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Bremore Ireland Port Maritime Usage Licence Application for Site Investigation Works Natura Impact Statement

BREMORE
IRELAND PORT

Client	**Bremore Ireland Port**
Document Ref.	22032-REP-006-02
Project Title	Bremore Ireland Port Maritime Usage Licence
Date	26/02/2026

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Document Reference:	22032-REP-006-02

Client:	Bremore Ireland Port
Ultimate Client:	Bremore Ireland Port
Confidentiality	Non Confidential

REVISION HISTORY

Rev	Date	Reason for Issue	Originator	Checker	Reviewer	Approver
00	09/05/2024	Draft for client review	Maggie Starr	Charlotte Manwaring	Joey O'Connor	Mohammed Alaa Almoghayer
01	23/07/2024	Final Report	Maggie Starr	Charlotte Manwaring	Joey O'Connor	Mohammed Alaa Almoghayer
02	26/02/2026	Revised following MARA AA Screening and Determination	Maggie Starr	Joey O'Connor	Joey O'Connor	Jeannine Dunne

DISCLAIMER

REVISION SUMMARY

Rev	Date	Section(s)	Detail of Change
00	09/05/2024	All.	First draft for client comment.
01	23/07/2024	All	Final Report
02	26/02/2026	All	Revised Final Report

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List of Abbreviations

AA	Appropriate Assessment
AIMU	Assessment of Impact on the Maritime Usage
BIPDAC	Bremore Ireland Port Designated Activity Company
CESS	Cumulative Effects Spatial Scope
CETC	Cumulative Effect Temporal Scope
CPT	Cone Penetration Test
DAHG	Department of Arts, Heritage and the Gaeltacht
DEHLG	Department of Environment, Heritage and Local Government
DHLGH	Department of Housing, Local Government and Heritage
EC	European Commission
EPS	European Protected Species
EU	European Union
FCS	Favourable Conservation Status
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
MI	Marine Institute
MAP	Maritime Area Planning
MARA	Maritime Area Regulatory Authority
MUL	Maritime Usage Licence
MU	Management Unit
NIS	Natura Impact Statement
NISA	North Irish Sea Array
NPWS	National Parks and Wildlife Service
NRW	Natural Resources Wales
OWF	Offshore Wind Farm
QI	Qualifying Interests
SAC	Special Areas of Conservation
SCI	Special Conservation Interest
SISAA	Supporting Information for Screening for Appropriate Assessment
SPA	Special Protection Areas

Glossary of Terms

Appropriate Assessment (AA)	An Appropriate Assessment (AA) is an assessment of the potential adverse effects of a plan or project (in combination with other plans or projects) on Special Areas of Conservation and Special Protection Areas. These Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are protected by both National and European Law.
Array Investigation Area	Area where site investigations will take place to determine the suitability of that area as an offshore wind farm
Ecology	Ecology is a branch of biology concerning the spatial and temporal patterns of the distribution and abundance of organisms, including the causes and consequences.
Environmental Receptors	Environmental receptors are any organism, habitat or natural resource which could be adversely affected by an activity.
Favourable Conservation Status	The EU Habitats Directive requires EU Member States to achieve FCS of natural habitats and species, defined with respect to species by Article 1 (i) of the Directive as below: "conservation status will be taken as 'favourable' when: population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."
Geophysical Surveys	Geophysical surveys are ground-based physical sensing techniques that produce a detail image or map of an area. Ground-based surveys may include: Seismic surveys - vibrations are recorded with geophones to provide information about the properties of rocks.
Geotechnical investigation and evaluation	Geotechnical investigation and evaluation include methods to acquire and evaluate subsurface information, including drilling and sampling, laboratory testing, cone penetration testing, and pressure meter testing.
Maritime Usage Licence Area	Within this report: The areas within the outer limit of the State's continental shelf and high water mark for which a Maritime Usage Licence Application is submitted to MARA for a licence under the Maritime Area Planning Act 2021.
Metocean	Metocean conditions refer to the combined wind, wave, and climate conditions as found on a certain location. They are most often presented as statistics, including seasonal variations, scatter tables, wind roses and probability of exceedance.
Natura Impact Statement	A Natura Impact Statement (NIS) is the statement prepared following Appropriate Assessment (AA) of Natura 2000 sites as required under the EU Habitats Directive which presents information on the assessment and the process of collating data on a project and its potential significant impacts on Natura 2000 site(s).

Receiving Environment	The receiving environment is the environment upon which a proposed activity might have effects.
Special Areas of Conservation (SAC)	These are prime wildlife conservation areas considered to be important on a European as well as national level. The EU Habitats Directive lists certain habitats and species that must be protected within SACs.
Special Protection Areas (SPA)	Ireland is required under the terms of the EU Birds Directive (2009/147/EC) to designate Special Protection Areas (SPAs) for the protection of: Listed rare and vulnerable species; regularly occurring migratory species and wetlands, especially those of international importance.

1 INTRODUCTION

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

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

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

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

The total MUL area is 159.48 km^2, and the Potential Development Area is 4.21 km^2.

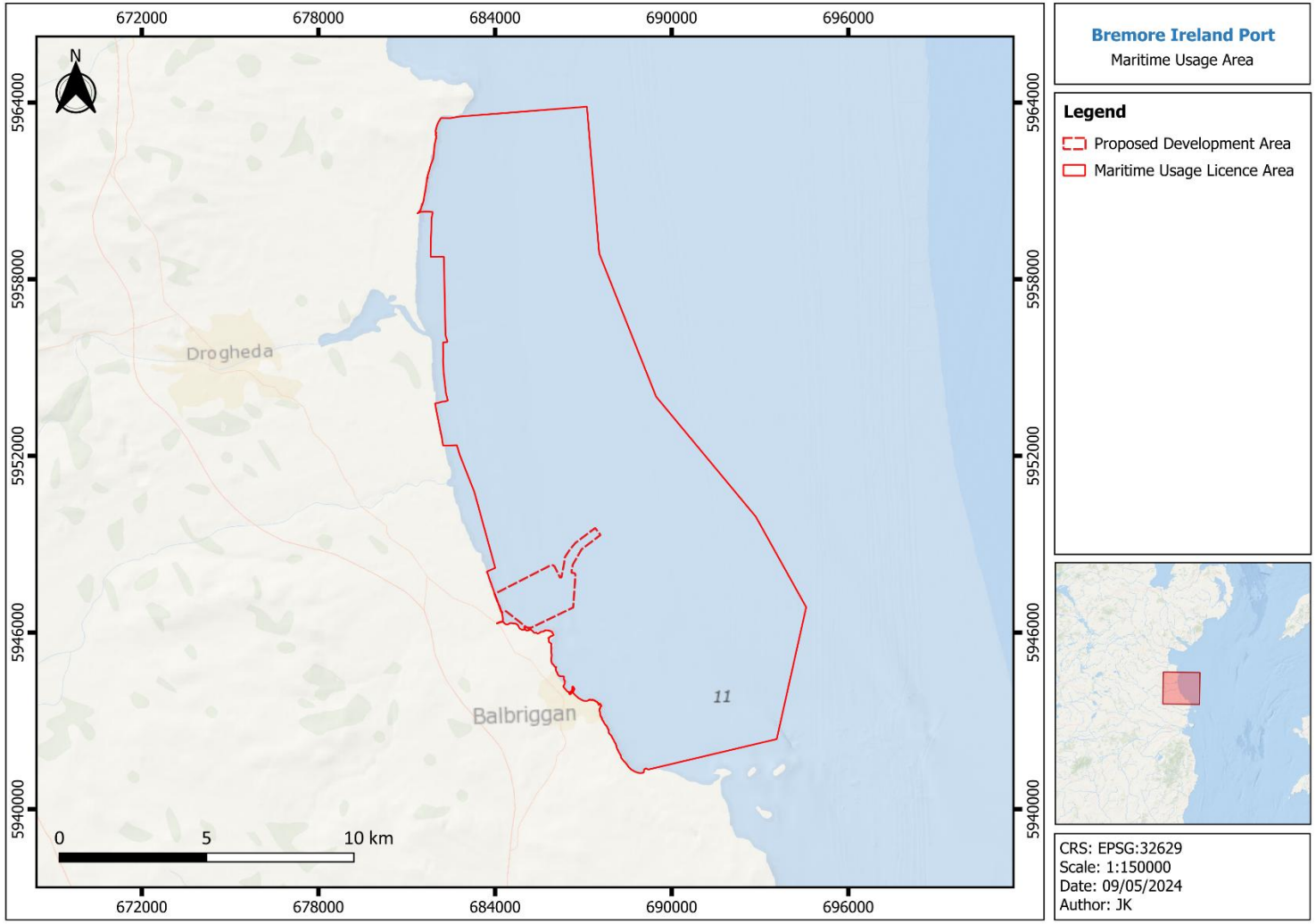

Figure 1-1 Bremore Ireland Port Licence Application Area

1.1 AIM OF THIS REPORT

This report is part of the Maritime Usage Licence (MUL) Application to the Maritime Area Regulatory Authority (MARA) and constitutes the Natura Impact Statement (NIS) which forms part of the Appropriate Assessment (AA) process as required under the Habitats Directive (92/43/EEC).

This report aims to support the application process and provide the necessary information to the competent authorities to assist them in making an informed decision on the likely significant effect of this project on the receiving environment including on Special Protection Areas (SPAs) and Special Areas of Conservation (SACs).

1.2 STRUCTURE OF THE REPORT

This report is structured into the following chapters to include information relating to the receiving environment, SACs, SPAs, Qualifying Interests (QIs), the potential impacts and AA process and other environmental receptors. Specifically, the chapters of this report are as follows:

- Chapter 1: Introduction (this chapter)
- Chapter 2: Habitats Directive (92/43/EEC) (outlines key aspects of the process)
- Chapter 3: Supporting Information for a Stage 2 Appropriate Assessment (Natura Impact Statement)
- Chapter 4: Impact Assessment
- Chapter 5: Appropriate Assessment Conclusion

1.3 LICENCE AREA

This MUL Application seeks consent to conduct site investigation activities to inform development of Bremore Ireland Port off the coast of counties Dublin, Meath and Louth.

The coordinates of the Licence Area are provided in the accompanying AIMU report.

1.4 SITE INVESTIGATION ACTIVITIES

The objective of the proposed Bremore Ireland Port site investigation campaigns is to determine the environmental conditions and seafloor and subsurface geological characteristics within the Licence Area.

The proposed programme of site investigations to be undertaken within the Licence Area is described in section 2.2 and 2.3 of the Assessment of Impacts on the Maritime Usage (AIMU) report accompanying this Application. Table 2-2 of the AIMU describes the proposed investigations to be undertaken, and Table 2-3 gives typical durations for each survey type. The exact technical specifications of the equipment to be used will not be known until the survey contracts have been awarded. However, a description of typical equipment and surveys is provided in the Programme of Works, Appendix A to the AIMU.

1.5 SURVEY SCHEDULE

The intention is to begin survey activities as soon as feasible in 2026 following licence award, with a phased programme of multiple survey campaigns to be undertaken over the duration of the licence. This phased approach will progress the overall development towards detailed design stage.

The exact mobilisation dates will not be known until the process of procuring a contractor is complete, but the approximate duration of each site investigation activity is provided in Table 2-3 in Section 2.2 of the AIMU document accompanying this application.

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

2 HABITATS DIRECTIVE (92/43/EEC)

The purpose of this report is to inform the AA process as required under the Habitats Directive (92/43/EEC). The AA Screening contained in the accompanying Supporting Information for Screening for Appropriate Assessment (SISAA) document and Appropriate Assessment Screening and Determination[1] completed by MARA have assessed whether the proposed surveys, both alone and cumulatively/in combination with other planned activities under the remit of this project and others, are likely to have a significant effect on any Natura 2000 sites or their Qualifying Interests. This document sets out the Stage 2 NIS of the AA process and constitutes an updated NIS in response to a request from MARA (dated 6 February 2026) following the completion of MARA's Appropriate Assessment Screening exercise.

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

1. Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of Environment, Heritage and Local Government, 2010 revision)
2. Appropriate Assessment under Article 6 of the Habitats Directive; Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10
3. Guidance to Manage the Risk to Marine Mammals from Manmade Sound Sources in Irish Waters. Prepared by National Parks and Wildlife Service, DAHG (2014)
4. Guidelines for Good Practice: Appropriate Assessment of Plans under Article 6(3) Habitats Directive (International Workshop on Assessment of Plans under the Habitats Directive, 2011)
5. Marine Natura Impact Statements in Irish Special Areas of Conservation: A working document. Prepared by National Parks and Wildlife Service, DAHG (2012)
6. Managing Natura 2000 Sites - The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission - 21 November 2018)
7. Office of the Planning Regulator – Practice Note 01 – PN01 (March 2021)

2.1 LEGISLATIVE BACKGROUND

The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) adopted in 1992, transposed into Irish Law in 1997 and subsequently amended and consolidated, aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It provides a framework for the legal protection to ensure the conservation of a wide range of rare, threatened, or endemic animal and plant species throughout the European Union. The Birds Directive (Conservation of Wild Birds Directive (79/409/EEC) aims to protect all of the 500 wild bird species naturally occurring in the European Union. The Habitats Directive, along with the Birds Directive forms the cornerstone of Europe's nature conservation policy.

[1] https://www.maritimeregulator.ie/wp-content/uploads/2025/11/MUL240011_Bremore_Port_Screening_for_Appropriate_Assessment_and_Determination_APPR.pdf

Together they form a coherent network of protected areas (Special Areas of Conservation and Special Protection Areas), called Natura 2000, safeguarded against potentially damaging developments.

The requirement for "Appropriate Assessment" is set out in Articles 6(3) and 6(4) of the Habitats Directive (92/43/EEC). If a project is likely to have a significant effect on a Natura 2000 site, either alone or in combination with other plans or projects, it must undergo an appropriate assessment (AA). According to Article 6(3) of the Habitats Directive:

"Any plan or project not directly connected with or necessary to the management of the site (Natura 2000 site) but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment of its implications for the site in view of the site's conservation objectives".

In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only having ascertained that it will not adversely affect the integrity of the site concerned and if appropriate, after having obtained the opinion of the general public.

Article 6(4) states: *"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for environment or, further to an opinion from the Commission to other imperative reasons of overriding public interest."*

2.2 THE APPROPRIATE ASSESSMENT PROCESS

The European Commission's methodological guidance (EC, 2021) promotes a three-stage process to complete an AA and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. The steps and procedures involved in completing each stage, as described in the guidance, are shown below (Figure 2-1).

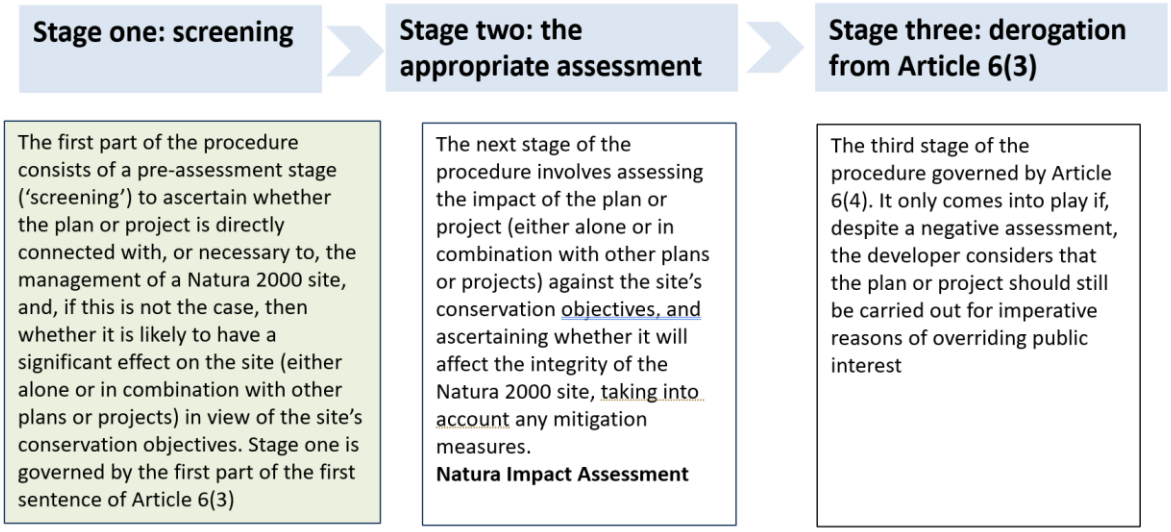

Figure 2-1 Stages in the AA process (Source: EC, 2021)

Stage 1. Screening for Appropriate Assessment

Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

i. whether a plan or project is directly connected to or necessary for the management of the site, and
ii. whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). Screening should be undertaken without the inclusion of mitigation, unless potential impacts clearly can be avoided through the modification or redesign of the plan or project, in which case the screening process is repeated on the altered plan. The greatest level of evidence and justification will be needed in circumstances when the process ends at screening stage on grounds of no impact.

Stage 2. Appropriate Assessment

This stage considers whether the plan or project, alone or cumulatively with other projects or plans, will have adverse effects on the integrity of a Natura 2000 site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The proponent of the plan or project will be required to submit a Natura Impact Statement, i.e. the report of a targeted professional scientific examination of the plan or project and the relevant Natura 2000 sites, to identify and characterise any possible implications for the site in view of the site's conservation objectives, taking account of cumulative effects. This should provide information to enable the competent authority to carry out the appropriate assessment. If the assessment is negative, i.e. adverse effects on the integrity of a site

cannot be excluded, then the process must proceed to Stage 3, or the plan or project should be abandoned. The AA is carried out by the competent authority and is supported by the NIS.

Stage 3. Imperative Reasons of Overriding Public Interest (IROPI)/Derogation

Stage 3 is the main derogation process of Article 6(4) which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a Natura 2000 site to proceed in cases where it has been established that no less damaging alternative solution exists. The extra protection measures for Annex I priority habitats come into effect when making the IROPI case. Compensatory measures must be proposed and assessed. The Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister for Housing, Planning and Local Government.

2.3 METHODOLOGY FOR THE PREPARATION OF THIS REPORT

This document forms part of a series of documents taken together to support Stages 1 and 2 (Screening and Natura Impact Statement) of the AA process, as detailed in section 2.2 above, and has been prepared in accordance with the guidance numbered 1 to 7 in the first paragraphs of this section.

As the proposed works are not directly connected to or necessary for the management of a Natura 2000 site, this document focuses on assessing whether the works, alone or cumulatively with other plans and projects, are likely to have significant effects on any Natura 2000 site in view of its conservation objectives.

This report has been informed by a review of the publicly available datasets and the available literature that allowed the characterisation of the receiving environment and supported the identification and assessment of potential impacts and their significance. The sources of the information used are cited throughout the report and listed in the References section.

The examination, analysis and evaluation of the relevant information that supported AA process conducted and documented in this report followed the precautionary principle throughout.

The report methodology followed the steps below, corresponding to the chapters which constitute the structure of the report:

- Description of the proposed project (see chapter 1 and SISAA)
- Description of legislative background, of the Appropriate Assessment process and Methodology for the preparation of the report (this chapter)
- Identification and description of the potential direct and indirect effects on the Natura 2000 sites (see SISAA document)
- Identification of the relevant Natura 2000 sites and their Qualifying Interests (QIs), and their AA Screening (Stage 1) against the identified potential impacts (see SISAA document and chapter 4)
- Natura Impact Statement (Stage 2) including detailed characterisation of the sites or species screened in for Stage 2 of the AA Process (see chapter 5)

This report has been prepared by Maggie Starr (BSc. (Hons) Marine Sciences). Maggie is a Marine Ecologist and Ornithologist with experience across terrestrial, freshwater, coastal and offshore environments. She is a trained Marine Mammal Observer (MMO) with expertise in mammal and bird surveys (land based and aerial), habitat classification and ecological assessment. Her professional experience includes ecological surveying across terrestrial, freshwater and marine environments, field survey coordination and management, and preparation of statutory reports including AA Screening, Stage 2 NIS, EcIA, EIAR and MUL documentation.

This report has been checked and reviewed by Charlotte Manwaring (BSc. Hons Geological Science, MSc. Geochemistry) and Joey O'Connor (BSc. Hons Marine Science, MSc. Engineering in the Coastal Environment). Charlotte is a Senior Environmental Scientist with extensive experience as an environmental consultant, undertaking various multi-disciplinary projects within consulting engineering. Joey is a Marine Ecologist with coastal engineering expertise and extensive experience of offshore benthic survey and Marine Protected Area monitoring who has undertaken multiple environmental assessments under the Habitats Directive for GDG and as a statutory adviser to the UK government and its devolved administrations with the Joint Nature Conservation Committee.

3 SUPPORTING INFORMATION FOR A STAGE 2 APPROPRIATE ASSESSMENT (NATURA IMPACT STATEMENT)

3.1 OUTCOME OF SCREENING FOR APPROPRIATE ASSESSMENT

A robust screening process informs those Natura 2000 sites and their qualifying interests that have been screened in for further assessment under Stage 2 AA. Table 3-1 lists those Natura 2000 sites and their qualifying interests screened in, together with the Impacts identified as relevant for each site and Qualifying Interests (QIs) and Special Conservation Interests (SCIs) that may result in "Likely Significant Effects" to conservation objectives in the absence of mitigation measures.

Table 3-1 Summary of SACs and their QIs and SPAs and their SCIs screened in for Stage 2 Appropriate Assessment

European Site Name & Code	By sea distance from MUL Area (km)	QIs / SCIs Screened In
SACs		
Rockabill to Dalkey Island [003000]	2.2	Harbour Porpoise (*Phocoena phocoena*) [1351]
River Boyne and River Blackwater [002299]	4.9	Otter (*Lutra Lutra)* [1355] *River Lamprey* (*Lampetra fluviatilis*) [1099] Atlantic Salmon (*Salmo salar*) [1106]
Lambay Island SAC [000204]	11	Grey Seal (*Halichoerus grypus*) [1364] Harbour Seal (*Phoca vitulina*) [1365] Harbour Porpoise (*Phocoena phocoena*) [1351]
Codling Fault Zone SAC [003015]	40	Harbour Porpoise (Phocoena phocoena) [1351]
Slaney River Valley SAC [000781]	<145	Twaite Shad (*Alosa fallax fallax*) [1103] Atlantic Salmon (*Salmo salar*) [1106] Sea Lamprey (*Petromyzon marinus*) [1095] River Lamprey (*Lampetra fluviatilis*) [1099]
SPAs		
North-west Irish Sea SPA [004236]	Direct Overlap	Common Scoter (*Melanitta nigra*) Red-throated Diver (*Gavia stellata*) Great Northern Diver (*Gavia immer*) Fulmar (*Fulmarus glacialis*) Manx Shearwater (*Puffinus puffinus*) Shag (*Phalacrocorax aristotelis*) Cormorant (*Phalacrocorax carbo*) Little Gull (*Larus minutus*) Kittiwake (*Rissa tridactyla*) Black-headed Gull (Chroicocephalus ridibundus) Common Gull (*Larus canus*) Lesser Black-backed Gull (*Larus fuscus*) Herring Gull (*Larus argentatus*) Great Black-backed Gull (*Larus marinus*)

European Site Name & Code	By sea distance from MUL Area (km)	QIs / SCIs Screened In
		Little Tern (*Sterna albifrons*) Roseate Tern (*Sterna dougallii*) Common Tern (*Sterna hirundo*) Arctic Tern (*Sterna paradisaea*) Puffin (*Fratercula arctica*) Razorbill (*Alca torda*) Guillemot (*Uria aalge*)
River Nanny and Shore SPA [004158]	0.14	Oystercatcher (*Haematopus ostralegus*) [A130] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Herring Gull (*Larus argentatus*) [A184] Wetland and Waterbirds [A999]
Boyne Estuary SPA [004080]	0.14	Shelduck (*Tadorna tadorna*) [A048] Oystercatcher (*Haematopus ostralegus*) [A130] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Black-tailed Godwit (*Limosa limosa*) [A156] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Little Tern (*Sternula albifrons*) [A885] Wetland and Waterbirds [A999]
Rockabill SPA [004014]	0.2	Purple Sandpiper (*Calidris maritima*) [A148] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194]
Skerries Islands SPA [004122]	0.5	Black-tailed Godwit (*Limosa limosa*) [A156] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Little Tern (*Sternula albifrons*) [A885] Wetland and Waterbirds [A999]
Lambay Island SPA [004069]	<11	Fulmar (*Fulmarus glacialis*) [A009] Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Phalacrocorax aristotelis*) [A018] Greylag Goose (*Anser anser*) [A043] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200] Puffin (*Fratercula arctica*) [A204]

3.2 CONSERVATION OBJECTIVES FOR QUALIFYING INTERESTS

The relevant QI- and SCI-specific conservation objectives for all sites screened in for Stage 2 AA (NIS) are set out in Section 4 below.

4 IMPACT ASSESSMENT

Species-specific impacts, conservation objectives and, where required, mitigation measures for the Qualifying Interests (QIs) of screened-in SACs and the Special Conservation Interests (SCIs) of screened-in SPAs are assessed in this section. The assessment reflects the impact pathways identified through the project's Supporting Information for Screening for Appropriate Assessment (SISAA) and the screening determination issued by MARA.

The assessment considers both the proposed site investigation activities alone and in combination with other plans and projects, in accordance with the requirements of Article 6(3) of the Habitats Directive. Where potential for adverse effects cannot be excluded on the basis of impact characteristics alone, appropriate mitigation is identified and assessed to ensure that the integrity of European sites is not adversely affected, having regard to their conservation objectives.

4.1 PHOCID PINNIPEDS: GREY SEAL [1364] AND HARBOUR SEAL [1365]

4.1.1 EUROPEAN SITE ASSESSED

- Lambay Island SAC (000204)

Grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*) are QIs of Lambay Island SAC. The potential impact pathways relevant to these species in the context of the proposed maritime usage are underwater noise and vibration, and vessel presence including collision risk.

The conservation objective for grey and harbour seal at Lambay Island SAC is to maintain the species in favourable conservation condition. This relates to maintaining population size and structure, breeding success, access to suitable habitat, and the continued availability of supporting habitat within the site.

4.1.2 POTENTIAL IMPACT PATHWAYS

The proposed maritime usage consists of temporary marine site investigation surveys, including geophysical and geotechnical works, undertaken from survey vessels operating at low speeds.

The identified impact pathways are:

- Underwater noise and vibration
- Vessel presence and collision risk

Spatial Separation from Haul-out and Breeding Sites: Lambay Island SAC supports recognised haul-out and breeding sites for grey seal and harbour seal. The MUL Application Area is located over 11 km south-west of Lambay Island SAC. No works are proposed within the SAC, and no land-based activities are associated with the proposed maritime usage.

Given this spatial separation:

- There is no direct disturbance pathway to hauled-out or breeding seals within Lambay Island SAC;

- Airborne noise generated by survey vessels at this distance would attenuate to below levels capable of causing disturbance at haul-out sites;
- Underwater sound associated with survey activities would not affect seals while hauled out on land.

Accordingly, no plausible pathway exists for disturbance of seals at haul-out or breeding sites within Lambay Island SAC.

4.1.3 Assessment of Potential Impacts

4.1.3.1 Underwater Noise and Disturbance

The proposed site investigation activities introduce underwater sound through the operation of geophysical survey systems (SBP, MBES, SSS), geotechnical investigations (rotary drilling, vibrocore, CPT) and vessel propulsion.

Grey and Harbour seals (Phocidae in water) are classified as low-frequency pinnipeds under the Southall *et al*. (2007; 2019) functional hearing group framework, with greatest sensitivity in the approximate range of 50 Hz to 50 kHz. Assessment of potential effects therefore considers both source frequency and received sound level.

Sub-bottom Profiler (SBP)

Sub-bottom profilers represent the geophysical source with the greatest potential for acoustic interaction due to comparatively higher source levels and lower operating frequencies.

Indicative SBP systems proposed operate within low- to mid-frequency bands (e.g. secondary frequencies approximately 2–22 kHz for parametric systems, and lower-frequency components for boomer/sparker systems). Published measurements indicate peak source levels typically in the range of approximately 200–228 dB re 1 µPa @1 m depending on system configuration (MacGillivray et al., 2014).

SBP signals consist of short-duration pulses of several tens of milliseconds. MacGillivray *et al*. (2014) demonstrated that audibility and sensation levels decrease rapidly with horizontal range in shallow-water environments and are influenced by pulse duration, repetition rate and frequency content.

Auditory injury to grey and harbour seals from non-impulsive or semi-impulsive survey sources would require received sound pressure levels or cumulative sound exposure levels exceeding established injury criteria (Southall *et al*., 2007; 2019). Such exposure would only occur where an individual remains within very close proximity to the active transducer for sufficient time to accumulate sound exposure.

Given:

- The directional nature of SBP transducers
- The short pulse duration
- The intermittent repetition rate

- The mobility of both the survey vessel and grey seals prolonged close-range exposure is considered unlikely.

On this basis, the primary potential effect mechanism associated with SBP operation is behavioural disturbance (e.g. short-term avoidance) rather than auditory injury.

Multibeam Echosounder (MBES) and Side Scan Sonar (SSS)

The Multibeam Echosounder (MBES) systems proposed for the survey operate at high frequencies in shallow waters (<200m), typically in the range of approximately 200–700 kHz (e.g. Kongsberg EM2040 MKII)[2]. These frequencies are substantially above the documented functional hearing range of phocid pinnipeds in water (Southall *et al*., 2007; 2019), which extends to approximately 86 kHz.

Side-scan sonar (SSS) systems proposed for the survey (e.g. EdgeTech 4205) operate at even higher frequencies, typically:

- 300–500 kHz (low frequency channel); and
- 500–900 kHz (high frequency channel),

with source levels in the order of approximately 220–230 dB re 1 µPa @1 m (EdgeTech, 2021).

These frequencies are well above the functional hearing range of grey and harbour seals. In addition, SSS signals are highly directional and are typically confined to within a few hundred metres of the survey vessel (<300 m), with rapid attenuation in shallow water.

Water depths within the MUL Application Area range from approximately 0 m to c. 26 m. In shallow coastal waters, high-frequency sound undergoes rapid attenuation due to frequency-dependent absorption and interaction with the seabed and sea surface, further limiting propagation range.

Given:

- The operating frequencies of MBES and SSS relative to grey seal hearing sensitivity;
- Rapid attenuation in shallow water (0–26 m);
- Narrow, downward-directed beam geometry;
- Short pulse duration; and
- Continuous forward movement of the survey vessel,

MBES and SSS emissions are unlikely to be detectable by grey and harbour seals at biologically meaningful levels beyond very close proximity to the source. Auditory injury is not considered plausible, and behavioural disturbance, if it were to occur, would be highly localised and transient.

[2] https://www.kongsberg.com/discovery/seafloor-mapping/em/EM2040-Mk2/

Geotechnical Works (Rotary Drilling, Vibrocore, CPT)

Rotary drilling generates continuous, non-impulsive low-frequency sound with indicative source levels in the order of approximately 145 dB re 1 µPa @1 m. Vibrocore and CPT operations are short-duration, localised seabed-interaction activities.

These source levels are substantially lower than SBP peak levels and are comparable to or below routine vessel noise. Sound from drilling and sampling activities attenuates rapidly with distance and does not generate high peak pressures associated with injury.

Accordingly, geotechnical works are not predicted to result in auditory injury to grey and harbour seals and would, at most, result in short-term localised behavioural avoidance in close proximity to operations.

Acoustic Doppler Current Profiler (ADCP)

Seabed-mounted Acoustic Doppler Current Profiler (ADCP) systems typically operate at high ultrasonic frequencies, commonly in the order of 300–600 kHz (and in some cases higher). These frequencies are above the documented functional hearing ranges of marine mammals (Southall *et al.*, 2007; 2019), as well as fish and birds, and are therefore unlikely to be detectable at biologically meaningful levels.

In addition, ADCP acoustic beams are narrow and vertically oriented, further limiting the potential for horizontal esonification.

Given:

- the high operating frequency (c. 300–600 kHz);
- the narrow, upward-directed beam geometry;
- rapid attenuation in shallow water (0–26 m); and
- the stationary and highly localised nature of the instrument,

no plausible pathway exists for auditory injury. Behavioural disturbance is considered highly unlikely and, if it were to occur, would be confined to the immediate vicinity of the deployed unit.

Accordingly, ADCP deployment will not give rise to adverse effects on the integrity of any European site with respect to marine mammal Qualifying Interests and is not assessed further for any of the receptors.

4.1.3.2 SEABED VIBRATION

Seabed vibration associated with drilling, CPT or vibrocore operations will be confined to the immediate vicinity of the equipment and will attenuate rapidly within the substrate. No pile driving or high-energy impulsive installation methods are proposed. Vibration effects are therefore not predicted to result in disturbance at a spatial scale relevant to grey and harbour seal use of the SAC.

4.1.3.3 VESSEL PRESENCE AND COLLISION RISK

The risk of collision between marine mammals and vessels is influenced primarily by vessel speed and duration of interaction (see Schoeman *et al*., 2020 for review). Injuries to marine mammals from vessel strikes are species-dependent but generally are more severe at higher impact speeds (Wang *et al*., 2007). Survey vessels associated with the proposed SI activities will operate at low speeds (c. 5 knots) thus allowing any animal in the area time to avoid collision, and vessel numbers will be limited.

The works are temporary in duration and spatially restricted. The probability of collision is therefore low. No increase in mortality or injury rates that could affect the conservation status of grey and harbour seal within Lambay Island SAC is predicted.

4.1.3.4 MITIGATION - PINNIPEDS

The MUL Application Area is located adjacent to Boyne Coast and Estuary SAC, which comprises an estuarine system. In accordance with Section 4.3.4 of the DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*, enhanced mitigation measures applicable to geophysical acoustic surveys within bays, inlets or estuaries, and within 1,500 m of the entrance of enclosed systems, will be implemented.

Accordingly, for all geophysical acoustic surveys (including SBP, MBES and SSS) will be undertaken in accordance with the procedures set out in DAHG (2014), including:

- Visual monitoring prior to commencement of noise-generating activities by a suitably qualified Marine Mammal Observer
- Pre-start monitoring of a defined mitigation zone appropriate to the sound source during daylight hours and good visibility
- Soft-start procedures where applicable
- Delay of activities if marine mammals are detected within the relevant mitigation zone during the pre-start monitoring

In addition, and as a precautionary enhancement to visual monitoring, Passive Acoustic Monitoring (PAM) may be deployed where operationally feasible to provide supplementary detection capability. PAM will act as an additional monitoring measure and does not replace the mitigation procedures required under DAHG (2014).

The application of these measures provides a precautionary framework to avoid injury and minimise disturbance to marine mammals associated with estuarine and adjacent coastal habitats. The proposed works will not result in habitat loss, restriction of access to haul-out or breeding sites, barrier effects, or injury to grey and harbour seals.

Accordingly, while temporary behavioural disturbance cannot be entirely excluded, the magnitude, duration and spatial extent of any such disturbance will not affect population size, population structure, breeding success, range, or supporting habitat within Lambay Island SAC. The conservation objective for grey and harbour seal will therefore not be undermined.

4.1.3.5 CONCLUSION

This assessment has been undertaken in accordance with MARA's AA Screening Determination and considers the impact pathways identified therein, namely disturbance, displacement or harm from underwater noise and vibration (and, where relevant, underwater noise in a behavioural context) and vessel collision risk in respect of the Lambay Island SAC (grey and harbour seals QI) screened in for Stage 2 Appropriate Assessment.

Taking account of:

- The non-impulsive nature of the proposed geophysical and geotechnical survey activities;
- The high operating frequencies of MBES, SSS and ADCP systems relative to phocid pinniped hearing sensitivity (Southall *et al*., 2007; 2019);
- Rapid attenuation of high-frequency sound in shallow coastal waters (0–26 m);
- The requirement for close and sustained exposure for auditory injury thresholds to be exceeded;
- The directional characteristics and short pulse duration of survey sources;
- The mobility and avoidance behaviour of grey and harbour seals; and
- Implementation of mitigation measures in accordance with DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*,

auditory injury to grey seal or harbour seal is not predicted.

The most plausible effect mechanism associated with underwater noise is short-term behavioural disturbance in the vicinity of active sound sources, primarily associated with SBP operation. Any such disturbance would be temporary, spatially limited and reversible, and would not result in sustained displacement from, or reduced use of, designated habitats.

The MUL Application Area is located over 11 km north-west of Lambay Island SAC, which supports recognised haul-out and breeding sites for grey and harbour seal. No works are proposed within the SAC. Given this spatial separation, there is no plausible pathway for disturbance of seals while hauled out or breeding within Lambay Island SAC. Airborne noise associated with survey vessels at this distance would attenuate to below levels capable of causing disturbance at haul-out sites.

Vessel activity associated with the surveys will be temporary and undertaken at low speeds (c. 5 knots). Given the limited number of vessels, slow operational speeds and the ability of seals to detect and avoid approaching vessels, collision risk is considered negligible and substantially lower than that associated with existing commercial and fishing vessel activity in the wider area.

Minor seabed vibration associated with certain geotechnical activities will be confined to the immediate vicinity of the equipment and will attenuate rapidly within the substrate. No pathway exists for vibration to result in injury, sustained disturbance, habitat alteration or restriction of access to suitable habitat within Lambay Island SAC.

All geophysical acoustic surveys will be undertaken in accordance with DAHG (2014) guidance, including pre-start monitoring by a MMO, implementation of soft-start procedures where applicable,

and delayed commencement where marine mammals are detected within the prescribed mitigation zone. The MUL Application Area is located adjacent to Boyne Coast and Estuary SAC; accordingly, the geophysical survey measures applicable to surveys within bays, inlets or estuaries, and within 1,500 m of their entrance, will be implemented in full.

The application of these mitigation measures ensures that injury is avoided and that any behavioural disturbance is minimised.

4.2 Cetaceans: Harbour Porpoise [1351]

4.2.1 European Sites Assessed

- Rockabill to Dalkey Island SAC (003000)
- Lambay Island SAC (000204)
- Codling Fault Zone SAC (003015)

Harbour porpoise (*Phocoena phocoena*) is a QI of the above SACs. The conservation objective for harbour porpoise at these sites is to maintain the species in favourable conservation condition.

For Lambay Island SAC (NPWS, 2024 Version 2) and Codling Fault Zone SAC (NPWS, 2025 Version 2), favourable conservation condition is defined by the following attributes:

- **Access to suitable habitat:** Species range within the site should not be restricted by artificial barriers to site use.
- **Disturbance:** Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site.

Rockabill to Dalkey Island SAC has a comparable conservation objective requiring the maintenance of population size, range, and habitat conditions necessary to support the species.

4.2.2 Potential Impact Pathways

The proposed maritime usage (SI activities) comprises temporary marine site investigation surveys, including geophysical and geotechnical works, undertaken from vessels operating at low speeds.

The relevant impact pathways are:

- Underwater noise and vibration
- Vessel presence and collision risk

No seabed modification, and no installation of permanent structures within any SAC are proposed.

4.2.3 Assessment of Potential Impacts

4.2.3.1 Underwater Noise and Disturbance

The principal potential impact pathway associated with the proposed site investigation activities is the introduction of underwater sound from geophysical and geotechnical survey equipment. The relevant

sound sources include Sub-bottom Profilers (SBP), Multibeam Echosounders (MBES), Side Scan Sonar (SSS), rotary drilling, vibrocore operations and vessel propulsion.

Among these, SBP systems represent the source with the greatest potential for acoustic interaction with marine mammals due to their comparatively higher source levels and lower operating frequencies.

Sub-Bottom Profiling (SBP)

Sub-bottom profilers are widely used geophysical survey tools that emit short-duration acoustic pulses to image shallow subsurface sediments. Indicative SBP systems proposed for the works include parametric, boomer and sparker systems operating across low to mid-frequency bands.

Published measurements of commonly deployed shallow-water SBP systems indicate peak source levels typically in the range of approximately 200–228 dB re 1 µPa @ 1 m, depending on system type and operational settings (MacGillivray *et al*., 2014). SBP signals consist of short pulses, typically of tens of milliseconds duration, with repetition rates dependent on survey configuration.

MacGillivray *et al*. (2014) modelled the audibility of representative geophysical survey sources to marine mammals and demonstrated that lower-frequency components of SBP signals are most readily detected by low-frequency cetaceans, while odontocetes such as harbour porpoise are capable of detecting such signals at close range depending on system characteristics and propagation conditions. However, the study also demonstrated that high-frequency survey systems such as MBES and SSS generate substantially lower estimated sensation levels across all marine mammal hearing groups due to rapid attenuation in shallow water and operation near the upper limits of mammalian hearing sensitivity.

Auditory injury may occur only where received sound pressure levels or cumulative sound exposure levels exceed established tolerance thresholds for the relevant functional hearing group (Southall *et al.,* 2007; Southall *et al*., 2019). For non-impulsive and impulsive survey sources such as SBPs, injury would require animals to pass very close to the active transducer and remain within the highly localised zone of ensonification for sufficient time to accumulate sound exposure. Such exposure scenarios are considered unlikely given the mobility of the species concerned and the movement of the survey vessel.

On this basis, and consistent with the findings of MacGillivray *et al*. (2014), the principal potential effect mechanism associated with SBP operation is considered to be behavioural disturbance (e.g. short-term avoidance), rather than auditory injury.

Any behavioural response would be spatially restricted to the immediate vicinity of the operating source and limited to the duration of survey activity.

Multibeam Echosounder and Side Scan Sonar

MBES systems proposed for the survey operate at high frequencies, typically in the range of approximately 200–400 kHz (e.g. Kongsberg EM2040 MKII)[3]. Side-scan sonar (SSS) systems (e.g. EdgeTech 4205) operate at frequencies of approximately 300–500 kHz (low channel) and 500–900 kHz (high channel), with source levels in the order of 220–230 dB re 1 µPa @1 m.

Harbour porpoise are classified as very high-frequency (VHF) cetaceans under Southall et al. (2007; 2019), with functional hearing extending to approximately 180 kHz and peak sensitivity at lower frequencies (c. 100–140 kHz). The operating frequencies of MBES and SSS are therefore above the peak sensitivity range of harbour porpoise and at or above the documented upper functional hearing range. MacGillivray *et al*. (2014) demonstrated that high-frequency systems produce relatively low estimated sensation levels for all marine mammal hearing groups due to frequency-dependent attenuation and reduced hearing sensitivity at these frequencies.

In addition, water depths within the MUL Application Area range from approximately 0 m to c. 26 m. In shallow coastal waters, high-frequency sound undergoes rapid frequency-dependent attenuation and additional energy loss through interaction with the seabed and sea surface, thereby constraining propagation distance.

MBES and SSS systems emit very short-duration pulses with narrow, downward-directed beams. The combination of:

- High operating frequency relative to peak porpoise sensitivity;
- Rapid attenuation in shallow water (0–26 m);
- Narrow beam geometry;
- Short pulse duration; and
- Continuous forward movement of the survey vessel,

means that exposure at any fixed location is brief and spatially limited.

Auditory injury would require received sound pressure levels or cumulative sound exposure levels to exceed established thresholds and for an animal to remain in close proximity to the active source for sufficient duration to accumulate sound energy (Southall et al., 2007; 2019). Given the operational characteristics described above, sustained close-range exposure sufficient to result in auditory injury is considered highly unlikely.

Accordingly, MBES and SSS operation is not predicted to result in auditory injury to harbour porpoise. Any behavioural response, if it were to occur, would be short-term and localised to the immediate vicinity of the active survey vessel and would not result in sustained displacement from, or reduced use of, designated SAC habitats.

Geotechnical Works (Rotary Drilling, Vibrocore, CPT)

[3] https://www.kongsberg.com/discovery/seafloor-mapping/em/EM2040-Mk2/

Rotary drilling and vibrocore operations generate non-impulsive, low-frequency continuous sound with substantially lower source levels than SBP systems. Recorded sound pressure levels for rotary drilling are typically in the order of approximately 145 dB re 1 µPa @ 1 m.

Such levels are comparable to, or below, background vessel noise and are expected to attenuate to ambient levels within a short distance of the source. As such, drilling and sampling activities are not anticipated to give rise to auditory injury and would be limited, at most, to minor short-term behavioural disturbance in close proximity to the works.

4.2.3.2 SEABED VIBRATION

Seabed vibration associated with drilling, CPT or vibrocore operations will be highly localised and rapidly attenuated within the substrate. Given the absence of pile driving or high-energy impulsive installation methods, vibration effects are considered negligible beyond the immediate vicinity of the equipment and would not give rise to disturbance at a scale relevant to SAC conservation objectives.

4.2.3.3 VESSEL PRESENCE AND COLLISION RISK

The risk of collision between marine mammals and vessels is influenced primarily by vessel speed and duration of interaction (see Schoeman et al., 2020 for review). Injuries to marine mammals from vessel strikes are species-dependent but generally are more severe at higher impact speeds (Wang et al., 2007). Survey vessels will operate at low speeds (approximately 5 knots or less), and vessel numbers will be limited. The works are temporary and spatially restricted.

The probability of vessel collision resulting in injury or mortality is therefore low. No increase in mortality rates capable of affecting harbour porpoise population parameters within the relevant SACs is predicted. Vessel presence will not restrict access to suitable habitat within the SACs and will not result in sustained displacement.

4.2.3.4 MITIGATION – HARBOUR PORPOISE

All geophysical acoustic survey activities (including Sub-bottom Profilers, Multibeam Echosounder and Side Scan Sonar) will be undertaken in accordance with the Department of Arts, Heritage and the Gaeltacht (DAHG, 2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*.

As the MUL Application Area is located adjacent to Boyne Coast and Estuary SAC, the geophysical survey measures applicable to surveys within bays, inlets or estuaries, and within 1,500 m of their entrance, will be implemented in full.

Measures will include:

- Pre-start monitoring by a suitably qualified Marine Mammal Observer (MMO);
- A pre-survey monitoring period as specified in DAHG (2014);

- Implementation of soft-start procedures for Sub-bottom Profilers and other relevant acoustic sources where technically feasible;
- Delayed commencement of acoustic sources where harbour porpoise are detected within the prescribed mitigation zone;

In addition, and as a precautionary enhancement to visual monitoring, Passive acoustic monitoring may be deployed where operationally feasible to provide supplementary detection capability. PAM will supplement, but not replace, the mitigation measures required under DAHG (2014).

These measures are designed to avoid auditory injury and to minimise the likelihood and magnitude of behavioural disturbance.

Survey vessels will operate at low speeds and in accordance with standard maritime navigation and safety procedures, thereby minimising vessel strike risk.

4.2.3.5 CONCLUSION

This assessment has been undertaken in accordance with MARA's AA Screening Determination and considers the impact pathways identified therein, namely disturbance, displacement or harm from underwater noise and vibration (and, where relevant, underwater noise in a behavioural context) and vessel collision risk in respect of the Rockabill to Dalkey Island SAC (harbour porpoise QI) and Lambay Island SAC (harbour porpoise QI) screened in for Stage 2 Appropriate Assessment.

Taking account of:

- The source characteristics and operational parameters of the proposed geophysical and geotechnical surveys;
- The high operating frequencies of MBES, SSS and ADCP systems relative to harbour porpoise hearing sensitivity;
- Rapid attenuation of high-frequency sound in shallow coastal waters (0–26 m);
- The requirement for close and sustained exposure for auditory injury thresholds to be exceeded (Southall *et al*., 2007; 2019);
- The mobility and avoidance behaviour of harbour porpoise; and
- Implementation of measures in accordance with DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*,

the proposed site investigation activities are not predicted to result in auditory injury to harbour porpoise.

The most plausible impact pathway is temporary, localised behavioural disturbance associated primarily with Sub-bottom Profiler operation. Any such disturbance would be confined to the immediate vicinity of active sound sources, would be short-term and reversible, and would not result in sustained displacement from, or reduced use of, designated SAC habitats.

Vessel activity associated with the surveys will be temporary and undertaken at low speeds (c. 5 knots). Given the limited number of vessels, slow operational speeds, and the ability of harbour porpoise to detect and avoid approaching vessels, the risk of collision is considered negligible and substantially lower than that associated with existing commercial and fishing vessel activity in the wider area.

Minor seabed vibration associated with certain geotechnical activities will be spatially restricted to the immediate vicinity of the equipment and will attenuate rapidly with distance. No pathway exists for vibration to result in injury, sustained disturbance, habitat alteration or restriction of access to suitable habitat within Rockabill to Dalkey Island SAC, Lambay Island SAC or Codling Fault Zone SAC.

All geophysical acoustic surveys will be undertaken in accordance with DAHG (2014) guidance, including pre-start monitoring, soft-start procedures and delayed commencement where marine mammals are detected within the prescribed mitigation zone. The application of these measures ensures that injury is avoided and that disturbance is minimised.

4.3 OTTER [1355]

Otters are semi-aquatic mammals utilising freshwater, estuarine and coastal habitats. Coastal otters, while foraging in marine waters, remain strongly dependent on freshwater sources for drinking and washing to remove salt deposits and maintain fur condition (Kruuk, 2006; Chanin, 2013; Chanin, 2003). As a result, their distribution along the coastline is closely associated with the outflows of rivers and streams (Kruuk & Balhary, 1990; Moorehouse, 1988; Dalton *et al*., 2021).

Studies indicate that coastal otters typically forage close to shore, generally within approximately 80–100 m of the shoreline (Kruuk & Moorhouse, 1991; Liles, 2009), and most feeding occurs in shallow water less than 3 m deep (Nolet *et al*., 1993). Diving depths are generally shallow and rarely exceed approximately 10 m.

Where prey availability is high, coastal territories can be relatively small, sometimes as little as 2 km of coastline (Kruuk, 1995; O'Sullivan, 1993). Individuals typically utilise defined stretches of shoreline associated with freshwater access points rather than venturing extensively into deeper offshore waters.

The MUL Application Area extends across a broad marine area. While certain survey activities are proposed adjacent to the mouth of the River Boyne, geophysical operations will be temporary, mobile and distributed across the wider marine area. Survey activities will not be continuously undertaken directly in front of the river mouth. In addition, substantial portions of the survey area extend offshore into water depths (up to c. 26 m) beyond those typically utilised by foraging otters.

Accordingly, any potential interaction between survey activities and coastal QI otters is likely to be spatially limited to nearshore areas in the immediate vicinity of freshwater outflows and would not represent a continuous barrier to movement or sustained exclusion from foraging habitat.

4.3.1 EUROPEAN SITE ASSESSED

- River Boyne and River Blackwater SAC (002299)

Otter is a QI of the River Boyne and River Blackwater SAC. The conservation objective is to maintain the species in favourable conservation condition, including:

- No significant decline in otter distribution
- No significant decline in extent of terrestrial and freshwater (river and lake) habitat
- No significant decline in couching sites and holts for lying up or fish biomass availability for dietary needs

4.3.2 Potential Impact Pathways

The potential impact pathways relevant to otter in the context of the proposed maritime usage are:

- **Underwater noise and vibration** associated with geophysical and geotechnical survey activities
- **Airborne (above-water) noise and human presence**, with potential for disturbance or displacement

No land-based works are proposed within the River Boyne and River Blackwater SAC, and no physical alteration of freshwater or riparian habitat will occur.

4.3.3 Assessment of Potential Impacts

4.3.3.1 Underwater Noise and Vibration

There are no published underwater audiograms for Eurasian otter (*Lutra lutra*). In the absence of species-specific data, underwater hearing thresholds derived for sea otter (*Enhydra lutris*) are commonly applied as a proxy (Ghoul & Reichmuth, 2014). These indicate an underwater hearing range approximately between 125 Hz and 38 kHz.

This hearing range falls within the broader low-frequency functional hearing group range applied to phocid pinnipeds in water (Southall et al., 2007; 2019). A detailed assessment of underwater noise sources, including Sub-bottom Profilers, Multibeam Echosounders, Side Scan Sonar, ADCPs and geotechnical activities, has been undertaken above for grey and harbour seal using a precautionary approach. That assessment concluded that:

- Auditory injury is not predicted;
- The only plausible pathway is short-term, localised behavioural disturbance associated primarily with low- to mid-frequency sources;
- High-frequency systems (MBES, SSS, ADCP) operate above peak sensitivity and attenuate rapidly in shallow waters (0–26 m);
- Sustained close-range exposure sufficient to result in injury is not plausible.

Given that otter underwater hearing sensitivity is more restricted (upper limit c. 38 kHz) than that of phocid seals assessed above, and given the non-impulsive, temporary and spatially mobile nature of the proposed survey activities, the conclusions reached for seals are considered conservative when applied to otter.

Seabed vibration associated with rotary drilling, CPT or vibrocore activities will be spatially confined to the immediate vicinity of the equipment and will attenuate rapidly within the substrate. No high-

energy impulsive installation methods (e.g. impact piling or blasting) are proposed. Given the limited spatial extent of vibration, the absence of works within freshwater channels or riparian habitat, and the typically nearshore and shallow foraging behaviour of otters, no plausible pathway exists for vibration to result in injury, sustained disturbance, habitat alteration or restriction of access to freshwater entry points within the River Boyne and River Blackwater SAC.

In addition, ecological context is relevant. Coastal otters typically forage close to shore (generally within approximately 80–100 m of the shoreline) and in shallow water (commonly <3 m depth and rarely exceeding ~10 m). The MUL Application Area is extensive and survey activities will be distributed across a wide marine area. While certain activities are proposed adjacent to the mouth of the River Boyne, operations will be temporary and mobile and will not be continuously undertaken directly in front of the river mouth. A substantial proportion of survey effort will occur offshore in water depths (up to c. 26 m) beyond those typically utilised by foraging otters.

Accordingly, any behavioural response by otters would be localised, temporary and confined to the immediate vicinity of active sound sources, and would not result in sustained displacement from core freshwater access points, riparian habitat, couching sites or holts within the River Boyne and River Blackwater SAC.

On this basis, underwater noise and vibration associated with the proposed maritime usage will not result in adverse effects on the integrity of the River Boyne and River Blackwater SAC with respect to otter.

4.3.3.2 Airborne (Above-Water) Noise and Human Presence

Airborne noise and human presence associated with the proposed maritime usage will arise primarily from:

- Intertidal habitat walkover surveys
- Targeted quadrat and core sampling
- Bird surveys undertaken onshore within the MUL Application Area

These activities will be short in duration, undertaken by small survey teams, and spatially discrete rather than continuous along the shoreline. No permanent infrastructure, shore-based construction works or lighting installations are proposed.

It is recognised that human presence within the intertidal zone has the potential to result in temporary behavioural disturbance within typoical foraging ranges of coastal otters, particularly if activity occurs in proximity to freshwater outflows or undetected couching sites and holts. Such disturbance may manifest as short-term avoidance or retreat to cover.

However:

- No excavation, vegetation clearance or alteration of banks is proposed;
- No works are proposed within freshwater channels;

- Survey effort will be temporary and spatially distributed across a large area;
- Activities will not involve sustained presence at any one shoreline location.

Accordingly, while temporary disturbance is possible, the scale and duration of activity are limited and would not, in the absence of sensitive features, result in sustained displacement from core freshwater habitat or breeding sites.

4.3.3.3 MITIGATION - OTTER

The proposed site investigation activities are temporary, spatially distributed and limited in duration. As a precautionary measure, and in recognition of the proximity of the River Boyne and River Blackwater SAC (an estuarine system), all geophysical acoustic surveys will be undertaken in accordance with the Department of Arts, Heritage and the Gaeltacht (DAHG, 2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*, as applied for grey seal, harbour seal and harbour porpoise above.

Accordingly, the following measures will be implemented:

- Pre-start monitoring by a suitably qualified MMO
- A pre-survey monitoring period in accordance with DAHG (2014)
- Implementation of soft-start procedures for Sub-bottom Profilers and other relevant acoustic sources where technically feasible
- Delayed commencement of acoustic sources where marine mammals are detected within the prescribed mitigation zone

The application of DAHG (2014) measures on a precautionary basis further reduces the potential for underwater acoustic disturbance to otter.

In relation to airborne noise and human presence associated with intertidal and shoreline survey activities, a suitably qualified and experienced Ecological Clerk of Works (ECoW) will undertake pre-survey inspections of all areas where onshore or intertidal works are proposed. These inspections will determine the presence or absence of otter holts, couches or other significant signs of activity.

Should the ECoW identify any features of ecological importance, including otter holts, couches, resting places or other protected species features, appropriate ecological constraint maps will be prepared. These will clearly identify exclusion zones and appropriate buffer distances within which survey activities and personnel access will not be permitted.

All ecological constraints and exclusion zones will be communicated to survey personnel through pre-commencement Toolbox Talks, ensuring that all crew members are aware of ecological sensitivities, restricted areas and required working practices.

Where necessary, additional avoidance measures may include:

- Micro-siting or relocation of survey works;
- Timing restrictions;

- Establishment of additional stand-off distances; or
- Other measures agreed with the relevant regulatory authority.

Survey vessels will operate at low speeds (c. 5 knots), thereby minimising collision risk and reducing the potential for disturbance.

The implementation of these measures ensures that disturbance is avoided or minimised and that breeding sites, resting places, freshwater access points and riparian habitat are protected.

Accordingly, the proposed site investigation activities will not result in a restriction of otter range, a decline in habitat availability, disturbance of holts or couches, or a reduction in prey availability within the River Boyne and River Blackwater SAC.

4.3.3.4 CONCLUSION

This assessment has been undertaken in accordance with MARA's AA Screening Determination and considers the impact pathways identified therein, namely disturbance, displacement or harm from underwater noise and vibration (and, where relevant, underwater noise in a behavioural context) and disturbance and displacement from airborne noise/human presence in respect of the River Boyne and River Blackwater SACs (otter QI) screened in for Stage 2 Appropriate Assessment.

Taking account of:

- The temporary, intermittent and spatially distributed nature of the proposed site investigation activities;
- The limited overlap between otter underwater hearing sensitivity and only certain low-frequency acoustic sources;
- Rapid attenuation of sound in shallow coastal waters (0–26 m);
- The absence of high-energy impulsive installation methods;
- The typical nearshore and shallow foraging behaviour of coastal otters;
- The precautionary implementation of DAHG (2014) measures for all geophysical acoustic surveys; and
- The implementation of pre-survey Ecological Clerk of Works inspections, ecological constraint mapping, exclusion buffers and site-specific avoidance measures if required,

the proposed maritime usage is not predicted to result in auditory injury, sustained disturbance, habitat loss, or restriction of access to freshwater or riparian habitat for otter within the River Boyne and River Blackwater SAC.

While temporary behavioural disturbance associated with underwater sound or human presence within the intertidal zone is recognised as possible, such disturbance would be localised, short-term and reversible. With the mitigation measures described above in place, there will be no:

- Significant decline in otter distribution;
- Reduction in the extent of freshwater or terrestrial habitat;

- Disturbance of holts, couches or breeding sites; or
- Reduction in prey availability.

Accordingly, the proposed site investigation activities, either alone or in combination with other plans or projects, will not result in adverse effects on the integrity of the River Boyne and River Blackwater SAC with respect to otter, having regard to the site's conservation objectives.

4.4 Annex II Fish species: Atlantic Salmon [1106], River Lamprey [1099] and Sea Lamprey

4.4.1 European Site Assessed

- River Boyne and River Blackwater SAC [002299]
- Slaney River Valley SAC [000781]

River lamprey (*Lampetra fluviatilis*) and Atlantic salmon (*Salmo salar*) are fish QIs of the River Boyne and River Blackwater SAC. River lamprey, sea lamprey (*Petromyzon marinus*), twaite shad (*Alosa fallax*) and Atlantic salmon are fish QIs of the Slaney River Valley SAC The conservation objectives relate to maintaining the species in favourable conservation condition, including:

- Maintenance of viable populations
- Maintenance of natural hydrological and migratory connectivity
- Maintenance of suitable spawning and nursery habitat
- Unrestricted access between marine and freshwater environments

Slaney River Valley SAC

These QIs are anadromous and may occur in marine waters during parts of their life cycle. It is therefore acknowledged that individuals originating from the Slaney catchment could be present within the wider Irish Sea, including the MUL Application Area.

However, the conservation objectives for the Slaney River Valley SAC relate to freshwater and estuarine attributes within the SAC boundary. These include maintenance or restoration of:

- Migratory access from the estuary to upstream freshwater habitats (extent of anadromy);
- Spawning habitat extent and quality within river channels;
- Juvenile habitat availability in freshwater;
- Water quality standards and recruitment metrics within the catchment.

Although individuals of these species may be present within the MUL marine area, there is no plausible impact pathway by which the proposed works could affect the freshwater conservation objective attributes of the Slaney River Valley SAC.

Acoustic telemetry studies on Atlantic salmon smolts have provided important insights into their migratory pathways through the Irish Sea. Smolts leaving rivers along the northeast coast of Ireland

typically undertake a northerly migration through the North Channel, entering deeper offshore waters to the north of Ireland, rather than moving directly south or west through coastal Irish waters (Barry *et al*., 2020). Additionally, Atlantic salmon originating from rivers in southeast Ireland and from northwest Spain have been tracked migrating westward across the Celtic Sea towards oceanographic fronts and the continental shelf edge, before continuing their transatlantic migration to feeding grounds off East Greenland (Rikardsen *et al*., 2021;). These findings suggest that while Irish coastal waters may be used during the early marine phase, particularly for smolt dispersal and staging, the core migratory routes of Atlantic salmon populations from the east coast of Ireland and other parts of Europe largely bypass the western Irish Sea.). These findings indicate that while Irish coastal waters may be used transiently during smolt dispersal and early marine staging, the principal migratory routes of Atlantic salmon from east coast river systems are directed offshore and northward or westward, rather than forming persistent coastal corridors within the western Irish Sea.

Accordingly, even if Slaney-origin QI fish species were present within the wider Irish Sea during the early marine phase, the proposed works would not constitute a physical or behavioural barrier capable of affecting the conservation objective relating to extent of anadromy or migratory connectivity within the Slaney River Valley SAC.

In particular, no mechanism exists to affect:

- Extent of anadromy;
- Spawning habitat extent or quality;
- Juvenile habitat availability;
- Salmon conservation limit attainment, fry abundance, smolt output or redd distribution;
- Water quality within the SAC.

Twaite shad is an anadromous member of the herring family that was historically more widespread in Irish rivers but is now considered nationally rare. It is listed under Annex II of the Habitats Directive. Adult Twaite shad migrate into large rivers in spring (April to June) to spawn in fast flowing, oxygen-rich freshwater habitats, while juveniles migrate downstream to estuarine and coastal waters later in summer. Current Irish populations are primarily confined to the River Barrow and River Suir; however, historical records indicate that the species also occurred in the River Slaney and River Boyne, suggesting potential use of eastern coastal waters during the marine phase (King et al., 2011; Inland Fisheries Ireland, 2022).

Twaite shad have only been confirmed in the River Barrow, with anecdotal reports pointing to a decline of population in the Slaney River Valley SAC of which twaite shad is a QI. The twaite shad has been categorised under the EU Habitats Directive as an Annex II and V species and Vulnerable on the Ireland Red List (King *et al*., 2011).

Therefore, there is no plausible impact pathway by which the proposed maritime usage could affect the conservation objective attributes of the Slaney River Valley SAC.

Accordingly, adverse effects on the integrity of the Slaney River Valley SAC can be ruled out, and the site does not require further assessment within this NIS.

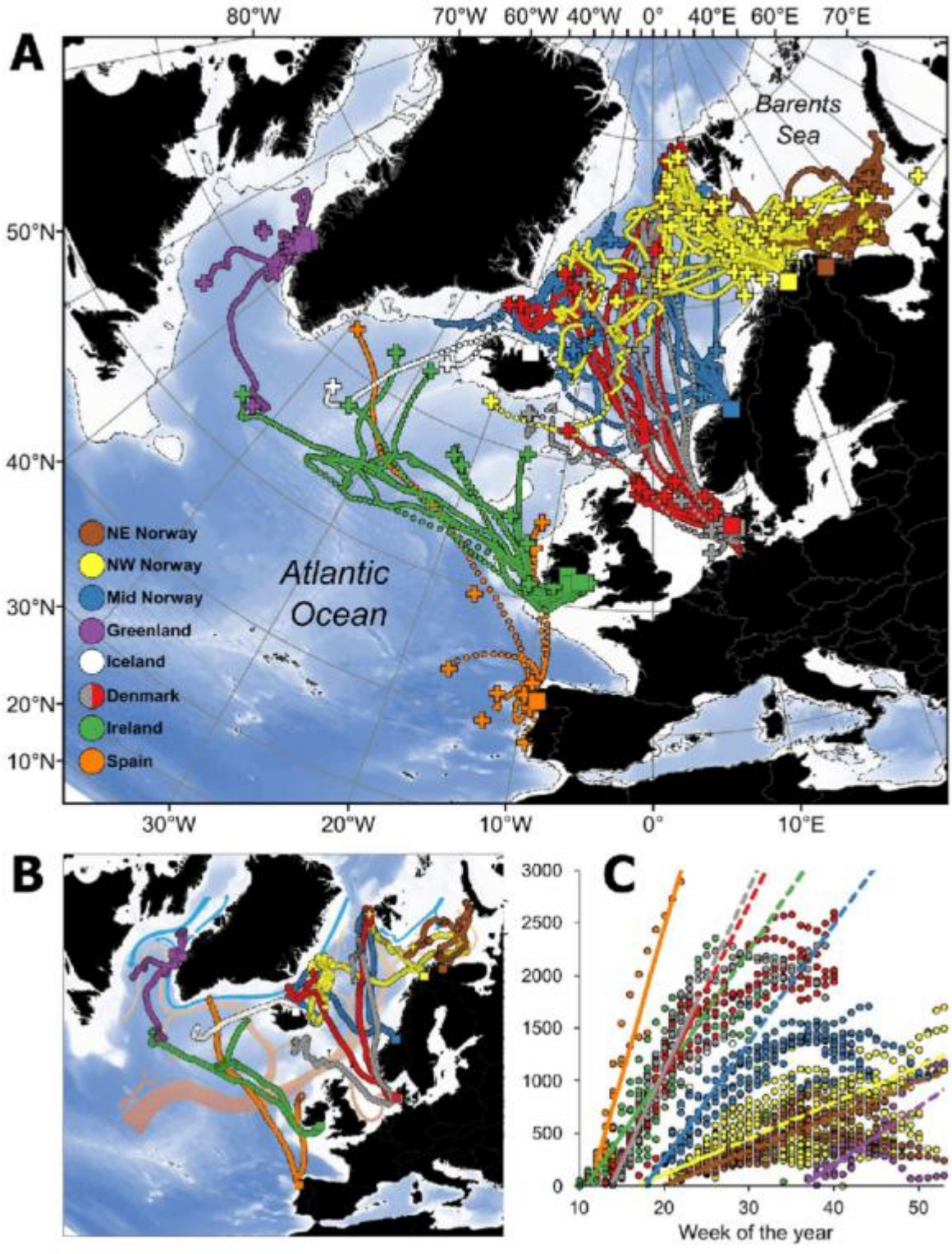

Figure 4-1 Migrations of Atlantic salmon tagged in eight different geographic areas (Rikardsen *et al.* 2021).

4.4.2 Potential Impact Pathways

The potential impact pathways relevant to river lamprey and Atlantic salmon in the context of the proposed maritime usage are:

- Underwater noise and vibration;
- Temporary behavioural disturbance or displacement at the estuary mouth;
- Potential interference with migratory movement.

No dredging, piling, blasting or physical modification of the estuary or river channel is proposed.

4.4.3 Assessment of Potential Impacts

4.4.3.1 Underwater Noise and Vibration

Fish species vary in their sensitivity to underwater sound depending on auditory anatomy. Species with swim bladders mechanically coupled to the inner ear (e.g. clupeids) are more sensitive to sound pressure, whereas generalist teleosts and species without pressure-sensitive hearing structures primarily detect particle motion (Popper et al., 2014; Popper & Hawkins, 2019).

Atlantic salmon and lamprey are not considered highly pressure-sensitive species. Their swim bladder (in salmon) is not mechanically coupled to the inner ear, and lamprey lack a swim bladder entirely. Hearing in these species primarily involves detection of particle motion rather than sound pressure (Popper et al., 2014; Hawkins & Popper, 2017). As such, they are generally less susceptible to sound pressure effects from geophysical survey sources than species with specialised auditory adaptations.

Sub-bottom Profilers (SBP) may emit frequencies within the 1–6 kHz range at source levels of approximately 200 dB re 1 µPa @1 m (MacGillivray et al., 2014). MBES and SSS systems operate at substantially higher frequencies (200–400 kHz and above), which are unlikely to be detectable by these species. Geotechnical drilling produces comparatively low-level, continuous sound. Mickle *et al.* (2018) tested auditory responses in the sea lamprey (*Petromyzon marinus*) and found sea lampreys can detect noise frequencies of 50–300 Hz with equal sensitivity but did not detect sounds above 300Hz. While shipping noise is likely audible to lamprey, lamprey are not sensitive to sound pressure.

Fish injury from non-impulsive sources requires exposure to sufficiently high sound exposure levels over time (Popper *et al*., 2014). Barotrauma injury is associated with rapid pressure change from high-energy impulsive sources (e.g. explosives), which are not proposed as part of the site investigation works.

The proposed surveys are:

- Non-impulsive in nature;
- Temporary and intermittent;
- Spatially mobile across a large marine area;
- Not continuously undertaken at the estuary mouth.

Accordingly, auditory injury to river lamprey or Atlantic salmon is not predicted.

The most plausible pathway is temporary behavioural avoidance in the immediate vicinity of active acoustic sources. Such responses have been documented in fish exposed to elevated sound levels (Slabbekoorn *et al*., 2010; Hawkins & Popper, 2017), but are typically short-term where exposure is limited in duration.

4.4.3.2 Migration and Barrier Effects

Atlantic salmon and river lamprey undertake anadromous migrations between freshwater and marine habitats. Maintenance of unobstructed migratory pathways is central to the conservation objectives of the River Boyne and River Blackwater SAC.

The proposed MUL Application Area is located offshore and extends across a broad marine area in front of the estuary. While certain survey activities may occur within the wider MUL area, geophysical survey activities with the greatest potential to generate elevated underwater sound levels will primarily be undertaken within the Proposed Development Area, which is located in the southerly section of the MUL Application Area, approximately 5 km south of the River Boyne and River Blackwater SAC.

Accordingly:

- No continuous acoustic activity is proposed directly at the estuary mouth;
- Survey operations will not form a persistent acoustic barrier across the migratory corridor;
- Activities will be temporary, intermittent and spatially mobile.

Fish exposed to elevated sound levels may exhibit short-term behavioural responses including avoidance or changes in swimming direction or depth (Popper et al., 2014; Slabbekoorn et al., 2010; Hawkins & Popper, 2017). However, such responses are typically localised and reversible where exposure is limited in duration and extent.

Given the spatial separation (c. 5 km) between the primary geophysical survey focus and the SAC boundary, the temporary and mobile nature of operations, and the absence of high-energy impulsive sources, no sustained barrier effect or interference with anadromous migration is predicted for Atlantic salmon or river lamprey.

Migratory connectivity between marine and freshwater habitats will therefore not be compromised.

4.4.3.3 Conclusion

This assessment has been undertaken in accordance with MARA's AA Screening Determination and considers the impact pathways identified therein, namely disturbance, displacement or harm from underwater noise and vibration (and, where relevant, underwater noise in a behavioural context) in respect of the River Boyne and River Blackwater SACs (Atlantic salmon and river lamprey QIs) screened in for Stage 2 Appropriate Assessment.

Taking account of:

- The non-impulsive nature of the proposed geophysical and geotechnical survey activities;
- The temporary, intermittent and spatially mobile characteristics of the works;
- The primary focus of geophysical activities within the Proposed Development Area located approximately 5 km south of the River Boyne and River Blackwater SAC;
- The reliance of Atlantic salmon and river lamprey primarily on particle motion detection rather than pressure-sensitive hearing (Popper *et al*., 2014; Hawkins & Popper, 2017);
- The absence of high-energy impulsive survey methods;
- The absence of physical obstruction, sediment plume across the estuary, or alteration of freshwater or spawning habitat;

the proposed maritime usage is not predicted to result in auditory injury, sustained disturbance, migration barrier effects, habitat loss, or restriction of access to spawning or nursery habitat for Atlantic salmon or river lamprey.

While short-term, localised behavioural responses to underwater sound are possible (Popper *et al*., 2014; Slabbekoorn *et al*., 2010), such responses would be temporary and reversible and would not interfere with anadromous migration or population viability.

Accordingly, the proposed site investigation activities will not result in adverse effects on the integrity of the River Boyne and River Blackwater SAC with respect to Atlantic salmon or river lamprey, having regard to the site's conservation objectives.

4.5 BIRDS

4.5.1 EUROPEAN SITES ASSESSED

- Northwest Irish Sea SPA [004236] (overlaps MUL area)
- River Nanny Estuary and Shore SPA [004158]
- Boyne Estuary SPA [004080]
- Rockabill SPA [004014]
- Skerries Islands SPA [004122]
- Lambay Island SPA [004069]

The SPAs comprise a mixture of estuarine wintering waterbird sites, offshore marine seabird sites, and island breeding seabird colonies. While the Special Conservation Interests (SCIs) differ between sites, the conservation objectives consistently require the maintenance (or restoration, where specified) of population attributes and the protection of spatial distribution and supporting habitat resources.

These SPAs have been grouped according to shared ecological function and conservation objective attributes - Table 4-1. The grouping identifies the key attributes relevant to the Proposed Development and forms the basis for the assessment of potential impact pathways set out below.

Table 4-1 Grouping of SPAs and Relevant Conservation Objective Attributes for Stage 2 Appropriate Assessment (Birds)

European Site, and SCIs (as per COs / screening)	SPA Functional Type	Seasonal Objective Type	Key CO Attributes Relevant to Proposed Works	Assessment Grouping
Lambay Island SPA (004069) Fulmar, Cormorant, Shag, Lesser Black-backed Gull, Herring Gull, Kittiwake, Guillemot, Razorbill, Puffin; Greylag Goose	Breeding seabird colony SPA (with additional wintering objective)	**Breeding (seabirds); Wintering (Greylag Goose)**	**Breeding seabirds**: population size, productivity, nesting distribution, forage spatial distribution, extent/abundance (and availability), disturbance at breeding site, disturbance in ecologically connected waters, barriers to connectivity. **Wintering goose**: winter population trend, winter spatial distribution, disturbance, supporting winter habitat, barriers to connectivity.	Breeding seabirds assessed with other breeding colony SPAs. Greylag Goose assessed with wintering waterbird SPAs.
Skerries Islands SPA (004122) Cormorant, Shag, Herring Gull; Light-bellied Brent Goose, Purple Sandpiper, Turnstone	Mixed SPA (breeding seabirds + wintering waterbirds)	**Breeding & Wintering**	**Breeding species**: population size, productivity, nesting distribution, disturbance at colony, barriers to connectivity. **Wintering species**: winter population trend, spatial distribution, disturbance, supporting habitat, connectivity.	Breeding seabirds grouped with Lambay/Rockabill breeding colony SPAs. Wintering species grouped with estuarine wintering SPAs.
Rockabill SPA (004014) Roseate Tern, Common Tern, Arctic Tern; Purple Sandpiper	Mixed SPA (breeding tern colony + wintering shorebird)	**Breeding & Wintering**	**Breeding terns**: population size, productivity, nesting habitat distribution, disturbance at breeding site, disturbance in ecologically connected waters, barriers to connectivity. **Wintering sandpiper**: winter distribution, disturbance, supporting habitat.	Breeding terns grouped with other breeding colony SPAs. Purple Sandpiper grouped with wintering waterbird SPAs.
Boyne Estuary SPA (004080) Shelduck, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Knot, Sanderling, Black-tailed Godwit, Redshank, Turnstone, Little Tern, Wetland & Waterbirds assemblage	Estuarine SPA (breeding + wintering objectives)	**Breeding (Little Tern) and Wintering (all other listed species & assemblage)**	**Breeding Little Tern:** breeding population abundance (AONs); productivity; breeding distribution; prey biomass available; barriers to connectivity; disturbance at breeding site. **Wintering species & Wetlands:** population trend; distribution (range/timing/intensity of use); wetland habitat area as a resource for migratory waterbirds.	Breeding Little Tern with other breeding colony SPAs. Wintering species and Wetland & Waterbirds assemblage grouped with estuarine wintering SPAs.
River Nanny Estuary and Shore SPA (004158) Oystercatcher, Ringed Plover, Golden Plover, Knot, Sanderling, Herring Gull, Wetland & Waterbirds assemblage	Estuarine wintering waterbird SPA	**Wintering**	Long-term population trend (wintering species), distribution: range, timing, intensity of use (wintering species), wetland habitat area	Wintering species and Wetland & Waterbirds assemblage grouped with estuarine wintering SPAs.
North-West Irish Sea SPA (004236) Common Scoter, Red-throated Diver, Great Northern Diver, Fulmar, Manx Shearwater, Shag, Cormorant, Little Gull,	Offshore / at-sea seabird SPA	**Primarily Non-breeding / at-sea breeding (foraging)**	Population size, spatial distribution, forage spatial distribution, extent, abundance and availability, disturbance (within the SPA), barriers to connectivity and site use	Marine non-breeding and breeding-season foraging seabirds

European Site, and SCIs (as per COs / screening)	SPA Functional Type	Seasonal Objective Type	Key CO Attributes Relevant to Proposed Works	Assessment Grouping
Kittiwake, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull, Roseate Tern, Common Tern, Arctic Tern, Puffin, Razorbill, Guillemot, Little Gull, Little Tern				

4.5.2 Potential Impact Pathways

The potential impact pathways relevant to qualifying interests of the SPAs in the context of the proposed maritime usage are:

- Airborne (above-water) noise associated with survey activities
- Human presence, with potential for disturbance or displacement
- Vessel presence within, or in proximity to, designated sites
- Underwater Noise and Vibration (considered only insofar as it may contribute to disturbance/displacement of diving seabirds)

No seabed installation, no pile driving, no blasting, and no permanent infrastructure are proposed.

4.5.3 Assessment of Potential Impacts

The only plausible mechanism for impact on SPA seabirds is behavioural disturbance associated with the presence and movement of survey vessels. The survey vessels operate at low speeds, are temporary and mobile, do not create exclusion zones, do not anchor long-term, and do not involve shoreline or colony access.

Published studies examining seabird responses to vessel traffic demonstrate that:

- Displacement responses are distance-dependent
- Effects are behavioural (avoidance/redistribution) rather than injurious
- Disturbance footprints are localised to the immediate vicinity of vessels
- Redistribution typically reverses following cessation of activity

(Fliessbach et al., 2019; Jarrett et al., 2018).

Given that the North-West Irish Sea SPA is a large offshore marine site supporting highly mobile seabirds, temporary avoidance of a moving survey vessel does not equate to:

- Reduction in SPA-level population size
- Alteration of SPA-scale spatial distribution
- Creation of a barrier to connectivity
- Reduction in forage availability

There is no mechanism by which a single low-speed survey vessel could affect prey distribution, prey abundance, or site-wide habitat suitability.

This pathway relates solely to the conservation objective attribute **“disturbance across the site”**. The scale, duration and mobility of the proposed SI works are not of a magnitude capable of affecting that attribute at SPA scale.

4.5.3.1 SEABIRDS – NORTH-WEST IRISH SEA (OVERLAP)

North-West Irish Sea SPA [004236] overlaps the proposed MUL area. The site-specific conservation objective is to maintain the favourable conservation condition of the SPA qualifying interests, defined through attributes and targets including population size, spatial distribution, forage spatial distribution/extent/abundance/availability, disturbance across the site, and barriers to connectivity and site use.

Airborne Noise and Vessel Presence

The only plausible mechanism for impact on SPA seabirds is behavioural disturbance associated with the presence and movement of survey vessels. The survey vessels operate at low speeds, are temporary and mobile, do not create exclusion zones, do not anchor long-term, and do not involve shoreline or colony access.

Published studies examining seabird responses to vessel traffic demonstrate that:

- Displacement responses are distance-dependent
- Effects are behavioural (avoidance/redistribution) rather than injurious
- Disturbance footprints are localised to the immediate vicinity of vessels
- Redistribution typically reverses following cessation of activity

(Fliessbach *et al*., 2019; Jarrett *et al*., 2018).

Given that the North-West Irish Sea SPA is a large offshore marine site supporting highly mobile seabirds, temporary avoidance of a moving survey vessel does not equate to reduction in SPA-level population size, alteration of SPA-scale spatial distribution, creation of a barrier to connectivity, or reduction in forage availability. There is no mechanism by which a single low-speed survey vessel could affect prey distribution, prey abundance, or site-wide habitat suitability.

This pathway relates solely to the conservation objective attribute “disturbance across the site”. The scale, duration and mobility of the proposed SI works are not of a magnitude capable of affecting that attribute at SPA scale.

Underwater Noise and Vibration

Unlike cetaceans, seabirds are not considered highly sensitive to underwater sound in regulatory guidance. The evidence base indicates:

- Injury or mortality in seabirds has been associated with high-amplitude explosive sources at very close proximity (tens of metres) (Yelverton *et al*., 1973; Cooper, 1982; Stemp, 1985; Danil & St Leger, 2011)
- There is limited evidence of injury from non-explosive geophysical survey sources
- Behavioural responses, where documented, are spatially limited

Hartley Anderson Ltd. (2020) and Harding & Cousins (2022) conclude that the principal effect mechanism for seabirds from non-explosive underwater sound is short-term behavioural avoidance rather than injury.

The proposed SI sources are non-explosive, emit short-duration pulses (SBP, MBES, SSS), operate in shallow waters (0–26 m), attenuate rapidly, and are associated with a moving vessel. Any diving seabirds present would be more likely displaced by the vessel itself than by underwater sound. There is no credible injury pathway for SPA seabirds from the described SI activities.

Underwater noise therefore does not introduce a distinct additional impact mechanism beyond the temporary, localised behavioural disturbance already assessed under vessel presence.

Conclusion – Marine Seabirds

Taking account of the temporary, mobile and low-speed nature of the proposed site investigation surveys, the absence of habitat loss or seabed modification, the lack of high-energy impulsive sound sources, and the limited and localised nature of any disturbance associated with vessel presence, there is no mechanism by which the proposed maritime usage could affect SPA-level population size, spatial distribution, forage availability or connectivity within the North-West Irish Sea SPA.

Any response by seabirds would be confined to short-term, localised behavioural redistribution in the immediate vicinity of survey vessels and would be reversible upon cessation of activity. Such effects would not occur at a scale or duration capable of undermining the conservation objective attributes of the site.

Accordingly, the proposed site investigation activities will not result in adverse effects on the integrity of the North-West Irish Sea SPA, having regard to its conservation objectives.

4.5.3.2 ISLAND BREEDING SEABIRDS

- Rockabill SPA (004014) – 0.2 km from the MUL Application Area
- Skerries Islands SPA (004122) – 0.5 km from the MUL Application Area
- Lambay Island SPA (004069) – <11 km from the MUL Application Area

These SPAs are designated for breeding seabirds. The conservation objectives require maintenance (or restoration where applicable) of:

- Breeding population size
- Productivity (where specified)
- Spatial distribution of nesting colonies
- Forage resource attributes (where specified)
- Disturbance at breeding sites (and, where specified, in ecologically connected marine waters)
- Barriers to connectivity and site use

The proposed maritime usage comprises temporary vessel-based geophysical and geotechnical SI surveys operating at low speeds (c. 5 knots).

The relevant pathways are:

- Airborne (above-water) noise
- Vessel presence and associated visual disturbance
- Underwater noise (behavioural relevance only)

No landings, no colony access, no shoreline works and no seabed installation within these SPAs are proposed.

Disturbance at Breeding Colonies

The closest designated colony is Rockabill SPA at approximately 0.2 km from the MUL boundary. Skerries Islands SPA lies approximately 0.5 km from the MUL area. Lambay Island SPA is located at <11 km separation.

At a separation distance of approximately 11 km, vessel presence and associated airborne noise from low-speed survey operations are not considered capable of causing disturbance at breeding colonies on Lambay Island. Sound attenuation over distance and the absence of direct approach to colony cliffs or landing sites means there is no credible pathway for disturbance at colony level for Lambay Island SPA.

In contrast, Rockabill and Skerries Islands SPAs are located within 0.2–0.5 km of the MUL area. At these distances, vessel presence in adjacent marine waters during the breeding season could plausibly result in disturbance of rafting birds or birds commuting to and from colonies. The potential mechanism would be behavioural disturbance (alert responses, temporary flushing, localised redistribution) rather than direct nesting habitat impact, as no landings, colony access, or shoreline works wihtin the breeding colony SPAs are proposed.

Breeding seabirds are most vulnerable where disturbance:

- Occurs repeatedly in close proximity to colonies;
- Is sustained for prolonged periods;
- Causes flushing leading to egg or chick exposure; or
- Alters attendance patterns during incubation or chick-rearing.

The proposed SI works are temporary and vessel-based. Short-term marine vessel movements at moderate distances are generally associated with alert or minor avoidance responses rather than breeding failure, unless repeated and very close to colonies (Fliessbach *et al*., 2019). However, surveys requiring vessels to remain stationary or move slowly in proximity to colony waters for prolonged periods could increase the likelihood of disturbance responses.

Accordingly, given the close separation distances (0.2–0.5 km), disturbance of breeding seabirds at Rockabill SPA and Skerries Islands SPAs cannot be excluded in the absence of mitigation. This potential pathway is therefore considered further to ensure that adverse effects on site integrity are avoided.

Disturbance in Ecologically Connected Marine Waters (Foraging and Rafting Areas)

Breeding seabirds associated with Rockabill and Skerries Islands SPAs utilise adjacent marine waters for foraging, rafting and commuting between feeding areas and nesting colonies. Lambay Island SPA is located at a separation distance of <11 km from the MUL Application Area and supports seabirds that forage across extensive marine areas beyond the immediate vicinity of the colony.

For Lambay Island SPA, the separation distance and the extensive availability of alternative marine foraging habitat between the colony and the MUL area mean that vessel-based survey activity within the MUL boundary would represent a very small proportion of the available foraging range. The waters surrounding Lambay extend across a broad marine area, including extensive suitable feeding grounds outside the MUL Application Area. As such, survey activity within the MUL area would not restrict access to foraging habitat, reduce forage availability, or create a barrier to connectivity between the colony and feeding areas. There is therefore no credible pathway by which the proposed SI activities could adversely affect the forage or spatial distribution attributes of Lambay Island SPA.

In contrast, Rockabill SPA (0.2 km) and Skerries Islands SPA (0.5 km) lie in close proximity to the MUL boundary. At these distances, vessel activity within near-colony waters could intersect with rafting or actively foraging seabirds during the breeding season. The plausible mechanism of effect is temporary behavioural disturbance or short-range displacement from the immediate vicinity of the survey vessel.

The proposed SI works are temporary, mobile and undertaken by a limited number of low-speed vessels. There is no seabed installation, no prey removal, no sediment plume generation and no establishment of exclusion zones. Published evidence indicates that seabird responses to vessel traffic at sea are typically localised and reversible, with birds redistributing within the wider marine area once disturbance ceases (Fliessbach *et al*., 2019; Jarrett *et al*., 2018).

Accordingly, while a disturbance pathway exists in relation to Rockabill and Skerries Islands SPAs due to proximity, any displacement would be spatially restricted to the immediate vicinity of active vessels and would not:

- Reduce forage spatial distribution, extent or abundance at SPA scale;
- Create a barrier to movement between colony and feeding grounds;
- Result in sustained redistribution of breeding seabirds; or
- Affect breeding productivity through loss of foraging opportunity.

The potential for adverse effects on site integrity arising from disturbance in ecologically connected marine waters is therefore limited to temporary, localised behavioural responses, and is carried forward for mitigation consideration in respect of Rockabill and Skerries Islands SPAs only.

Underwater Noise and Vibration

The proposed SI activities include Sub-bottom Profilers (SBP), Multibeam Echosounder (MBES), Side Scan Sonar (SSS), rotary drilling, vibrocore and CPT operations. These sources generate short-duration acoustic pulses (SBP, MBES, SSS) or low-level, non-impulsive continuous sound and localised seabed vibration (geotechnical equipment). No high-energy impulsive installation methods (e.g. impact piling or blasting) are proposed.

Evidence of injury to seabirds from underwater sound is limited and is primarily associated with high-amplitude explosive sources at very close proximity (Yelverton et al., 1973; Cooper, 1982; Danil & St Leger, 2011). The proposed SI works do not involve explosive sources or shockwave-generating activities.

Diving seabirds (e.g. auks, cormorant, shag) foraging in marine waters near Rockabill and Skerries Islands could be exposed to underwater sound during survey operations. However:

- Acoustic pulses are short in duration;
- Sources are associated with a moving vessel;
- Water depths within the MUL area (0–26 m) promote rapid attenuation;
- There is no sustained ensonification of a fixed location;
- There is no mechanism for explosive overpressure exposure.

Underwater sound exposure, if experienced by diving seabirds, would most plausibly result in short-term behavioural avoidance of the immediate vicinity of the active source. Such responses would be localised and reversible.

Seabed vibration associated with rotary drilling, vibrocore and CPT operations will be confined to the immediate vicinity of the equipment and will attenuate rapidly within sediments. There is no pathway by which such vibration could:

- Disturb nesting birds on island substrates;
- Cause egg or chick mortality;
- Reduce breeding productivity;
- Alter colony distribution; or
- Reduce prey biomass at SPA scale.

Accordingly, underwater noise and seabed vibration associated with the proposed SI activities do not introduce a credible pathway for injury, mortality, productivity reduction or prey depletion in relation to Rockabill SPA, Skerries Islands SPA or Lambay Island SPA. Any effect would be limited to temporary, localised behavioural disturbance already considered under vessel presence and disturbance pathways, and would not be of a magnitude capable of adversely affecting site integrity.

Conclusion – Island Breeding Seabird SPAs

The assessment has considered potential disturbance at breeding colonies, disturbance in ecologically connected marine waters, and the effects of underwater noise and seabed vibration arising from the proposed vessel-based site investigation activities.

For Lambay Island SPA, the separation distance of approximately 11 km between the MUL Application Area and the breeding colony means that no credible pathway exists for disturbance at colony level. In addition, the extensive availability of alternative marine foraging habitat outside the MUL area means that survey activity within the MUL boundary would not restrict access to feeding grounds, reduce forage availability, or create a barrier to connectivity.

For Rockabill SPA (0.2 km) and Skerries Islands SPA (0.5 km), a plausible pathway exists for temporary behavioural disturbance in near-colony marine waters due to vessel presence during the breeding season. However, the proposed works are temporary, mobile and undertaken at low vessel speeds. No landings, no colony access, no shoreline works and no habitat modification are proposed. There is no mechanism for nesting habitat loss, productivity reduction, prey depletion, or sustained displacement from colonies.

Underwater acoustic sources are non-explosive and short-duration, and no high-energy impulsive installation methods are proposed. Seabed vibration associated with geotechnical activities will be spatially confined and rapidly attenuated. There is no credible pathway for injury, mortality, productivity reduction or prey biomass reduction at SPA scale.

Accordingly, while temporary and localised behavioural responses may occur in proximity to survey vessels, the proposed site investigation activities, in the absence of mitigation, are not predicted to result in adverse effects on the integrity of Rockabill SPA, Skerries Islands SPA or Lambay Island SPA, having regard to their conservation objectives.

4.5.3.3 ESTUARINE WATERBIRDS SPAS

- River Nanny Estuary and Shore SPA (004158) – 0.14 km from the MUL Application Area
- Boyne Estuary SPA (004080) – 0.14 km from the MUL Application Area
- These SPAs are designated for wintering waterbird species and associated wetlands and waterbirds assemblages.

The conservation objectives require:

- Maintenance of long-term population trend (wintering species)
- No significant decrease in the range, timing or intensity of use of areas by wintering species
- Maintenance of wetland habitat area as a resource for waterbirds

The proposed maritime usage comprises temporary vessel-based geophysical and geotechnical site investigation surveys operating at low speeds (c. 5 knots or less), together with limited intertidal habitat walkovers and shoreline survey activities within the MUL Application Area.

The relevant pathways screened in by MARA are:

- Airborne (above-water) noise
- Human presence
- Vessel presence

No works are proposed within either SPA boundary and no physical alteration of wetland habitat will occur.

Airborne Noise and Vessel Presence

The MUL Application Area is located approximately 0.14 km (140 m) from both SPAs. Survey vessels will not enter estuary channels and will not operate within SPA boundaries.

At this separation distance, airborne noise from low-speed survey vessels operating offshore of the SPA boundary may be audible to wintering waterbirds using nearshore waters. Vessel presence may also result in visual disturbance where birds are present in waters close to the SPA boundary.

Wintering waterbirds are known to respond to vessel approaches, particularly where activity occurs in proximity to roosting or feeding areas. Disturbance responses are typically distance-dependent, behavioural (e.g. alertness, flushing, short-range displacement), localised to the immediate area of approach, and reversible following cessation of activity (Jarrett et al., 2018).

In this case:

- Vessels will operate at low speeds (c. 5 knots);
- Activity will be temporary and spatially distributed;
- No prolonged stationary operations within estuary waters are proposed;
- No entry into SPA channels will occur;
- No habitat modification is proposed.

Any flushing or short-term redistribution resulting from vessel presence would therefore be temporary and confined to the immediate vicinity of vessel approach. In addition, the majority of vessel-based geophysical and geotechnical site investigation activities will be confined to the smaller proposed development sampling area (c. 26.41 km^2), located within the southern portion of the MUL area and associated with the Potential Development Area. River Nanny Estuary and Shore SPA and Boyne Estuary SPA are located within the north-western section of the MUL Application Area, spatially separated from the southern proposed development sampling area where the majority of vessel-based activities will occur. There is no mechanism for sustained disturbance capable of causing a significant decrease in the range, timing or intensity of use of either SPA.

Accordingly, vessel presence and associated airborne noise are not predicted to adversely affect the conservation objective attributes relating to population trend or site use.

Human Presence – Intertidal and Shoreline Surveys

Intertidal habitat walkover surveys, targeted quadrat and core sampling, and bird surveys will be undertaken onshore within the MUL Application Area. These activities will be short in duration, undertaken by small survey teams, and spatially discrete rather than continuous along the shoreline.

Human presence within intertidal zones adjacent to estuarine SPAs has the potential to cause disturbance to wintering waterbirds, particularly where activity occurs near:

- High-tide roost sites;
- Concentrated feeding areas;
- Narrow shoreline margins.

Disturbance responses may include temporary flushing or short-distance displacement. Such responses are typically behavioural, localised and reversible where activity is limited in duration and not repeated at high frequency.

In this case:

- No works are proposed within SPA boundaries;
- No excavation, vegetation clearance or alteration of wetland habitat is proposed;
- No installation of lighting, infrastructure or permanent access routes is proposed;
- Survey effort will be temporary and spatially distributed;
- Activities will not involve sustained presence at any one shoreline location.

There is no pathway for reduction in wetland habitat area, physical loss or degradation of foraging habitat, or long-term exclusion from roost sites.

However, temporary and localised disturbance of wintering SCI species in proximity to survey personnel cannot be excluded, particularly during the overwintering period. While any displacement would be transient and reversible (Jarrett *et al.*, 2018), repeated disturbance in sensitive areas (e.g. high-tide roosts) could, in the absence of control measures, give rise to alterations in the range, timing or intensity of site use.

Accordingly, mitigation is required to ensure that shoreline and intertidal survey activities do not result in disturbance at a level capable of undermining the conservation objective attributes relating to population trend and distribution for River Nanny Estuary and Shore SPA and Boyne Estuary SPA.

Breeding Little Tern – Boyne Estuary SPA

Boyne Estuary SPA is designated, inter alia, for breeding Little Tern (*Sternula albifrons*). Little Terns nest on sandy or shingle substrates within the SPA during the breeding season and are highly sensitive to human disturbance in proximity to nesting colonies.

No intertidal works, shoreline surveys or vessel operations are proposed within the Boyne Estuary SPA boundary. No direct access to nesting habitat within the SPA will occur and no physical alteration of nesting substrate is proposed.

However, the MUL Application Area is located approximately 0.14 km (140 m) from the SPA boundary, and intertidal and shoreline surveys will be undertaken within the adjacent coastal zone. Given the close proximity, disturbance to breeding Little Tern arising from human presence cannot be excluded in the absence of mitigation, particularly during the breeding season when birds may be sensitive to repeated disturbance.

While no habitat loss pathway has been identified, behavioural disturbance resulting in flushing or displacement from nesting areas could, if repeated, give rise to reduced breeding productivity or alteration of colony distribution.

Accordingly, a potential adverse effect on the integrity of Boyne Estuary SPA, in respect of its breeding Little Tern interest feature, cannot be excluded in the absence of mitigation.

Mitigation measures specific to breeding Little Tern are therefore required and are set out in the Bird Mitigation section below to ensure that disturbance does not undermine the conservation objective attributes of the SPA.

Conclusion – Estuarine Winter Waterbirds SPAs

The assessment has considered airborne noise, human presence and vessel presence.

No works are proposed within SPA boundaries and vessels will not enter estuarine channels. Vessel-based survey activity will be temporary, mobile and predominantly confined to the southern proposed development sampling area. Vessel presence and associated airborne noise are not predicted to result in sustained displacement or alteration of site use.

Shoreline and intertidal survey activities undertaken adjacent to SPA boundaries have the potential to cause temporary disturbance or displacement of wintering SCI species, particularly in proximity to high-tide roosts or concentrated feeding areas. While no habitat loss or physical alteration is proposed, disturbance cannot be excluded in the absence of control measures.

Mitigation is therefore required to ensure that survey activities do not result in alterations to the range, timing or intensity of site use capable of undermining the conservation objective attributes relating to population trend and distribution.

4.5.3.4 MITIGATION - BIRDS

The following measures will be implemented to minimise the potential for disturbance to breeding seabirds, rafting and foraging seabirds within the North-West Irish Sea SPA, and wintering waterbirds associated with adjacent estuarine SPAs.

North-West Irish Sea SPA (Foraging and Rafting Seabirds)

To minimise disturbance to seabirds using offshore foraging and rafting habitat:

- The MMO onboard the survey vessel(s) will have suitable ornithological competence to identify rafting and actively foraging seabirds.

- Where significant aggregations of seabirds are observed in the vicinity of survey operations, vessel activity will be adapted, where practicable, to reduce close approach and minimise repeated disturbance.
- Survey vessel(s) will maintain steady operational movement and avoid unnecessary manoeuvring that could lead to repeated flushing of birds.
- Where extended stationary operations are required, these will, where practicable, avoid areas where persistent seabird aggregations are present.

These measures ensure that any disturbance to seabirds within the SPA remains short-term and does not alter forage spatial distribution, abundance or availability at site scale.

Rockabill SPA and Skerries Islands SPA (Breeding Seabird Colonies)

To minimise disturbance during the breeding season:

- Activities requiring vessels to remain stationary or operate at very slow speeds for extended periods will be avoided in close proximity to breeding colonies where practicable.
- The appointed MMO will have appropriate ornithological competence to identify breeding seabirds, rafting behaviour and commuting flight lines.
- Where notable aggregations of breeding seabirds are observed in the vicinity of survey operations, vessel activity will be adapted, where practicable, to increase separation distances and reduce disturbance.
- If evidence of sustained disturbance or repeated flushingin proximity of the River Nanny Estuary and Shore SPA and Boyne Estuary SPA is observed by the MMO, operational approaches will be reviewed and adapted in consultation with the competent authority.

These measures are intended to ensure that disturbance remains temporary and localised and does not affect breeding productivity, colony distribution or forage resource use.

River Nanny Estuary and Shore SPA and Boyne Estuary SPA (Estuarine Wintering Waterbirds and Breeding Little Tern)

To minimise disturbance to wintering estuarine waders and waterbirds during shoreline and intertidal survey activities:

- An Ecological Clerk of Works (ECoW) with appropriate ornithological expertise will be present during intertidal and shoreline surveys undertaken within the wintering period.
- The ECoW will oversee survey activities to avoid approaches to high-tide roosts and concentrated feeding areas where birds are present.
- Where aggregations of wintering waterbirds are observed in proximity to planned survey activity, survey progression will be adapted to minimise disturbance, where practicable.
- Survey personnel will avoid prolonged presence in areas where birds are actively roosting or feeding.

These measures are intended to prevent repeated disturbance capable of altering the range, timing or intensity of site use within the estuarine SPAs.

To minimise disturbance to wintering estuarine waders and waterbirds and to breeding Little Tern during shoreline and intertidal survey activities:

- An Ecological Clerk of Works (ECoW) with appropriate ornithological expertise will be present during intertidal and shoreline surveys undertaken within the wintering period.
- The ECoW will oversee survey activities to avoid approaches to high-tide roosts and concentrated feeding areas where birds are present.
- Where aggregations of wintering waterbirds are observed in proximity to planned survey activity, survey progression will be adapted, where practicable, to minimise disturbance.
- Survey personnel will avoid prolonged presence in areas where birds are actively roosting or feeding.
- Where shoreline or intertidal works are proposed during the Little Tern breeding season, a pre-works survey will be undertaken by a suitably qualified and experienced ECoW to confirm the presence or absence of nesting Little Tern within the MUL Application Area.
- Should Little Tern nests be identified within the MUL area in proximity to proposed works, the ECoW will prepare ecological constraint maps identifying appropriate stand-off distances and buffer zones. These buffers will be clearly communicated to all personnel and implemented for the duration of the breeding period and Ecological Constraint Maps.

These measures are intended to prevent repeated disturbance capable of altering the range, timing or intensity of site use for wintering waterbirds and to avoid disturbance to breeding Little Tern colonies within Boyne Estuary SPA.

4.5.3.5 CONCLUSION

This assessment has been undertaken in accordance with MARA's AA Screening Determination and considers the impact pathways identified therein, namely airborne noise, human presence and vessel presence (and, where relevant, underwater noise in a behavioural context) in respect of the SPAs screened in for Stage 2 Appropriate Assessment.

Potential disturbance pathways were identified for:

- Breeding seabird colonies at Rockabill SPA and Skerries Islands SPA;
- Rafting and foraging seabirds within the North-West Irish Sea SPA;
- Wintering waterbirds associated with River Nanny Estuary and Shore SPA and Boyne Estuary SPA.

Mitigation measures have been incorporated to ensure that survey activities avoid unnecessary proximity to breeding colonies, reduce close approach to rafting or actively foraging seabird aggregation, where practicable, and minimise disturbance to wintering waterbirds during shoreline and intertidal surveys.

With the above measures implemented, disturbance to breeding, rafting, foraging and wintering seabirds and waterbirds will be reduced to temporary and localised behavioural responses only.

Accordingly, the mitigation framework ensures that disturbance pathways do not give rise to adverse effects on the integrity of Rockabill SPA, Skerries Islands SPA, Lambay Island SPA, North-West Irish Sea SPA, River Nanny Estuary and Shore SPA, or Boyne Estuary SPA, having regard to their site-specific conservation objectives.

4.6 IN-COMBINATION

4.6.1 ASSESSMENT OF IN-COMBINATION EFFECTS WITH OTHER PLANS AND PROJECTS

In-combination screening for cumulative effects has been undertaken following the approach outlined in the European Commission Notice Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive (EC, 2021).

Projects and proposed projects close or adjacent to the proposed Licence area, where potential for activities to overlap spatially and/or temporally and which may cause effects on Natura 2000 QIs, and likely cumulative effects were identified in Appropriate Assessment Screening and Determination completed by MARA (2026).

- Oriel Wind Farm (OA15.319799) Applied <8km from MUL
- Site Investigations for proposed Oriel Wind Farm Granted (FS007383) <8km from MUL
- Site Investigations for proposed North Irish Sea Array Windfarm Ltd (LIC23001) Granted overlap with the MUL
- North Irish Sea Array Windfarm Ltd (OA29N.319866) Applied overlap with the MUL
- Railway (DART) (NA29N.320164) Applied adjacent to the PDSA
- Pipeline FS003997 Granted overlap with MUL
- Drogheda Port Maintenance (FS007038) granted overlap with MUL
- Dumping at Sea (S0015-03) granted overlap with MUL

4.6.2 MANAGING CUMULATIVE EFFECTS

Implementation of the mitigations outlined in Section 4, and close liaison with those proposed projects which have been identified as potentially contributing to cumulative effects on designated qualifying interests of SACs and SPAs in the Zone of Influence of the projects, will be implemented to manage cumulative effects and ensure the integrity of relevant Natura 2000 sites is maintained.

5 APPROPRIATE ASSESSMENT CONCLUSION

MARA completed its Screening for Appropriate Assessment and issued a determination identifying the European sites and QIs to be progressed to Stage 2 AA.

This Natura Impact Statement has been prepared assess the European sites screened in by MARA.

This NIS has examined, in light of the best scientific knowledge and having regard to the conservation objectives of eleven (11) European sites concerned, the potential impact pathways arising from the proposed site investigation activities, both alone and in-combination with other plans and projects.

Implementing mitigation measures and management of potential cumulative effects from identified relevant projects, as set out in Section 4, will ensure that any adverse effects on the conservation objectives of the sites assessed will be avoided during the activities proposed and that the integrity of the sites assessed will be maintained.

It is therefore concluded that the potential impacts from the proposed surveys are not likely to result in significant effects (alone or in-combination/cumulatively) on the Conservation Objectives of any Natura 2000 site and will not pose a risk of adversely affecting (either directly or indirectly) the integrity of any European site either alone or cumulatively with other plans or projects.

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Appendix A

A.1 Mitigation Measures to prevent harm to Annex II Species assessed in the Supporting Information Provided for Stage 2 Appropriate Assessment

In line with best practice guidelines 'Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters' from DAHG (2014), which are now being incorporated into the standard operating procedures of all noise emitting surveys in Irish waters, the measures detailed below will be applied to where possible prevent and if not reduce injury and disturbance to Annex II species during all noise emitting site investigation activities.

As the proposed works will be short in duration and of a temporary nature and survey vessels will be slow moving (c. 5 knots), any risk due to collision is unlikely.

A.1.1 Marine Mammal Monitoring

A qualified and experienced Marine Mammal Observer (MMO) will be appointed to monitor for marine mammals and to log all relevant events using standardised data forms provided by the DAHG. During daylight hours the MMO(s) will carry out visual observations and during hours of darkness the MMO(s) will carry out Passive Acoustic Monitoring (PAM) to monitor for the presence of marine mammals before the soft start commences and will recommend delays in the commencement of the site investigations should any species be detected within the relevant monitored zone (see below).

The MUL Application Area is located adjacent to Boyne Coast and Estuary SAC, which comprises an estuarine system. In accordance with Section 4.3.4 of the DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*, enhanced mitigation measures applicable to geophysical acoustic surveys within bays, inlets or estuaries, and within 1,500 m of the entrance of enclosed systems, will be implemented.

A.1.1.1 Pre-start monitoring

Marine Mammal monitoring will be conducted for a pre-soft start search of 30 minutes i.e., prior to the commencement of marine operations (MBES, SSS, sub-bottom profiling, geotechnical seabed sampling). This will involve a visual observation (during daylight hours) or acoustic monitoring (during hours of darkness) to determine if any marine mammals are within the relevant zone of the activities.

A.1.1.2 Monitored zone

Should any marine mammal species be detected within a radial distance of the relevant zone of the survey vessel (as per the 'Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters' from DAHG (2014)), commencement of site investigation activities will be delayed until their passage, or the transit of the vessel, results in the cetaceans being of sufficient distance from the vessel. In both cases, there will be a 30-minute delay from the time of the last sighting/acoustic detection within the relevant zone of the survey vessel to the commencement / recommencement of the operations. The MMO will use a distance measuring stick or reticule binoculars to ascertain distances to marine mammals sighted visually. *Note: once started, site investigations will not cease should marine mammals approach the survey vessel.*

A.1.1.3 SOFT START

A soft start is the gradual ramping of power over a set period of time, to give any Annex IV species adequate time to leave the area.

Once the soft start commences, there is no requirement to halt or discontinue the procedure at night-time, if weather or visibility conditions deteriorate, or if marine mammal species enter the monitored zone.

In commencing a seismic survey operation, including any testing of seismic sound sources, where the output peak sound pressure level exceeds 170 dB re: 1µPa @1m, the following ramp up procedure will be undertaken in line with the DAHG (2014) guidance:

- Energy output will commence from a low energy start-up and be allowed to gradually build up to the necessary maximum output over a period of 20-40 minutes (the exact time period will be dependent on survey parameters and equipment and will be designed in consultation with an experienced marine ecologist).
- This controlled build-up of energy output will occur in consistent stages to provide a steady and gradual increase over the ramp-up period.
- If marine mammals enter or are detected within the monitored zone while the ramp-up procedure is under way but incomplete, the energy output will not be increased until the marine mammals are no longer within the monitored zone.

A.1.1.4 LINE CHANGES

Where the duration of a survey line or station change is greater than 40 minutes, the activity will, on completion of the line/station being surveyed, either cease (i.e., shut down) or preferably undergo a reduction in energy output to a lower state where the peak sound pressure level from any operating source is =<170 dB re 1 µPa @ 1 m. Prior to the start of the next line/station, if the power was shut down, all pre-survey monitoring measures and soft start procedures will be followed as for start-up. If there has been a reduction in power, a soft start will be undertaken gradually from the lower output level. The latter sound reduction measure will be applied to line changes at night-time or in daytime conditions of poor visibility. Where the duration of a survey line/station change is less than 40 minutes the activity will continue as normal (i.e., under full output).

A.1.1.5 BREAKS IN SURVEY PERIODS

If there is a break in sound output from survey equipment for a period greater than 30 minutes (e.g., due to equipment failure, shut-down, survey line/station change) then all pre-start monitoring measures and ramp-up procedures will recommence prior to re-starting.

A.1.1.6 REPORTING

All recordings of marine mammal species will be made using standardised data forms provided by the NPWS. Full reporting on operations and mitigation will be provided to the NPWS to facilitate reporting under Article 17 of the EC Habitats Directive and future improvements to guidance (DAHG, 2014). The report will also include feedback on how successful the measures were. This requirement will be communicated to the MMOs at project start up meetings and at crew change.

A.1.1.7 SURVEY VESSEL SPEED AND COURSE

The project survey vessels will be moving at a maximum speed of approximately 5 knots during surveys to allow marine mammal species to move away from the vessel should they be disturbed by the vessel presence or noise emissions. During transit times, the survey vessels will be travelling at speeds greater than 5 knots. However, these movements are not considered to deviate from normal vessel traffic in the area. Should a marine mammal species be found to be in the direct path of a survey vessel, during or outside of survey times, the survey vessel will slow down or, if possible, alter course to avoid collision.

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