone is confirmed clear of marine mammals for the full monitoring period.

Where visibility conditions prevent effective monitoring of the mitigation zone, commencement of acoustic operations will be delayed until suitable observation conditions are restored.

Soft-Start Procedures

All acoustic survey systems capable of controlled power-up will be initiated using a gradual soft-start procedure wherever technically feasible. Acoustic output will be increased progressively over a period of not less than 20 minutes, allowing marine mammals present within the vicinity of operations to move away from the source before full operating levels are reached.

Where equipment design does not permit a controlled soft-start (primarily ADCPs), acoustic systems will be activated sequentially, minimising sudden increases in acoustic output.

Shutdown Procedures

Where a marine mammal enters the 500 m mitigation zone during soft-start procedures, acoustic operations will be delayed until the animal has voluntarily moved clear of the area.

Where marine mammals are observed approaching acoustic operations during active surveying, the MMO will assess behaviour and proximity and advise the Party Chief Scientist and vessel Master regarding appropriate operational responses.

Vessel Operation and Collision Avoidance

Transit speeds will normally be maintained at approximately 10 knots or lower during survey operations. Where marine mammals are observed in close proximity to the vessel, speed and course alterations will be undertaken where safe and operationally practicable.

The vessel Master retains overall responsibility for navigational safety; however, avoidance of marine mammals will be prioritised wherever this can be achieved safely. Deliberate approaches to marine mammals will not be undertaken.

Acoustic Source Selection and Survey Design

The proposed survey utilises scientific acoustic systems that are substantially lower in source level and acoustic energy than commercial seismic exploration systems. Acoustic sources are highly directional, predominantly hull-mounted or vehicle-mounted, and are operated intermittently over limited spatial and temporal scales. Survey operations are mobile in nature, reducing the duration of exposure experienced by individual animals.

Lighting and General Operations

Artificial lighting will be restricted to that required for navigational safety and scientific operations. Waste management, fuel handling and vessel operations will be undertaken in accordance with MARPOL requirements, vessel environmental management procedures and established research vessel operating protocols to minimise the potential for indirect effects on marine fauna.

5.2.2 Assessment for Marine Mammals

The potential for the proposed survey activities to affect marine mammal qualifying interests was assessed with reference to the conservation objectives of the relevant European sites. Particular consideration was given to the potential effects of underwater noise, vessel

presence and associated disturbance pathways on harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*) and grey seal (*Halichoerus grypus*). The assessment presented in Table 7 considers the sensitivity of these species to the identified impact pathways, the relevant conservation objectives and targets, and the mitigation measures that will be implemented throughout the survey.

Table 7. Appropriate Assessment of marine mammal qualifying interests screened into Stage 2 assessment. The table summarises the relevant conservation objectives, potential impact pathways, ecological attributes, conservation targets and assessment of residual effects associated with the proposed survey activities, taking account of the mitigation measures described in Section 5.2.1. Those in bold screened in by Assessment.

Special Conservation Interest	Conservation Objective	Sites	Effect	Attribute	Relevant Target	Assessment
Harbour porpoise (Phocoena phocoena)	To maintain the favourable conservation condition of harbour porpoise within the relevant SACs	Belgica Mound Province SAC [IE002327]; Mers Celtiques – Talus du Golfe de Gascogne [FRS302015]; Récifs du talus du Golfe de Gascogne [FRS302016]	Underwater noise disturbance; behavioural disturbance; acoustic masking; temporary threshold shift (TTS); auditory injury	Population distribution; foraging behaviour; supporting habitat availability	No significant reduction in species abundance or access to supporting habitat	Harbour porpoise are recognised as one of the cetacean species most sensitive to anthropogenic underwater sound, particularly at mid- and high-frequency ranges. Potential effects associated with the proposed survey could include temporary behavioural disturbance, localised avoidance responses, short-term acoustic masking and, in extreme circumstances, temporary threshold shift (TTS). However, the proposed activities comprise temporary scientific survey operations using acoustic systems that are substantially lower in source level and acoustic energy than commercial seismic exploration systems. Acoustic operations are spatially restricted, intermittent in nature and undertaken from a single research vessel. Furthermore, a comprehensive suite of mitigation measures will be implemented, including continuous Marine Mammal Observer (MMO) coverage, pre-start monitoring, 500 m mitigation zones, delayed start procedures where marine mammals are present, soft-start procedures and vessel collision avoidance measures (Section 5.2.1).

Common bottlenose dolphin (*Tursiops truncatus*)

To maintain the favourable conservation condition of bottlenose dolphin within the relevant SACs

Slyne Head Islands SAC [IE000328]; Slyne Head Peninsula SAC [IE002074]; West Connaught Coast SAC [IE002998]; Duvillaun Islands SAC [IE000495]; Belgica Mound Province SAC

Underwater noise disturbance; behavioural disturbance; acoustic masking; temporary displacement

Population distribution; foraging behaviour; supporting habitat availability

Maintain natural distribution, abundance and access to supporting habitat

The majority of designated SACs are located substantial distances from the proposed operational areas (approximately 70–300 km), with no designated harbour porpoise breeding or haul-out sites occurring within the survey area itself. Taking account of the temporary and mobile nature of the activities, rapid attenuation of sound with distance, and the implementation of embedded mitigation measures, any residual disturbance effects are expected to be highly localised, temporary and reversible. No significant effects on population distribution, habitat use, foraging behaviour or conservation objectives are anticipated. Accordingly, the residual effect is considered negligible and no adverse effect on site integrity is predicted.

(De Jong and Ainslie 2008; Southall et al. 2008; Tougaard et al. 2015; Gomez et al. 2016; JNCC 2020)

Bottlenose dolphin may exhibit temporary behavioural responses to elevated underwater noise, including short-term avoidance of active survey areas and localised acoustic masking. However, the proposed survey is temporary, low intensity and spatially limited when compared with major industrial offshore activities.

Embedded mitigation measures, including MMO monitoring, pre-start searches, mitigation zones, soft-start procedures and vessel avoidance measures (Section 5.2.1), will further reduce the already limited potential for disturbance. Acoustic systems will be

		[IE002327]; Porcupine Bank Canyon SAC [IE003001]; South-west Porcupine Bank SAC [IE002329]; Mers Celtiques – Talus du Golfe de Gascogne [FRS302015]; Récifs du talus du Golfe de Gascogne [FRS302016]				operated intermittently over restricted areas and are not expected to result in long-term habitat exclusion, disruption of ecological connectivity or interruption of important life-history functions. The majority of designated SACs considered within this assessment are located at considerable distances from the operational area, and no designated bottlenose dolphin breeding or critical habitat areas overlap the proposed activities. Taking account of the limited duration of operations, the low likelihood of prolonged exposure and the implementation of mitigation measures, residual effects are considered highly localised and temporary. No significant effects on conservation objectives are anticipated and the residual effect is considered negligible. No adverse effect on site integrity is predicted. <i>(Southall et al. 2008; Richardson et al. 2013; Marley et al. 2017; Sørensen et al. 2023)</i>
<i>Grey seal (Halichoerus grypus)</i>	To maintain the favourable conservation condition of grey seal within the relevant SACs	Slyne Head Islands SAC [IE000328]; Islands SAC [IE000495];	Underwater noise disturbance; behavioural disturbance; temporary displacement	Population distribution; foraging behaviour; supporting habitat availability	Maintain natural distribution and supporting habitat condition	Grey seal may occur within the wider offshore region and could occasionally transit through the survey area during foraging movements. Potential effects are limited primarily to temporary behavioural disturbance associated with vessel presence and underwater noise. The proposed survey is temporary in duration, involves a single research vessel and incorporates a comprehensive suite of mitigation

measures including MMO monitoring, pre-start searches, mitigation zones, soft-start procedures and vessel collision avoidance measures (Section 5.2.1). In addition, the survey area is located substantial distances from designated haul-out sites, breeding colonies and other important grey seal aggregation areas associated with the assessed SACs.

Any behavioural responses that may occur are expected to be short-term, localised and fully reversible. No significant displacement, interruption of breeding activity or long-term habitat exclusion is anticipated. Taking account of the scale of the proposed activities and the mitigation measures to be implemented, residual effects are considered negligible and no adverse effect on site integrity is predicted.

(Thompson et al. 1989; Southall et al. 2008; Richardson et al. 2013)

5.3 Marine Ornithology

5.3.1 Embedded Mitigation Measures for Marine Ornithology

A range of embedded mitigation measures will be implemented throughout the proposed survey to minimise the potential for disturbance to seabirds and other qualifying bird species associated with relevant Special Protection Areas (SPAs). These measures are incorporated into the survey design and operational procedures and are intended to reduce the potential for vessel disturbance, attraction to vessel lighting and accidental interactions with survey operations. These are also detailed within the wider Annex IV Species Risk Assessment and associated derogation documentation (hosted online at <https://www.maritimeregulator.ie/application/mul250021/>).

Vessel Operations

Survey activities will be undertaken from a single research vessel operating over a limited duration and geographical area. Transit speeds will typically be maintained at approximately 10 knots or lower, and the vessel will follow predefined survey lines, minimising unnecessary manoeuvring and repeated disturbance within any one area.

The proposed activities are located predominantly offshore and do not overlap with designated breeding colonies, nesting sites or key terrestrial habitats associated with the SPA bird species considered in this assessment.

Seabird and Marine Wildlife Observations

Marine Mammal Observers (MMOs) and vessel personnel will maintain observations of marine wildlife throughout survey operations. Any notable aggregations of seabirds observed in close proximity to operational activities will be recorded and, where practicable and compatible with safe vessel operations, survey activities may be adjusted to minimise unnecessary disturbance.

Vessel Lighting

Artificial lighting will be restricted to that required for navigational safety, scientific operations and compliance with maritime regulations. External lighting will be directed and shielded where practicable to minimise unnecessary light spill onto the surrounding marine environment.

These measures are particularly relevant to nocturnal and crepuscular species such as storm petrel and Manx shearwater, which may be susceptible to attraction or behavioural modification associated with artificial lighting.

Waste Management and Attraction Prevention

No food waste, fish waste or other biodegradable material capable of attracting seabirds will be intentionally discharged within the survey area except where permitted under MARPOL requirements and vessel operating procedures. Waste will be stored, managed

and disposed of in accordance with the vessel's approved waste management plan and applicable international regulations.

These measures reduce the potential for artificial attraction of scavenging seabirds to the vessel and minimise the likelihood of behavioural alteration associated with survey operations.

Pollution Prevention

Fuel handling, chemical storage and operational procedures will be undertaken in accordance with established vessel environmental management systems and relevant maritime regulations. Spill response equipment will be maintained onboard throughout the survey and all personnel will follow established pollution prevention procedures.

These measures minimise the potential for indirect effects on marine bird species through accidental contamination of the marine environment.

Residual Risk

Taking account of the temporary nature of the proposed activities, the offshore location of the survey areas, the substantial distance from designated breeding colonies and the mitigation measures described above, the potential for significant effects on qualifying bird species is substantially reduced. The assessment presented in Table 8 considers the residual effects following implementation of these embedded mitigation measures.

5.3.2 Assessment for Marine Ornithology

Marine ornithology receptors are a qualifying interest of a number of the European sites considered within this assessment and have been identified as potentially sensitive to vessel activity, artificial lighting and, for some species, underwater noise associated with the proposed survey. The principal impact pathways considered include behavioural disturbance, displacement, vessel disturbance, lighting effects and, where relevant, underwater noise disturbance. The sensitivity of the relevant Special Conservation Interest (SCI) species to these pathways, together with the applicable conservation objectives, ecological attributes and conservation targets, are assessed in Table 8. This assessment takes account of the embedded mitigation measures described in Section 5.3.1, including vessel management procedures, marine wildlife observations, lighting controls, waste management measures and pollution prevention procedures.

Table 8. Appropriate Assessment of marine ornithology Special Conservation Interests screened into Stage 2 assessment. The table summarises the relevant conservation objectives, potential impact pathways, ecological attributes, conservation targets and assessment of residual effects associated with the proposed survey activities for qualifying bird species of relevant Special Protection Areas (SPAs), taking account of the mitigation measures described in Section 5.3.1. Those in bold screened in by Assessment.

<i>Special Conservation Interest</i>	<i>Conservation Objectives</i>	<i>Site</i>	<i>Effect</i>	<i>Attribute</i>	<i>Relevant Target</i>	<i>Assessment</i>
<p><i>Surface-feeding pelagic seabirds and gulls:</i> Fulmar (Fulmarus glacialis); Kittiwake (Rissa tridactyla); Herring gull (Larus argentatus); Lesser black-backed gull (Larus fuscus); Common gull (Larus canus)</p>	<p>To maintain the favourable conservation condition of the SCI bird species within the relevant SPAs</p>	<p>Inishmore SPA [IE004152]; Cliffs of Moher SPA [IE004005]; Loop Head SPA [IE004119]; Kerry Head SPA [IE004189]; Dingle Peninsula SPA [IE004153]; Blasket Islands SPA [IE004008]; Puffin Island SPA [IE004003]; Iveragh Peninsula SPA [IE004154]; Skelligs SPA [IE004007]; Deenish Island SPA [IE004175]; Beara Peninsula SPA [IE004155]; High Island, Inishark and Davillaun SPA [IE004144]; Clare Island SPA [IE004136];</p>	<p>Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance; lighting disturbance</p>	<p>Population distribution ; foraging behaviour; supporting habitat availability</p>	<p>No significant reduction in species distribution, abundance or access to supporting foraging habitat</p>	<p>The SPAs designated for these species are located approximately 100–350 km from the proposed survey activities and no designated breeding colonies, nesting habitat or key supporting habitat overlap the operational area. These species are primarily surface-feeding and aerial foragers and are therefore considered to have relatively low sensitivity to underwater noise generated by the proposed activities. Potential effects are limited principally to temporary behavioural disturbance associated with vessel presence, above-water noise and artificial lighting.</p> <p>The proposed activities are temporary, highly localised and involve only a single research vessel operating over a short duration. Furthermore, embedded mitigation measures including vessel management procedures, controlled lighting, marine wildlife observations and waste management measures designed to avoid artificial attraction of seabirds will be implemented throughout the survey (Section 5.3.1).</p> <p>Taking account of the substantial separation distance between the survey area and designated SPA breeding sites, the temporary nature of operations and the implementation of mitigation measures, any residual disturbance effects are expected to be highly localised, temporary and reversible. No significant effects on species distribution, abundance, foraging behaviour or supporting habitat availability are anticipated.</p>

<p><i>Terns and plunge-feeding seabirds: Arctic tern (Sterna paradisaea); Little tern (Sternula albifrons); Gannet (Morus bassanus)</i></p>	<p>To maintain the favourable conservation condition of the SCI bird species within the relevant SPAs</p>	<p>Duvillaun Islands SPA [IE004111];</p> <p>Inishmore SPA [IE004152]; Skelligs SPA [IE004007]; Deenish Island SPA [IE004175]; The Bull and Cow Rocks SPA [IE004066]; High Island, Inishark and Davillaun SPA [IE004144];</p>	<p>Behavioural disturbance; displacement; vessel disturbance; lighting disturbance</p>	<p>Population distribution ; foraging behaviour; prey availability</p>	<p>Maintain natural distribution and access to foraging habitat</p>	<p>Accordingly, the residual effect is considered negligible and no adverse effect on site integrity is predicted.</p> <p><i>(Garthe and Hüppop 2004; Furness et al. 2013)</i></p> <p>The relevant SPAs are located approximately 100–350 km from the proposed operational area and no overlap with breeding or nesting habitat occurs. These species may exhibit temporary avoidance behaviour associated with vessel presence and localised disturbance; however, the proposed survey is temporary, mobile and limited in spatial extent.</p> <p>Embedded mitigation measures, including vessel management procedures, wildlife observations, lighting controls and waste management measures (Section 5.3.1), further reduce the already limited potential for disturbance. The survey activities are not expected to result in habitat loss, long-term displacement, interruption of breeding behaviour or reduction in prey availability.</p> <p>Taking account of the temporary and localised nature of the activities and the implementation of mitigation measures, any residual effects are expected to be negligible, temporary and reversible. No adverse effect on site integrity is predicted.</p> <p><i>(Garthe and Hüppop 2004; Furness et al. 2013)</i></p>
<p><i>Diving alcids: Guillemot (Uria aalge); Razorbill (Alca torda); Puffin (Fratercula arctica)</i></p>	<p>To maintain the favourable conservation condition of the SCI bird species within the relevant SPAs</p>	<p>Inishmore SPA [IE004152]; Cliffs of Moher SPA [IE004005]; Loop Head SPA [IE004119]; Kerry Head SPA [IE004189]; Blasket Islands SPA [IE004008]; Puffin Island SPA</p>	<p>Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance</p>	<p>Population distribution ; diving and foraging behaviour; supporting marine habitat</p>	<p>Maintain natural distribution, foraging behaviour and supporting habitat condition</p>	<p>Diving alcids may have greater potential exposure to underwater noise than surface-feeding species owing to their subsurface foraging behaviour. Potential effects include temporary behavioural disturbance and localised avoidance responses. However, the acoustic systems proposed are substantially lower in energy than commercial seismic sources and are operated intermittently over limited spatial and temporal scales.</p> <p>SPAs designated for alcid species are located approximately 100–350 km from the proposed works</p>

		[IE004003]; Iveragh Peninsula SPA [IE004154]; Skelligs SPA [IE004007]; The Bull and Cow Rocks SPA [IE004066]; Clare Island SPA [IE004136];				and no direct overlap with breeding colonies occurs. Embedded mitigation measures, including controlled vessel operations, wildlife observations and operational controls described in Section 5.3.1, further reduce the potential for disturbance. Behavioural responses, if they occur, are expected to be temporary and localised and are not anticipated to result in significant displacement from important habitat, measurable reductions in prey availability or interruption to breeding success. Residual effects are therefore considered negligible and no adverse effect on site integrity is anticipated. <i>(De Jong and Ainslie 2008; Popper and Hastings 2009; Furness et al. 2013; Anderson Hansen et al. 2020)</i>
<i>Diving pursuit-feeders: Shag (Phalacrocorax aristotelis)</i>	To maintain the favourable conservation condition of the SCI bird species within the relevant SPAs	Blasket Islands SPA [IE004008];	Underwater noise disturbance; behavioural disturbance; displacement; vessel disturbance	Population distribution ; foraging behaviour; supporting marine habitat	No significant reduction in habitat availability or supporting ecological conditions	Relevant SPAs are located more than 100 km from the proposed operational area and no overlap with breeding colonies or important supporting habitat occurs. Potential effects are limited to temporary behavioural disturbance associated with vessel presence and underwater noise exposure during diving activity. The proposed activities are temporary and highly localised, and embedded mitigation measures including vessel management, wildlife observations and lighting controls will be implemented throughout the survey (Section 5.3.1). Any disturbance effects are expected to be short-term and reversible and are not anticipated to result in measurable changes to species distribution, habitat use or foraging behaviour. Accordingly, residual effects are considered negligible and no adverse effect on site integrity is predicted. <i>(Popper and Hastings 2009; Furness et al. 2013)</i>
<i>Nocturnal/procellariiform seabirds: Storm</i>	To maintain the favourable	Blasket Islands SPA [IE004008]; Puffin Island SPA	Lighting disturbance; behavioural	Population distribution ; nocturnal	Maintain natural behavioural patterns and	Relevant SPAs are located approximately 100–350 km from the operational area and no breeding colonies overlap the proposed activities. Potential effects are

<p>petrel (Hydrobates pelagicus); Manx shearwater (Puffinus puffinus)</p>	<p>conservation condition of the SCI bird species within the relevant SPAs</p>	<p>[IE004003]; Skelligs SPA [IE004007]; Deenish Island SPA [IE004175]; The Bull and Cow Rocks SPA [IE004066]; Cruagh Island SPA [IE004170]; Duvillaun Islands SPA [IE004111];</p>	<p>disturbance; vessel disturbance</p>	<p>behaviour; supporting habitat availability</p>	<p>habitat availability</p>	<p>principally associated with artificial lighting and vessel presence, which may result in temporary attraction or behavioural modification during nocturnal operations.</p> <p>Vessel lighting will be restricted to that required for navigational safety and scientific operations and will be managed in accordance with the measures described in Section 5.3.1. Additional waste management and operational controls will minimise the potential for attraction to the vessel.</p> <p>Taking account of the substantial distance from designated breeding colonies, the temporary nature of the survey and the implementation of mitigation measures, no significant effects on population distribution, breeding success or supporting habitat availability are anticipated. Residual effects are considered negligible and no adverse effect on site integrity is predicted.</p> <p><i>(Furness et al. 2013; Rich and Longcore 2013)</i></p>
<p><i>Coastal cliff-associated species:</i> <i>Peregrine falcon</i> <i>(Falco peregrinus);</i> <i>Chough</i> <i>(Pyrrhocorax pyrrhocorax)</i></p>	<p>To maintain the favourable conservation condition of the SCI bird species within the relevant SPAs</p>	<p>Cliffs of Moher SPA [IE004005]; Kerry Head SPA [IE004189]; Dingle Peninsula SPA [IE004153]; Blasket Islands SPA [IE004008]; Iveragh Peninsula SPA [IE004154]; Beara Peninsula SPA [IE004155]; Clare Island SPA [IE004136];</p>	<p>Visual disturbance; vessel disturbance; above-water noise</p>	<p>Population distribution ; breeding and foraging habitat availability</p>	<p>No significant reduction in supporting habitat availability or species distribution</p>	<p>The SPAs designated for these species are located approximately 100–350 km from the proposed survey activities and are associated primarily with terrestrial and coastal cliff habitats. No breeding, nesting or supporting habitat for these species overlaps the proposed operational area.</p> <p>Potential effects are limited to negligible visual or above-water disturbance associated with vessel presence. Given the substantial separation distances involved, the offshore nature of the proposed activities and the mitigation measures described in Section 5.3.1, no ecologically meaningful interaction pathway is identified.</p> <p>Residual effects are therefore considered negligible and no adverse effect on site integrity is predicted.</p> <p><i>(Furness et al. 2013)</i></p>

Coastal waterfowl: Barnacle goose (Branta leucopsis)

<p>To maintain the favourable conservation condition of the SCI bird species within the relevant SPAs</p>	<p>Cruagh Island SPA [IE004170]; High Island, Inishark and Davillaun SPA [IE004144]; Duvillaun Islands SPA [IE004111];</p>	<p>Behavioural disturbance; vessel disturbance; displacement</p>	<p>Population distribution ; supporting habitat availability</p>	<p>Maintain natural distribution and supporting habitat condition</p>	<p>Barnacle goose is associated primarily with coastal and terrestrial habitats and has very limited potential for interaction with the proposed offshore survey activities. No important supporting habitat occurs within or adjacent to the survey area.</p> <p>Given the substantial distance between designated SPA habitat and the proposed activities, together with the temporary nature of the survey and the mitigation measures described in Section 5.3.1, no significant behavioural disturbance, displacement or habitat effects are anticipated.</p> <p>Residual effects are considered negligible and no adverse effect on site integrity is predicted.</p> <p><i>(Furness et al. 2013)</i></p>
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5.4 Annex I Habitats and Benthic Communities

5.4.1 Embedded Mitigation Measures for Annex I Habitats and Benthic Communities

A range of embedded mitigation measures will be implemented throughout the proposed survey to minimise the potential for disturbance to Annex I reef habitats and associated benthic communities. These measures are incorporated into survey planning, site selection and operational procedures and are intended to avoid direct interaction with sensitive habitats. These are also detailed within the wider Annex IV Species Risk Assessment and associated derogation documentation (hosted online at <https://www.maritimeregulator.ie/application/mul250021/>).

Survey Planning and Habitat Avoidance

Prior to all seabed contact activities, available bathymetric, habitat mapping, previous ROV observations, previous scientific datasets and relevant Natura 2000 documentation will be reviewed to identify known or suspected occurrences of Annex I reef habitat and other sensitive benthic features.

Seabed sampling locations and temporary equipment deployment sites will be selected to avoid mapped reef features. Existing regional habitat mapping and geomorphological datasets provide a high degree of confidence in identifying areas where reef habitats are likely to occur.

Expert Habitat Interpretation

Survey operations will be designed and supervised by personnel with extensive experience in deep-water canyon systems, cold-water coral ecosystems and offshore habitat mapping. This includes researchers who have undertaken previous investigations within the Whittard Canyon system and contributed to the scientific understanding of reef distribution, canyon geomorphology and benthic ecosystem functioning within the wider region.

The presence of specialist geologists, geomorphologists and benthic scientists throughout the survey will ensure that seabed contact activities are informed by the best available scientific evidence and that sensitive habitats can be identified and avoided where necessary.

High-Resolution Seafloor Characterisation

The survey will utilise high-resolution multibeam echosounder, sub-bottom profiling and other geophysical datasets to characterise seabed morphology prior to any seabed contact activities. These data will be used to identify potentially sensitive habitats, steep canyon walls, reef-associated geomorphological features and other seabed characteristics that may warrant avoidance.

Where additional information becomes available during the survey, sampling plans may be refined in real time to avoid sensitive features identified through ongoing interpretation of newly acquired data.

Minimisation of Seabed Disturbance

The majority of survey activities are non-intrusive and involve no physical interaction with the seabed. Where seabed contact is required, activities are restricted to discrete scientific sampling locations and temporary equipment deployments with very small physical footprints relative to the scale of the surrounding canyon systems.

With regards to seafloor disturbance, the only activities to be employed that will interact with the seafloor are associated with sediment sampling (i.e. piston coring, box coring) which only remove a very small footprint of seabed:

- 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
- Mooring anchor: max 1m diameter

Even with multiple replicate cores per station, the total area disturbed is very small relative to the scale of canyon / basin habitats (many km²).

No dredging, trenching, excavation, construction works or permanent infrastructure installation will occur. All deployed scientific equipment will be recovered following completion of the survey.

Pollution Prevention

Fuel handling, waste management and vessel operations will be undertaken in accordance with established environmental management procedures, MARPOL requirements and vessel operating protocols. Spill response equipment will be maintained onboard throughout the survey and all personnel will follow approved pollution prevention procedures.

Residual Risk

Taking account of the extensive pre-survey planning, use of high-resolution habitat mapping, expert interpretation of seabed conditions, habitat avoidance measures and the highly localised nature of seabed contact activities, the potential for significant effects on Annex I reef habitats and associated benthic communities is substantially reduced. The assessment presented in Table 8 considers the residual effects following implementation of these embedded mitigation measures.

5.4.2 Assessment for Annex 1 habitats and Benthic Communities

Annex I habitats and associated benthic communities are qualifying interests of a number of the European sites considered within this assessment and have been identified as potentially sensitive to seabed disturbance, sediment resuspension, sediment deposition and accidental pollution associated with the proposed survey activities. Particular

consideration has been given to reef habitats, including deep-sea coral reef communities, occurring within the Southern Canyons SAC and other relevant SACs. The principal impact pathways considered include temporary physical disturbance arising from seabed sampling and equipment deployments, localised sediment resuspension and deposition, and indirect effects on habitat structure and ecological function. The sensitivity of the relevant qualifying interests to these pathways, together with the applicable conservation objectives, ecological attributes and conservation targets, are assessed in Table 9. This assessment takes account of the embedded mitigation measures described in Section 5.4.1, including habitat avoidance measures, expert-led site selection, high-resolution seafloor mapping, minimisation of seabed contact and pollution prevention procedures. The assessment also considers the highly dynamic nature of the canyon environment, where natural sediment transport, resuspension and depositional processes occur at scales substantially greater than those associated with the proposed scientific sampling programme.

Table 9. Appropriate Assessment of Annex I habitats and associated benthic communities screened into Stage 2 assessment. The table summarises the relevant conservation objectives, potential impact pathways, ecological attributes, conservation targets and assessment of residual effects associated with the proposed survey activities for reef habitats and associated benthic communities of relevant Special Areas of Conservation (SACs), taking account of the mitigation measures described in Section 5.4.1. Those in bold screened in by Assessment.

Qualifying Interest	Conservation Objective	Sites	Effect	Attribute	Relevant Target	Assessment
Annex I Reefs [1170], including deep-sea coral reef and carbonate mound communities	To maintain the favourable conservation condition of reef habitat [1170] within the relevant SACs	Belgica Mound Province SAC [IE002327]; Porcupine Bank Canyon SAC [IE003001]; South-west Porcupine Bank SAC [IE002329]; Southern Canyons SAC [IE002278]	Physical habitat disturbance; temporary seabed disturbance; sediment resuspension; sediment deposition; accidental pollution	Habitat extent; habitat structure; community distribution; supporting sedimentary and hydrographic conditions	No significant reduction in reef extent, habitat quality, community distribution or supporting environmental conditions	<p>The proposed activities include geophysical survey operations, seabed sampling and temporary scientific equipment deployments within offshore canyon and continental slope environments. Potential effects on Annex I reef habitat are therefore considered in relation to temporary physical disturbance, sediment resuspension, sediment deposition and highly localised seabed interaction.</p> <p>A comprehensive suite of mitigation measures will be implemented throughout the survey (Section 5.4.1), including pre-survey habitat review, use of existing habitat mapping datasets, high-resolution geophysical characterisation, expert interpretation of seabed conditions and avoidance of known or suspected reef features wherever possible. Survey operations will be planned and supervised by personnel with extensive experience of deep-water canyon systems, cold-water coral ecosystems and habitat mapping, including researchers who have undertaken previous investigations within the Whittard Canyon system and contributed directly to the scientific understanding of reef distribution and benthic ecosystem structure within the region.</p> <p>The majority of proposed activities are non-intrusive and involve no physical interaction with the seabed. Where seabed contact is required, activities are restricted to discrete scientific sampling locations and temporary equipment deployments with extremely small physical footprints relative to both the surrounding canyon systems and the extent of</p>

designated reef habitat. No dredging, trenching, excavation, construction works or permanent infrastructure installation are proposed. All deployed equipment will be recovered following completion of survey operations.

The only activities to be employed that will interact with the seafloor are associated with sediment sampling (i.e. piston coring, box coring) which only remove a very small footprint of seabed:

- 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
- Mooring anchor: max 1m diameter

Even with multiple replicate cores per station, the total area disturbed is very small relative to the scale of canyon / basin habitats (many km²).

The potential for sediment resuspension and deposition has also been considered. Scientific sampling activities will disturb only very small volumes of sediment relative to the natural sediment transport processes that characterise the Whittard Canyon system. The canyon is an active depositional environment that experiences periodic sediment resuspension and transport associated with bottom currents, internal tides and gravity-driven sediment flows. Published studies indicate that sediment plumes generated by much larger seabed disturbance activities are often spatially restricted by rapid settling, flocculation and background hydrodynamic variability, with deposition concentrated close to the source and suspended sediment concentrations declining rapidly to background levels. Given the substantially smaller scale of the proposed scientific sampling programme, any sediment resuspension generated is expected to be highly localised, short-lived and negligible in comparison with natural background variability and sediment transport processes

operating within the canyon system. No measurable deterioration of reef habitat structure or benthic community condition is therefore anticipated.

Although the southern operational area partially overlaps the Southern Canyons SAC, the combination of habitat avoidance measures, expert-led site selection, very limited seabed contact, extremely small sediment extraction volumes and the temporary nature of the activities substantially reduces the potential for significant effects. Any sediment resuspension generated is expected to be highly localised, short-lived and rapidly dispersed within the naturally dynamic deep-water environment.

Taking account of the mitigation measures described in Section 5.4.1, no measurable habitat loss, deterioration of reef structure, reduction in habitat extent or long-term degradation of benthic communities is anticipated. Any residual effects are expected to be highly localised, temporary and reversible. Accordingly, the residual effect is considered negligible and no adverse effect on site integrity is predicted.

(Howell et al. 2010; Amaro et al. 2016; Spearman et al. 2020; Huvenne 2024)

5.5 In-Combination Assessment

5.5.1 Introduction

In accordance with Article 6(3) of the Habitats Directive, the potential for the proposed survey activities to act in-combination with other plans and projects was considered. The MARA Appropriate Assessment Screening Determination identified three projects with potential spatial overlap with the proposed activities and therefore potential for cumulative effects: the 2Africa Submarine Cable System (LIC230033), the Amazon Marine Cable System geophysical survey (MUL230031), and the Amazon Marine Cable System cable installation project (MAC250018) (Table 10). The Climate Action Plan 2025 was also identified as a relevant strategic plan. The principal impact pathways identified by MARA were underwater noise and physical habitat disturbance.

Table 10. Plans and projects considered within the in-combination assessment. Overview Assessment is elaborated on in section 5.5.2 and 5.5.3.

Plan / Project	Potential Overlap Pathway	Potential for In-Combination Effects	Assessment
<i>2Africa Submarine Cable System (LIC230033)</i>	Vessel activity; localised seabed disturbance; underwater noise	Limited	Activities are geographically constrained and temporary. No evidence of direct temporal overlap with the proposed survey. Given the negligible residual effects identified for the proposed activities, no significant in-combination effects are anticipated.
<i>Amazon Marine Cable System Geophysical Survey (MUL230031)</i>	Underwater noise; vessel disturbance	Moderate (same impact pathway)	Similar survey activities may generate temporary underwater noise; however, no evidence of concurrent operations has been identified. Both activities are mobile, temporary and spatially restricted. Significant cumulative disturbance effects are not anticipated.
<i>Amazon Marine Cable System Cable Installation (MAC250018)</i>	Vessel activity; localised seabed disturbance; underwater noise	Limited	Installation activities are temporary and geographically constrained. The negligible residual effects associated with the proposed survey mean that no significant cumulative effects are anticipated.
<i>Climate Action Plan 2025</i>	Strategic policy framework	Negligible	The Climate Action Plan does not itself give rise to direct environmental effects within the survey area and does not alter the conclusions of this assessment.

5.5.2 Underwater Noise

Potential cumulative underwater noise effects were considered in relation to marine mammal and marine bird qualifying interests of the European sites assessed in this Natura Impact Statement.

The proposed survey utilises scientific acoustic systems that are substantially lower in source level and acoustic energy than commercial seismic exploration systems. Acoustic operations are intermittent, temporary and mobile in nature and will be undertaken from a single research vessel over a maximum survey duration of approximately three weeks per

year. Embedded mitigation measures described in Sections 5.2.1 and 5.3.1 further reduce the potential for disturbance.

The Amazon Marine geophysical survey (MUL230031) represents the only identified project with a potentially similar underwater noise pathway. However, no evidence has been identified that survey operations will occur concurrently with the proposed activities. Furthermore, any overlap would be temporary and geographically limited within a large offshore environment. Given the limited spatial extent of the disturbance footprint, the mobility of marine mammal receptors and the temporary nature of both activities, significant cumulative disturbance effects are not anticipated.

The cable installation projects identified by MARA are expected to generate localised and temporary underwater noise associated with vessel activity and installation works. However, these activities are geographically constrained and temporary in nature. When considered alongside the negligible residual effects identified for the proposed survey, no significant in-combination effects on marine mammal or marine bird conservation objectives are anticipated.

In addition, the 5 km spatial scope adopted by MARA for the in-combination assessment is based on the Effective Deterrence Range of harbour porpoise, the marine mammal species considered most sensitive to underwater noise. Within this area, the proposed survey activities would be undertaken by a single mobile research vessel, such that any acoustic exposure at a given location would be temporary and transient rather than continuous, further reducing the potential for meaningful cumulative disturbance effects.

5.5.3 Physical Habitat Disturbance

Potential cumulative effects on Annex I reef habitat were considered in relation to the Southern Canyons SAC, which partially overlaps the southern survey area.

The proposed activities involve only highly localised seabed sampling and temporary equipment deployments with extremely small physical footprints. No dredging, trenching, excavation, construction works or permanent infrastructure installation are proposed. Habitat avoidance measures, expert-led site selection and high-resolution seafloor mapping will be employed throughout the survey.

Of the projects identified by MARA, only the cable installation activities have the potential to generate a similar habitat disturbance pathway. However, any seabed disturbance associated with the proposed survey is negligible in scale compared to the natural sediment transport processes operating within the canyon system and is expected to be highly localised, temporary and fully reversible. No measurable habitat loss or deterioration of reef structure is anticipated.

Given the limited spatial footprint of the proposed activities and the negligible residual effects identified in Section 5.4, the proposed survey is not expected to contribute materially to any cumulative habitat disturbance pathway affecting the conservation objectives of the Southern Canyons SAC.

5.5.4 In-Combination Conclusion

Having considered the projects and plans identified by MARA, together with the impact pathways of underwater noise and physical habitat disturbance, it is concluded that the proposed survey will not contribute materially to any significant cumulative effect on the qualifying interests or conservation objectives of the European sites assessed within this Natura Impact Statement. Taking account of the temporary nature of the activities, the embedded mitigation measures, the limited spatial footprint of seabed interaction and the negligible residual effects identified in Sections 5.2–5.4, no adverse effect on the integrity of any European site is predicted either alone or in-combination with other plans or projects.

6. Conclusion

This Natura Impact Statement has been prepared to inform Appropriate Assessment under Article 6(3) of the Habitats Directive in respect of the proposed MISSING-Link offshore scientific survey. The assessment considered European sites and qualifying interests for which Likely Significant Effects could not be excluded at screening stage, including marine mammals, marine ornithology receptors and Annex I reef habitats and associated benthic communities.

The assessment has demonstrated that the proposed activities are temporary, localised and reversible in nature. The majority of survey operations are non-intrusive and involve no physical interaction with the seabed. Where seabed contact is required, activities are limited to discrete scientific sampling locations and temporary equipment deployments with very small physical footprints relative to the scale of the surrounding offshore environment. No dredging, trenching, excavation, construction works or permanent infrastructure installation are proposed.

For marine mammals, potential effects associated with underwater noise, behavioural disturbance and vessel activity were assessed taking account of the proposed acoustic sources, survey design and embedded mitigation measures, including MMO coverage, pre-start monitoring, mitigation zones, soft-start procedures and vessel avoidance measures. Residual effects were determined to be temporary, highly localised and negligible, with no adverse effect on the conservation objectives of any relevant Special Area of Conservation. For marine ornithology receptors, potential effects associated with vessel presence, artificial lighting, underwater noise and temporary disturbance were assessed. Taking account of the substantial distances between the survey areas and designated breeding colonies, together with the embedded mitigation measures and temporary nature of operations, no significant effects on Special Conservation Interest species or supporting habitats were identified.

For Annex I reef habitats and associated benthic communities, the assessment considered the potential for temporary seabed disturbance, sediment resuspension and accidental pollution. The assessment concluded that extensive habitat avoidance measures, expert-led site selection, high-resolution habitat mapping and the extremely limited footprint of

seabed contact activities ensure that any effects would be highly localised, temporary and reversible. No measurable habitat loss, deterioration of reef structure or degradation of benthic community condition is anticipated.

The potential for in-combination effects with other plans and projects identified by MARA was also assessed. Taking account of the temporary nature of the proposed activities, the limited spatial footprint of disturbance, the mobility of relevant receptors and the embedded mitigation measures, no significant in-combination effects were identified.

On the basis of the information presented in this Natura Impact Statement, and having regard to the conservation objectives of the relevant European sites, it is concluded that the proposed MISSING-Link offshore scientific survey, either alone or in combination with other plans or projects, will not adversely affect the integrity of any European site. This conclusion is reached beyond reasonable scientific doubt and reflects the implementation of the mitigation measures and operational controls described throughout this assessment.

7. References

- Amaro T, Huvenne VAI, Allcock AL, et al (2016) Appendix B: The Whittard Canyon—a case study of submarine canyon processes. Lateral transport of suspended particulate matter in nepheloid layers along the Irish continental margin—A case study of the Whittard Canyon, North-East Atlantic Ocean 251
- Anderson Hansen K, Hernandez A, Mooney TA, et al (2020) The common murre (*Uria aalge*), an auk seabird, reacts to underwater sound. *J Acoust Soc Am* 147:4069–4074
- De Jong CA f, Ainslie MA (2008) Underwater radiated noise due to the piling for the Q7 Offshore Wind Park. *Journal of the Acoustical Society of America* 123:2987
- Furness RW, Wade HM, Masden EA (2013) Assessing vulnerability of marine bird populations to offshore wind farms. *J Environ Manage* 119:56–66
- Garthe S, Hüppop O (2004) Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. *Journal of applied Ecology* 41:724–734
- Gomez C, Lawson JW, Wright AJ, et al (2016) A systematic review on the behavioural responses of wild marine mammals to noise: the disparity between science and policy. *Can J Zool* 94:801–819
- Howell KL, Davies JS, Narayanaswamy BE (2010) Identifying deep-sea megafaunal epibenthic assemblages for use in habitat mapping and marine protected area network design. *Journal of the Marine Biological Association of the United Kingdom* 90:33–68
- Huvenne V (2024) RRS James Cook Expedition JC237, 6 AUGUST–4 SEPTEMBER 2022. CLASS—Climate-linked Atlantic Sector Science Whittard Canyon and Porcupine Abyssal Plain Fixed Point Observatories
- JNCC (2020) Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). JNCC Report No 654, Peterborough:

Marley SA, Salgado Kent CP, Erbe C, Parnum IM (2017) Effects of vessel traffic and underwater noise on the movement, behaviour and vocalisations of bottlenose dolphins in an urbanised estuary. *Sci Rep* 7:13437

National Parks and Wildlife Service (2014) Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters. . Department of Arts, Heritage and the Gaeltacht Dublin:

Popper AN, Hastings MC (2009) The effects of anthropogenic sources of sound on fishes. *J Fish Biol* 75:455–489

Rich C, Longcore T (2013) Ecological consequences of artificial night lighting. Island Press

Richardson WJ, Greene Jr CR, Malme CI, Thomson DH (2013) Marine mammals and noise. Academic press

Sørensen PM, Haddock A, Guarino E, et al (2023) Anthropogenic noise impairs cooperation in bottlenose dolphins. *Current Biology* 33:749–754

Southall BL, Bowles AE, Ellison WT, et al (2008) Marine mammal noise-exposure criteria: initial scientific recommendations. *Bioacoustics* 17:273–275

Spearman J, Taylor J, Crossouard N, et al (2020) Measurement and modelling of deep sea sediment plumes and implications for deep sea mining. *Sci Rep* 10:5075

Thompson PM, Fedak MA, McConnell BJ, Nicholas KS (1989) Seasonal and sex-related variation in the activity patterns of common seals (*Phoca vitulina*). *Journal of Applied Ecology* 521–535

Tougaard J, Wright AJ, Madsen PT (2015) Cetacean noise criteria revisited in the light of proposed exposure limits for harbour porpoises. *Mar Pollut Bull* 90:196–208

8. ANNEX

MUL250021_NIS_A1

Indicative coordinates of the proposed sampling stations and scientific equipment deployment locations associated with the MISSING-Link survey. The positions presented represent the anticipated operational locations assessed within this Natura Impact Statement and are provided to define the spatial extent of activities considered during the Appropriate Assessment process.

Activity	Latitude (WGS84)	Longitude (WGS84)	Comments
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Extent - Whittard Area	48.180	-9.916	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.176	-10.826	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.275	-11.384	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.706	-11.459	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	49.349	-11.420	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	49.375	-11.029	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	49.072	-9.763	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.645	-9.496	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.499	-9.449	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.500	-9.800	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.334	-9.800	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.333	-9.917	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Whittard Area	48.180	-9.916	This boundary includes the extent of autonomous subsurface glider-based measurements
Extent - Gollum Area	50.374	-11.914	-
Extent - Gollum Area	50.666	-12.041	-
Extent - Gollum Area	50.666	-12.041	-
Extent - Gollum Area	50.793	-11.729	-

Extent - Gollum Area	50.835	-11.235	-
Extent - Gollum Area	50.826	-10.912	-
Extent - Gollum Area	50.694	-10.777	-
Extent - Gollum Area	50.349	-10.785	-
Extent - Gollum Area	50.205	-10.879	-
Extent - Gollum Area	50.374	-11.914	-
Megacore Location	48.616	-10.033	Coring for organic carbon and pollutant measurements
Megacore Location	48.616	-10.022	Coring for organic carbon and pollutant measurements
Megacore Location	48.620	-10.011	Coring for organic carbon and pollutant measurements
Megacore Location	48.623	-10.001	Coring for organic carbon and pollutant measurements
Megacore Location	48.626	-9.995	Coring for organic carbon and pollutant measurements
Megacore Location	48.364	-10.071	Coring for organic carbon and pollutant measurements
Megacore Location	48.360	-10.063	Coring for organic carbon and pollutant measurements
Megacore Location	48.355	-10.055	Coring for organic carbon and pollutant measurements
Megacore Location	48.350	-10.051	Coring for organic carbon and pollutant measurements
Megacore Location	48.345	-10.045	Coring for organic carbon and pollutant measurements
Megacore Location	48.269	-10.764	Coring for organic carbon and pollutant measurements
Megacore Location	48.267	-10.767	Coring for organic carbon and pollutant measurements
Megacore Location	48.265	-10.771	Coring for organic carbon and pollutant measurements
Megacore Location	48.262	-10.774	Coring for organic carbon and pollutant measurements
Megacore Location	48.260	-10.778	Coring for organic carbon and pollutant measurements
Megacore Location	48.535	-11.129	Coring for organic carbon and pollutant measurements
Megacore Location	48.532	-11.134	Coring for organic carbon and pollutant measurements
Megacore Location	48.528	-11.140	Coring for organic carbon and pollutant measurements

Megacore Location	48.524	-11.145	Coring for organic carbon and pollutant measurements
Megacore Location	48.520	-11.151	Coring for organic carbon and pollutant measurements
Megacore Location	50.711	-11.382	Coring for organic carbon and pollutant measurements
Megacore Location	50.717	-11.385	Coring for organic carbon and pollutant measurements
Megacore Location	50.723	-11.386	Coring for organic carbon and pollutant measurements
Megacore Location	50.729	-11.387	Coring for organic carbon and pollutant measurements
Megacore Location	50.733	-11.388	Coring for organic carbon and pollutant measurements
Megacore Location	50.711	-11.578	Coring for organic carbon and pollutant measurements
Megacore Location	50.717	-11.578	Coring for organic carbon and pollutant measurements
Megacore Location	50.723	-11.578	Coring for organic carbon and pollutant measurements
Megacore Location	50.727	-11.580	Coring for organic carbon and pollutant measurements
Megacore Location	50.733	-11.582	Coring for organic carbon and pollutant measurements
CTD Cast Location	48.518	-9.544	Water column observaton and sampling
CTD Cast Location	48.386	-9.873	Water column observaton and sampling
CTD Cast Location	48.769	-10.122	Water column observaton and sampling
CTD Cast Location	48.689	-10.066	Water column observaton and sampling
CTD Cast Location	48.619	-9.994	Water column observaton and sampling
CTD Cast Location	48.541	-9.932	Water column observaton and sampling
CTD Cast Location	48.445	-9.941	Water column observaton and sampling
CTD Cast Location	48.536	-11.125	Water column observaton and sampling
CTD Cast Location	48.268	-10.763	Water column observaton and sampling
CTD Cast Location	48.365	-10.077	Water column observaton and sampling
CTD Cast Location	48.991	-10.998	Water column observaton and sampling
CTD Cast Location	48.759	-11.146	Water column observaton and sampling
CTD Cast Location	48.326	-10.405	Water column observaton and sampling
CTD Cast Location	50.711	-11.383	Water column observaton and sampling
CTD Cast Location	50.729	-11.132	Water column observaton and sampling
CTD Cast Location	50.714	-11.576	Water column observaton and sampling

Piston Core Location	48.537	-11.128	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.267	-10.766	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.364	-10.070	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.625	-9.995	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.463	-9.952	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.761	-11.153	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.613	-10.032	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.257	-10.782	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.346	-10.047	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.544	-11.102	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	48.887	-11.087	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	50.712	-11.382	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	50.711	-11.577	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	50.729	-11.387	Seafloor sampling including organic carbon and pollutant measurements
Piston Core Location	50.727	-11.580	Seafloor sampling including organic carbon and pollutant measurements
AUV Survey Extent	48.731	-10.149	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.870	-10.218	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.874	-10.059	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.733	-10.034	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations

AUV Survey Extent	48.733	-10.034	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.731	-10.149	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.282	-10.842	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.330	-10.742	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.216	-10.563	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.183	-10.664	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.282	-10.842	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	49.071	-11.225	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	49.163	-11.117	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	49.104	-10.822	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.956	-10.765	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.938	-10.833	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.962	-11.038	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	49.025	-11.207	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations

AUV Survey Extent	49.024	-11.204	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	49.071	-11.225	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.915	-10.672	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	49.023	-10.555	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.932	-10.282	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.823	-10.404	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.915	-10.672	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	48.389	-10.175	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
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AUV Survey Extent	48.296	-10.018	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
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AUV Survey Extent	48.555	-11.197	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
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AUV Survey Extent	48.442	-11.106	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
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AUV Survey Extent	50.651	-12.024	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.675	-11.796	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.555	-11.751	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations

AUV Survey Extent	50.524	-11.965	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.599	-12.003	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.599	-12.003	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.651	-12.024	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.806	-11.119	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.818	-10.904	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.680	-10.788	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.605	-10.790	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.616	-11.026	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.631	-11.170	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.789	-11.242	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.806	-11.119	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.675	-11.583	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.758	-11.598	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations

AUV Survey Extent	50.781	-11.269	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.685	-11.244	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.662	-11.433	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
AUV Survey Extent	50.675	-11.583	AUV survey will be smaller than this indicative locaton - to be targetted based on shipboard observations
Box Core Location	48.564	-9.789	Coring for organic carbon and pollutant measurements
Box Core Location	48.724	-10.098	Coring for organic carbon and pollutant measurements
Box Core Location	48.558	-9.933	Coring for organic carbon and pollutant measurements
Box Core Location	48.326	-10.405	Coring for organic carbon and pollutant measurements
Box Core Location	48.391	-10.946	Coring for organic carbon and pollutant measurements
Box Core Location	48.649	-11.198	Coring for organic carbon and pollutant measurements
Box Core Location	48.876	-11.135	Coring for organic carbon and pollutant measurements
Box Core Location	49.015	-11.175	Coring for organic carbon and pollutant measurements
Box Core Location	48.974	-10.951	Coring for organic carbon and pollutant measurements
Box Core Location	48.938	-10.650	Coring for organic carbon and pollutant measurements
Box Core Location	48.574	-10.787	Coring for organic carbon and pollutant measurements
Box Core Location	48.495	-10.374	Coring for organic carbon and pollutant measurements
Box Core Location	48.623	-10.098	Coring for organic carbon and pollutant measurements
Box Core Location	48.865	-10.386	Coring for organic carbon and pollutant measurements
Box Core Location	48.682	-11.126	Coring for organic carbon and pollutant measurements

Mooring Location	48.535	-11.129	ADCP on mooring to measure near-seafloor currents. Sediment trap to sample suspended organic carbon and pollutants
Mooring Location	48.269	-10.764	ADCP on mooring to measure near-seafloor currents. Sediment trap to sample suspended organic carbon and pollutants
Mooring Location	48.365	-10.070	ADCP on mooring to measure near-seafloor currents. Sediment trap to sample suspended organic carbon and pollutants
Mooring Location	48.626	-9.996	ADCP on mooring to measure near-seafloor currents. Sediment trap to sample suspended organic carbon and pollutants
Mooring Location	50.712	-11.383	ADCP on mooring to measure near-seafloor currents. Sediment trap to sample suspended organic carbon and pollutants