MARESCONNECT

Maritime Usage Licence Application for Site Investigations for MaresConnect Interconnector Reference: MUL240008

Supporting Information for Screening of Appropriate Assessment

P2578_R6410_Rev1 | 20 June 2024

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Supporting Information for Screening of Appropriate Assessment

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GLOSSARY

AA
Appropriate Assessment

AIMU
Assessment of Impacts on the Maritime Usage

AOS
Area of Search

BEIS
Business, Energy and Industrial Strategy

cSAC
Candidate Special Area of Conservation

Cm
Centimetre

CPT
Core Penetration Test

CSZ
Core Sustenance Zones

DAHG
Department of Arts, Heritage and the Gaeltacht

dB
Decibel

DHLGH
Department of Housing, Local Government and Heritage

DECC
Department of Energy and Climate Change (UK)

EC
European Commission

EDR
Effective Deterrent Range

EEZ
Exclusive Economic Zone

EIA
Environmental Impact Assessment

EIAR
Environmental Impact Assessment Report

European Site
A candidate site of Community importance, a site of Community importance, a candidate Special Area of Conservation (SAC), an SAC, a candidate Special Protection Area (SPA) or an SPA.

EU
European Union

MUL
Maritime Usage Licence

MULA
Maritime Usage Licence Area

FLAA
Foreshore Licence Application Area

GB
Great Britain

GIS
Geographic Information System

ha
Hectare

HZ
Hertz

HVDC
High Voltage Direct Current

ICG-C
Intercessional Correspondence Group on Cumulative Effects

INNS
Invasive Non-Native Species

IROPI
Imperative Reasons of Overriding Public Interest

JUB
Jack Up Barge

JNCC
Joint Nature Conservation Committee

kHz
Kilohertz

Km
Kilometre

LSE
Likely Significant Effect

M
Metre

MARA
Maritime Area Regulatory Authority

MarSEA
Marine Evidence-based Sensitivity Assessment

MBES
Multibeam Echosounder

MU
Management Units

MW
Megawatt

NIS
Natura Impact Statement

nm
Nautical Mile

NPWS
National Parks & Wildlife Service

NMFS
National Marine Fisheries Services

OSPAR
Oslo and Paris Conventions

OWF
Offshore Windfarm

pSPA
Proposed Special Protection Area

PTS
Permanent Threshold Shift

QI
Qualifying Interest

ROI
Republic Of Ireland

RTK
Real-Time Kinematic

SAC
Special Area of Conservation

SBP
Sub-bottom Profiler

SCI
Special conservation interest

SEL
Sound Exposure Levels

SNCB
Statutory Nature Conservation Bodies

SPA
Special Protection Area

SPL
Sound Pressure Level

SSS
Side Scan Sonar

TTS
Temporary Threshold Shift

VC
Vibrocore

UK
United Kingdom

ZOI
Zone of Influence

1. INTRODUCTION

MaresConnect Ltd. (MCL) is completing feasibility studies for a new High Voltage Direct Current (HVDC) interconnector (MaresConnect) connecting the Great Britain (GB) and the Republic of Ireland (ROI) electricity transmission networks. The United Kingdom (UK) grid connection point will be established at an existing substation in Bodelwyddan, North Wales. The Irish grid connection point will be established at an existing substation (Woodland, Belcamp or Maynooth) in the vicinity of Co. Dublin. The project will provide a 750 MW (megawatt) cross-border transmission capacity between the networks of Ireland and Great Britain.

The project is currently in its planning stages and will require development permission in ROI and Wales and requires completion of environmental and technical assessments to inform the final interconnector design.

The proposed site investigations and survey works are the subject of this MUL and are independent of any potential future development of the MaresConnect project.

Within the jurisdiction of Ireland, the feasibility surveys will be carried out in the geographic area that extends seaward from the High-Water Mark (HWM) extending out to Ireland's Exclusive Economic Zone (EEZ) boundary, a geographic area of approximately 106,366.6 hectares (ha) in total. Due to the timing of these proposed survey works and changes in the regulatory consenting regime in recent years the works within Ireland's jurisdiction is now subject to two separate consenting processes.

In the first instance, MCL submitted and was granted a foreshore licence (FS007635) to carry out the relevant works within the foreshore, as defined in the Foreshore Act 1933, as amended (the Foreshore Acts) (the "**Foreshore Licence**"). The application for the Foreshore Licence was accompanied by an Environmental Report, Annex IV Species Risk Assessment and Natura Impact Statement, all of which assessed the works to be carried out within the foreshore (i.e. from the Irish HWM seaward to the 12 nautical mile (nm) limit of the foreshore).

Subsequent to the submission of the Foreshore Licence application, Part 5 of the Maritime Area Planning Act 2021, as amended (the "**MAP Act**") was commenced, requiring MCL to obtain an MUL to carry out works in the area beyond the seaward limit of the foreshore (i.e. beyond the 12nm limit of the foreshore seaward to the EEZ boundary). This MUL Application forms the application for the MUL.

The MUL Application is for site investigation and survey works to determine the suitability for cable routeing. The Maritime Usage Licence Area (MULA) is presented in Maritime Usage Licence Map 1 (Drawing Ref: P2578-LOC-001-A). The MULA covers approximately 332.96 km2 (33,296 ha) and, as noted above, extends from the 12nm limit of the 'foreshore' seaward to the EEZ boundary

A MUL is sought solely for the proposed site investigation works which will be temporary and short-term. The screening for Appropriate Assessment (AA) process will be undertaken by the Maritime Area Regulatory Authority (MARA). This supporting information for screening for AA has been prepared by Intertek on behalf of MCL, in accordance with the Habitats Regulations and relevant guidance, to inform the AA process.

MCL received a letter from the Department of Environment, Climate and Communications (DECC) on the 28th May 2024, which strongly supports this MaresConnect MUL application. This letter will accompany the MUL application and its supporting documents.

MARITIME USAGE LICENCE MAP 1

LOCATION OVERVIEW

MaresConnect Interconnector MUL Boundary

Drawing No: P2578M-LOC-001	B

Upper Right Corner
Irish Tranverse Mercator
797,852.44 795,993.88

Area: 33296 ha

Lower Left Corner
Irish Tranverse Mercator
709,176.04 716,910.58

Legend

- Maritime Usage Area
- EEZ Boundary
- 12 NM Territorial Sea Limit

N
W E
S

Note: Coordinates listed in
Irish Transverse Mercator
EPSG 2157

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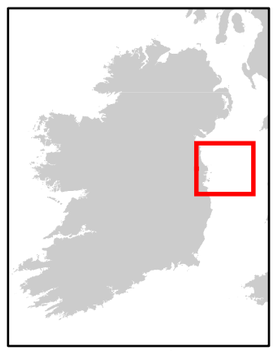

NOTE: Not to be used for Navigation

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Projection	Transverse Mercator
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File Reference	J:\P2578\Mxd_QGZ\00_OffshoreIreland\01_LOC\ P2578M-LOC-001.mxd
Created By	[redacted]
Reviewed By	
Approved By	

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1.1.2 Aim of this Report

This report forms part of the supporting information for the MUL Application to the MARA to undertake the proposed site investigation and survey works. The aim of this report is to inform the AA Screening process, in determining whether the proposed site investigations, both alone and in combination with other plans or projects, are likely to have a significant effect on any European Site. European Site is defined, by the European Communities (Birds and Natural Habitats) Regulations 2011 as amended, as a candidate site of Community importance, a site of Community importance, a candidate Special Area of Conservation (SAC), an SAC, a candidate Special Protection Area (SPA) or an SPA. This report assesses first the works to be carried out within the MULA alone, before going on to consider these works in combination with the entirety of the survey works to be carried out as part of the cable routeing exercise, including the survey works within the foreshore and the survey works to be carried out outside of Ireland's EEZ and located within the jurisdictional waters of the United Kingdom. [1] The in-combination assessment then goes on to consider the survey project in combination with other plans or projects. The effects of the site investigations on the European Sites are considered in the context of the conservation objectives of the SAC and/or SPA, and specifically on the habitats and species for which the European Sites have been designated in Irish and international waters. The closest SPA or SAC to the project area beyond the 12nm limit is in UK waters. If the likelihood of significant effects cannot be excluded, based on objective information, then those sites are taken forward for further consideration in the AA process. The purpose of the AA process is to determine whether the likely significant effects will either alone, or in combination with other plans or projects, adversely affect the integrity of the European Site.

This report should be read in conjunction with the Assessment of Impacts on the Maritime Usage (AIMU) Report (P2578_R6411_Rev0) submitted with the MULA. A description of the site investigation and survey works, the receiving environment, the potential pressures that could arise from the planned activities on the receiving environment, and potential in-combination effects of this project with other plans/projects in the nearby vicinity have been described in these two documents.

This report presents the findings of the Stage 1 Screening for Appropriate Assessment whereby it is determined if there is any connectivity between the proposed site investigations and any European Sites. Any sites where there is a potential pathway between the site investigation works and the European Site have been examined to determine the potential for likely significant effect (LSE) on the conservation objectives of these sites. Where a potential LSE on a Qualifying Interest (QI) / Special Conservation Interest (SCI) has been identified, the potential for an adverse effect on the integrity of the European Site has been assessed and information to support the AA has been provided (Section 3). If necessary, mitigation to avoid or reduce the significance of effects has been proposed in the AA (Section 5).

This report has been prepared in accordance with current guidance:

- The EC notice "Managing Natura 2000 Sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC", 21 November 2018;
- The Department of Arts, Heritage and the Gaeltacht (DAHG) "Marine Natura Impact Statements in Irish Special Areas of Conservation: A Working Document, April 2012."
- Office of the Planning Regulator (OPR) Practice Note 1 (PN01) "Appropriate Assessment Screening for Development Management, March 2021."

[1] MCL was granted a Marine Licence (reference number: CML2331) on the 12th October 2023 for seabed survey for the MaresConnect electricity interconnector in UK waters. A seabed Survey Licence will be applied 6 weeks prior to the start of the survey.

- The EC Guidance "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 92/43/EEC, October 2021".

1.1.3 Site investigaton Activities

This section provides a high-level overview of the proposed site investigation and survey works. Full details on the scope for site investigation and survey works is provided within Appendix A of the AIMU Report (P2578_R6411_Rev0) included with this MUL Application.

The Application seeks a Licence duration or term of five years, although most of the proposed site investigation works and surveys, as detailed below, will be undertaken for short periods (weeks), subject to the availability of site investigation and survey vessels and equipment and appropriate weather conditions. The proposed site investigations and survey works are most likely to be undertaken in Quarter 1 2025, but the application assesses the likely effects of the proposed investigations and survey works on the basis that they may be undertaken at any time throughout the year, with no seasonal restrictions.

The intention is to carry out site investigation and survey works as soon as feasible following the granting of the MUL, noting that the Foreshore Licence has already been received for the Foreshore area out to 12 nm. However the exact mobilisation dates for the activities will not be known until a MUL has been secured and the process of procuring the site investigation and survey works can be completed.

In summary the MUL Application is for the following proposed activities in the area between 12 nm and the limit of the EEZ:

- **Geophysical survey:** The geophysical survey will comprise multibeam echosounder (MBES), sidescan sonar (SSS), sub-bottom profiler (SBP) and magnetometer survey sensors to determine seabed conditions within the MUL area. Surveys will be undertaken at any time of the year (subject to weather conditions) and will be carried out over a period of 3-months (including downtime). It is currently planned that the geophysical survey would be undertaken in conjunction with the benthic sampling programme, but this is not certain (see below).
- **Geotechnical**: Up to 93 shallow-water CPTs and shallow-water vibrocores (VCs) (both with a penetration depth up to 6m) will be acquired to evaluate the nature and mechanical properties of the seabed sediments. Up to 19 boxcores or Van Veen grabs may be used to characterise shallow soils if the sediment is found to be very soft. The geotechnical survey is likely to be carried out over multiple campaigns to determine site characteristics and ground conditions to determine optimum potential cable positioning. Surveys will be undertaken at any time of the year (subject to weather conditions). Campaigns are likely to be within a two-to-four-month period at any time of the year - (subject to weather conditions). Indicative geotechnical sample stations are provided in MUL Application Map 2 (Drawing Reference: P2578-LOC-002) however the precise positioning of sample stations will be informed by the geophysical survey. Obtaining the results of the geophysical surveys prior to undertaking the geotechnical site investigations ensures that the selection of the precise sample sites is made on an informed basis, minimising the risk of interacting with sensitive ecological or archaeological features in or on the seabed.
- **Environmental (benthic sampling) and Intertidal**: The benthic sampling campaign is likely to occur with the geophysical survey, however, if this is not possible, in the alternative the benthic sampling will be carried out during a separate 2-3 day period. A grab sampler will be used to retrieve a soil sample of the seabed by the lowering of a mechanical grab. Each grab samples a volume of approximately 0.015m^3. Grabs are required to obtain a sample greater than 5cm in depth, if less than 40% of the grab is acquired then samples will be repeated for up to three attempts. It is likely that three grab samples will be taken at each station (19 stations in total); two for faunal analysis

and one for sediment and chemical analysis (57 samples in total). Additional drop-down camera and video transects will be acquired to characterise seabed habitats and sensitive features. Intertidal surveys will be undertaken separately and will take less than 1-week at each potential landfall. Terrestrial survey methods at the landfall (shoreline and hinterland) may include a topographic survey of the ground elevations using real-time kinematic (RTK) foot or vehicle traverses, laser-scanning and/or an aerial drone survey using photogrammetry techniques. Terrestrial geophysical investigations may include seismic refraction of the cable route centreline and offset lines to provide information on sub-surface sediment layers and thicknesses using a ground penetrating radar survey, or similar.

- **Archaeological survey**: A qualified, Irish registered, marine archaeologist will review all geophysical survey data ahead of geotechnical sampling to evaluate sampling positions for features of underwater importance. Obtaining the results of the geophysical surveys prior to undertaking the geotechnical site investigations ensures that the selection of the precise geotechnical sample sites is made on an informed basis, minimising the risk of interacting with archaeological features in or on the seabed.

Indicative locations of VC, CPT, grab sample positions are provided in Figure 1-2 (Drawing Reference: P2578-LOC-002-A). Locations are indicative only as the precise sample stations will be selected after the geophysical and archaeological survey has been completed, which will minimise any potential environmental or archaeological risks.

To date, the potential cable route options are based on desktop assessments, and on a precautionary basis for the purposes of this Licence Application. It has been assumed that the geophysical surveys will be conducted along all five potential routes within the MUL area, However, this represents the worst-case scenario, and it is likely not all routes will be sampled. For the purposes of this application, all routes have been assessed.

MARITIME USAGE LICENCE MAP 2

LOCATION OVERVIEW

MaresConnect Interconnector MUL Boundary Indicative Sampling Locations

Drawing No: P2578M-LOC-002	B

Upper Right Corner
Irish Tranverse Mercator
797,852.44 795,993.88

Lower Left Corner
Irish Tranverse Mercator
709,176.04 716,910.58

Area: 33296 ha

Legend

- Maritime Usage Area
- EEZ Boundary
- 12 NM Territorial Sea Limit
- Drop-down Camera, Grab and Box Core (5km intervals)
- Vibrocore and CPT (1km interval)

N W E S

19 Env Locations

93 Vibrocore and CPT Locations

Note: Coordinates listed in Irish Transverse Mercator EPSG 2157

Map prepared by:
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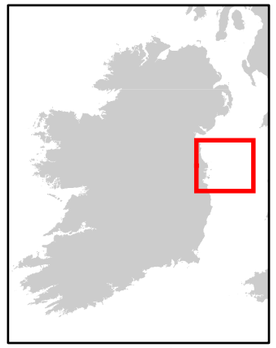

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2. LEGISLATIVE CONTEXT

2.1 Habitats Directive (92/43/EEC)

The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC), transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) (the "Habitats Regulations") require European Union (EU) Member States to establish a network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. This network of sites is known as the Natura 2000 network. The network comprises SACs designated under the Habitats Directive, and SPAs designated under the Birds Directive. SPAs and SACs are designated by the individual member states and are collectively referred to in the Habitats Regulations as European Sites.

The Natura 2000 network in Ireland is made up of European Sites which include SACs, SPAs, candidate SACs (cSACs) and proposed SPAs (pSPAs). cSACs and pSPAs also form part of the network and are treated as if fully designated. SACs are designated for the protection of Annex I habitats and Annex II species referred to as the Qualifying Interests (QI) of the site. SPAs are established for the protection of endangered species of wild birds designated under Annex I of the Birds Directive, along with regularly occurring migratory species, such as ducks, geese and waders and areas of wetland and they are referred to as the Special Conservation Interests (SCI) for the site.

A key requirement of the Habitats Directive is that the effects of any plan or project, alone, or in combination with other plans or projects, on the European Site network, should be assessed before any decision is made to allow that plan or project to proceed. This process is known as Appropriate Assessment (AA). Each plan or project considered for approval, must take into consideration the possible effects it may have in combination with other plans and projects when going through the AA process.

The obligation to undertake AA derives from Articles 6(3) and 6(4) of the Habitats Directive.

Article 6(3) of the Habitats Directive states that:

"Any plan or project not directly connected with or necessary to the management of the 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 after 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."

This provision is transposed into Irish law in respect of this MUL Application by Part 5 of the Habitats Regulations. Regulation 42(1) of the 2011 Regulations provides for screening for Appropriate Assessment as follows:

"A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European Site."

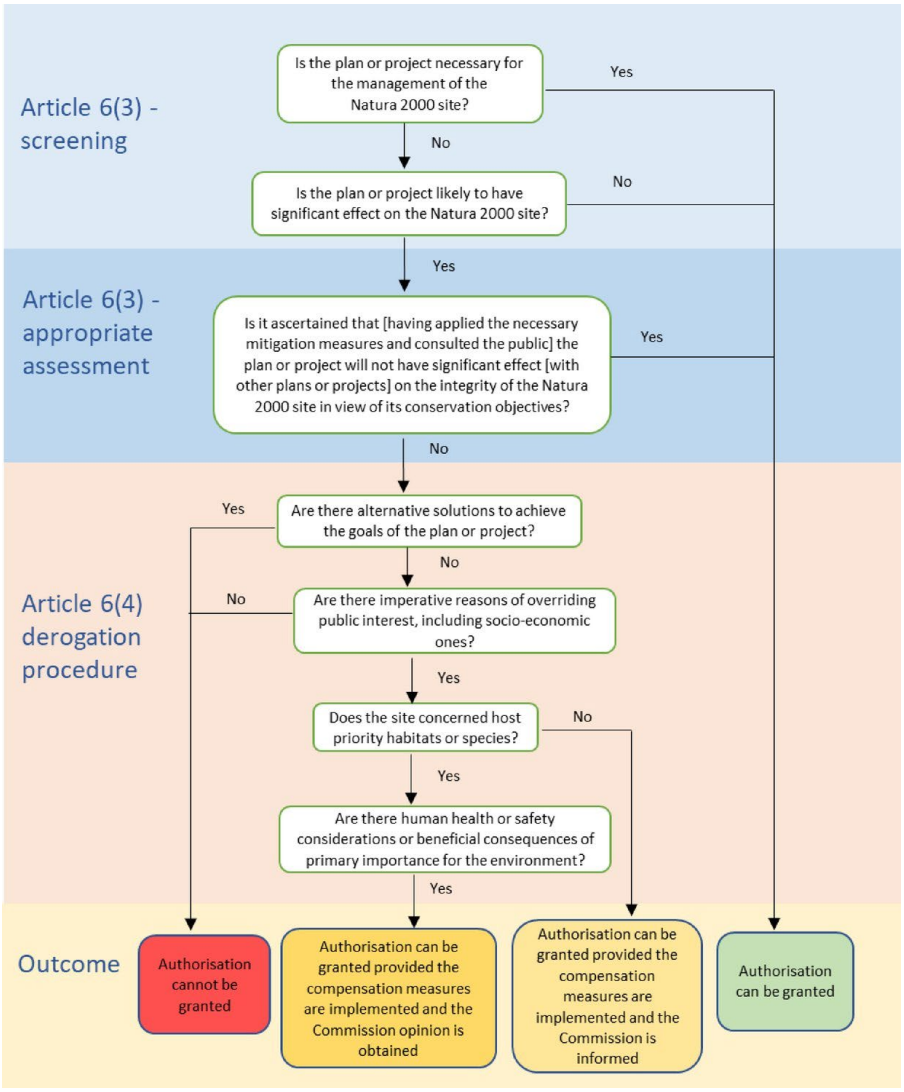
Regulations 42(6) and 42(7) provide for the outcome of screening for Appropriate Assessment as follows:

"The public authority shall determine that an Appropriate Assessment of a plan or project is required where the plan or project is not directly connected with or necessary to the management of the site as a European Site and if it cannot be excluded, on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European Site. Alternatively, a public authority shall determine that an Appropriate Assessment of a plan or project is not required where: the plan or project is not directly connected with or necessary to the management of the site as a European Site and if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European Site."

2.2 The Appropriate Assessment Process

The EC's methodological guidance (EC 2021) outlines a three-stage approach to the AA process, where the outcome at each successive stage determines whether a further stage in the process is required. The results at each step must be documented so there is transparency of the decisions made. The three stages are shown in Figure 2-1 and described below.

Figure 2-1 Stages of AA



Source: European Commission, 2021

2.2.2 Stage 1 - Screening for Appropriate Assessment

Stage 1 of the AA process is referred to as screening for Appropriate Assessment and identifies whether the proposed plan or project, either on its own or in combination with other plans or projects, would be "likely to have a significant effect" upon any European Site. A likely effect is one that cannot be ruled out on the basis of objective information. The test is a 'possibility' of effects rather than a 'certainty' of effects. The test of significance is whether a plan or project could undermine the site's conservation objectives. For the avoidance of doubt, it is confirmed that no measures intended to avoid or prevent any potential harmful effects of the project on any European Site have been considered when carrying out this screening exercise.

2.2.3 Stage 2 - Appropriate Assessment

If effects are considered likely to be significant, potentially significant or uncertain, or if the screening process becomes overly complicated, the process must proceed to Stage 2: Appropriate Assessment, with the preparation of a Natura Impact Statement (NIS) to inform the Appropriate Assessment that is to be conducted by the competent authority.

The European Court of Justice has also made a relevant ruling on what should be contained within an Appropriate Assessment:

"[The Appropriate Assessment] cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works proposed on the protected site concerned".

2.2.4 Stage 3 – Derogation from Article 6(3) Under Certain Conditions

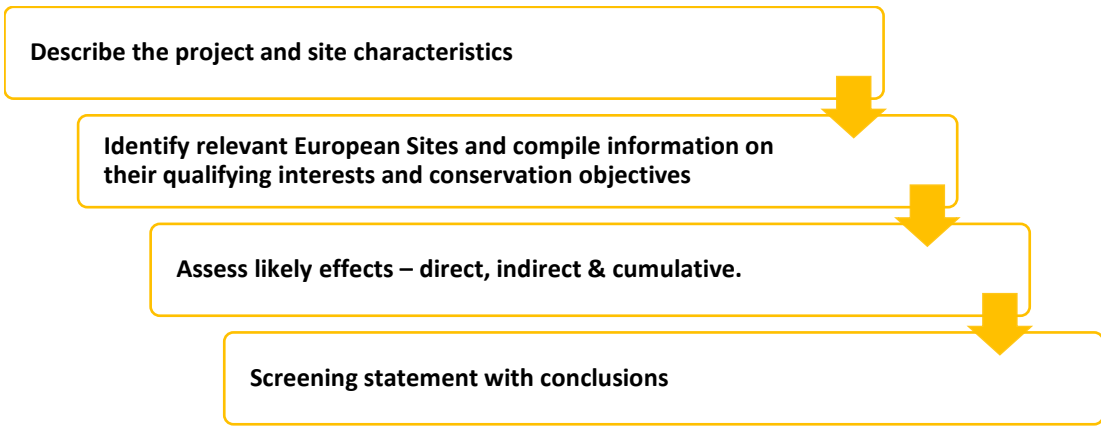
This stage of the procedure, governed by Article 6(4), only comes into play if, despite a negative assessment, the developer considers that the plan or project should still be carried out for imperative reasons of overriding public interest. This is only possible if there are no alternative solutions, the imperative reasons of overriding public interest are duly justified, and if suitable compensatory measures are adopted to ensure that the overall coherence of Nature 2000 is protected.

2.3 Approach to Screening for Appropriate Assessment

This Screening for AA has been undertaken according to the process set out in the National Parks and Wildlife Service (NPWS) and DEHLG (2010) Guidance; following the process illustrated in Figure 2-2. It has considered all case law relevant to the Habitats Directive summarised in the European Commission Guidance (European Commission 2018).

Screening has been undertaken prior to the application of mitigation measures in accordance with Court of Justice of the European Union ruling C-323/17 (People Over Wind and Sweetman v Coillte Teoranta, 2018).

Figure 2-1 Screening for AA Process

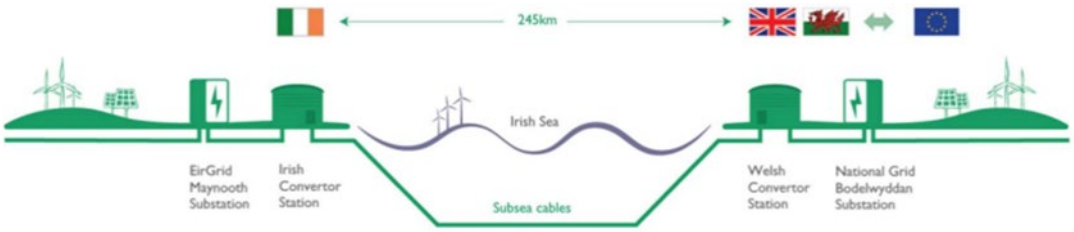


The structure for the remainder of the Screening for AA therefore reflects the key steps in this process.

2.4 Describe the Project and Site Characteristics

MCL are developing a high voltage direct current (HVDC) interconnector between the United Kingdom (UK) and the ROI called 'MaresConnect' The UK grid connection point will be established at the existing Bodelwyddan substation in North Wales. The Irish grid connection point is anticipated to be established at an existing substation (Woodland, Belcamp or Maynooth) in the vicinity of Co. Dublin (Figure 2-3). The interconnector will have a nominal capacity of 750 megawatt (MW), equivalent to the power of 570,000 homes. MaresConnect will strengthen the existing connection between the UK and ROI by adding additional capacity alongside existing interconnectors and contributing to each country's strategic interconnection objectives. MaresConnect has been awarded an Interconnector Licence in Great Britain (GB), authorising the operation of an electricity interconnector. This Project comprises the site investigation and associated survey works required for the development of the interconnector, of which is the subject of this MUL application.

Figure 2-2 MaresConnect Overview



Full details of the Site investigation Activities which pertain to this MUL Application are outlined in Section 1.1.3 The site characteristics i.e. the baseline environment within the MULA, are described in Section 2 of the AIMU (Document reference: P2578_R6411_Rev0).

2.5 Identification of Relevant Natura 2000 Sites

2.5.1 Site Identification Process

The potential for a European Site to be significantly affected depends on whether receptors which QI / SCI of a European Site:

a. Can come into contact with the surveys; and

b. Are sensitive to the survey activities to the extent that the activity is likely to have a significant effect on the conservation objectives for the QI/SCI.

Identifying relevant European Sites has therefore been achieved by applying the following steps:

1. Identify which receptors could be sensitive to the proposed site investigations.
2. Identify potential pressures and effects the proposed site investigations could have on these receptors and what the zone of influence (ZOI) for these receptors and then define an area of search (AOS):
   a. ZOI - the geographical spatial extent over which the activities are predicted to have an impact on the receiving environment. This will vary for different activities and for the different stages of the Project (installation, operation and decommissioning).
   b. AOS - using zones of influence as a guide and expert judgement on the basis of best scientific knowledge, define a search area within which protected sites are identified to determine if the relevant receptor is a designated feature of the site.
3. Screen SACs and SPAs within these search areas to identify QIs / SCIs and assess whether Interest Features of the European Site could be significantly affected by the proposed site investigations.
4. Assess whether any SACs and SPAs further afield from the survey area have mobile QIs / SCIs which may travel into the ZOI and have the potential to be significantly affected.

2.5.2 Identification of sensitive receptors

The key receptors which could potentially be affected by the proposed site investigations and could be the QIs / SCIs of designated European Sites in the region include:

- Intertidal and benthic habitats;
- Bats;
- Fish;
- Birds; and
- Marine mammals (cetaceans, pinnipeds and European otter).

3. POTENTIAL ENVIRONMENTAL IMPACTS OF PROPOSED ACTIVITIES

The Oslo and Paris Conventions (OSPAR) Intercessional Correspondence Group on Cumulative Effects (ICG-C) pressure list and definitions (OSPAR, 2011) have been used to describe the potential pressures expected from the proposed site investigations. These potential pressures may be direct or indirect, temporary or permanent, beneficial or harmful to the site, or a combination of these. The ZOI – spatial extent over which effects may extend – has also been defined.

Consideration has been given to how sensitive receptors could be affected and what the ZOI (the geographical extent over which an effect on the receiving environment is predicted to occur) is likely to be in defining the search area for relevant European Sites.

The geographical extent of the likely ZOI for non-mobile receptors such as benthic communities will represent the required search area for relevant European Sites. For highly mobile species such as bats, fish, birds and marine mammals the European Sites which are most likely to be significantly affected will be those within or near the ZOI. A justification for the established ZOI and search area for each receptor is explained below:

Benthic habitats have the potential to be directly affected in three ways:

- During the geotechnical and environmental surveys from the very small volume removal of sediment samples; and
- Through abrasion and displacement by positioning of equipment on the seabed e.g. Jack up Barge (JUB) legs, or concrete/steel mooring anchors.

Given that sampling points will not be determined until after the geophysical survey results are confirmed (positions represented in MUL maps are indicative only), the ZOI for benthic communities has been assumed to be the entire MULA. Relevant sites would include SACs designated for Annex I habitats which support benthic communities. Therefore, only SACs designated for benthic habitats which the MULA passes directly through have been screened for Annex I habitats.

Bats have the potential to be affected by light emitting from survey vessels. Such visual disturbance has the potential to affect foraging effort.

The Bat Conservation Trust has developed Core Sustenance Zones (CSZs) around communal bat roosts, within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost (BCT, 2016). Of the 15 bat species studied CSZs ranged from 1km to 6kms. To allow for the mobility of bat species which could forage into the ZOI, all SACs within 6km have been screened.

Fish have the potential to be affected by the geophysical survey from changes in underwater sound. The potential for effects may range from temporary behavioural changes, or temporary hearing loss, through to migration pathways being impeded by a noise barrier. Of the four migratory Annex II species known to be present in the vicinity of the MULA, only twaite shad are known to be sensitive to underwater noise generated from geophysical survey. Species, such as Atlantic salmon (*Salmo salar*) and sea (*Petromyzon marinus*) and river lamprey (*Lampetra fluviatilis*) have a lower sensitivity to sound as for salmon their swim bladder is located far from the ear and lamprey lack a swim bladder altogether (Popper *et al.*, 2014). Therefore, these species will only be sensitive to sound sources with a rapid pressure change, i.e. unexploded ordnance detonation, which is not proposed or anticipated under this MULA. The ZOI for direct effects from underwater noise to hearing sensitive fish species has been estimated as 2.2km.

There is the potential that noise could also impede migration to/from rivers near the MULA as twaite shad migrate from the sea to spawn in spring, usually between April and June (JNCC, 2022a). A study conducted by Davies *et al*. (2020) reported that of 73 twaite shad tagged 12 individuals were recorded 200 km from their original location after migrating to sea. Whilst it is acknowledged that twaite shad may migrate distances greater than 100km, it is recognised that species from protected sites further away are less likely to travel to the proposed MULA in high enough numbers for the population of qualifying species to be significantly affected. Therefore, a highly precautionary screening distance of 100km from the MULA has been applied based on professional judgement and the general acceptance of this figure in ecological assessments of migratory fish in OWF site investigations.

Marine birds – Advice on how to present assessment information on the extent and potential consequences of seabird displacement from offshore wind farm developments published by the UK Joint Statutory Nature Conservation Bodies (JNCC) 2017) states that for most bird species a standard displacement buffer of 2km is recommended. For divers and sea ducks this should be extended to 4km. More recent advice from JNCC notes that red-throated diver (*Gavia stellata*) avoid a much larger area. For non-breeding red-throated diver, a pragmatic displacement buffer of at least 10km is recommended (JNCC, 2022b). The most vulnerable birds to disturbance would be nesting birds in the breeding season in the immediate vicinity of the proposed site investigations. Disturbance to nesting birds caused by the presence of the survey vessel could have an effect on the success rate of the breeding population. The ZOI of disturbance on nesting birds has been assessed as up to 2km from the MULA.

To allow for the mobility of bird species which could forage into the ZOI, all SPAs within 15km of the MULA boundary have been screened as a starting point. Additionally, Woodward *et al*. (2019) was used to determine foraging ranges for seabirds during the breeding season to establish if seabirds were likely to be present in project area.

It is noted that seabirds from other, more distant SPAs occasionally forage in, travel through, or engage in other behaviours inside the MULA due to their typically wide foraging ranges. As the MULA is outside any core habitat use areas of the more distant SPAs, the frequency of birds with larger foraging ranges from these SPAs occurring within the MULA declines i.e. as the distance between the MULA and the further SPAs increases. It is unlikely that the population of longer ranging species from further SPAs will be in the vicinity of the proposed works in significant numbers or for a significant period of time, therefore the conservation objectives of sites with these species listed as a qualifying species will not be affected. The standard area of search for installation of OWF's is 100km and thus this highly precautionary range has been selected as an area of search for SPAs relevant to the MULA. However, only those SPAs that directly overlap or are within 15 km of the MULA are considered to have the potential of being impacted due to the highly localised, transient, and brief nature of the proposed site investigation works.

Marine mammals have the potential to be affected by changes in underwater noise. EC Habitats Directive Annex II listed species likely to be observed in the MULA include grey seal (*Halichoerus grypus*), harbour (common) seal (*Phoca vitulina*), and European otter (*Lutra lutra*), common bottlenose dolphin (*Tursiops truncates*) and harbour porpoise (*Phocoena phocoena*).

There are no published guidelines on distance thresholds to anthropogenic sound sources, due to the varied nature of sound in the marine environment modelled based on seabed morphology, sound velocity etc. In relation to geophysical surveys, the UK JNCC have established an effective deterrent range (EDR) of 5km for geophysical surveys (JNCC, 2020). Relevant sites would include SACs designated for marine mammals within 5km of the MULA. However, in recognition of the highly mobile nature of marine mammals, the following has been assumed and used to define the area of search for relevant European Sites:

- Any harbour porpoise or common bottlenose dolphin from European Sites located in the relevant Management Unit (MU) (JNCC, 2015) could be present in the MULA. The MU for harbour porpoise is the Celtic and Irish Sea; for bottlenose dolphin it is the Irish Sea and Offshore Channel, Celtic Sea and SW England;
- Harbour (common) seals prefer to come ashore in sheltered waters, and they usually feed within 40-50km from their haul-out site, they are not known to make trips greater than 50km from haul out sites (DECC, 2016).
- Grey seal are known to travel large distances to forage up to 100km (Berwickshire & Northumberland Marine Nature Partnership, 2021).
- European otter is known to have a home range of 20km for females and 32km for males (Nature Scot, 2021).

In summary, Table 3-1 defines the search areas used to identify relevant European Sites for screening.

Table 3-1 Search Areas and Zone of Influence (ZOI)

Interest feature	Species	Area of Search (AoS)	Zone of Influence (ZOI)
Benthic habitats	n/a	MULA	<5 m
Fish	Twaite shad	100 km	2.2 km
Birds	Most bird species	100 km	2 km
	Divers, seaduck	100 km	4 km
	Red-throated diver	100 km	10 km
Bats	All species	6 km	<100 m
Cetacean	Harbour porpoise	Celtic and Irish Sea MU	5 km (disturbance)
	Bottlenose dolphin	Irish Sea and offshore Channel and SW England	
Pinniped	Grey seal	100 km	
	Harbour (common) seal	50 km	
European otter		32 km	250 m

3.1.2 In-combination effects in Irish Waters

A key requirement of the Habitats Directive is that the effects of any project on the European Site network should be considered in combination with other plans or projects. Following the guidelines outlined by the European Commission (EC, 2021), which recommend sourcing information about "characteristics of other plans or projects (implemented, approved, or proposed) that may cause in-combination or cumulative effects with the project being assessed on Natura 2000 sites," various databases have been reviewed on the 10th June 2024. These include databases related to EIA, AA of plans and projects, regional or municipal plans, and local authority planning applications available from Competent Authorities.

As part of this SISAA report, all relevant plans and projects within the vicinity of the MULA have been examined, along with plans and projects within both the Foreshore licence application area (FLAA) (FS007635) and transboundary plans and projects within the vicinity of the MULA and FLAA. All consented activities, developments, and applications for activities or developments within the MULA and FLAA have been considered for their potential to cause cumulative effects in combination with

the proposed site investigation activities under this MUL Application and the FLAA on SACs, SPAs, and their qualifying interests

Commercial fisheries, shipping interests and recreational use have been screened out of the list of projects as they are considered to represent baseline conditions, and are not considered as projects, plans or licenced activities. Existing pipelines and cables within the MULA and FLAA were also not considered as they will not interact with the proposed site investigations.

Databases which were reviewed as part of this process included:

- The Department of Housing Local Government and Heritage - Foreshore Search Engine
- MARA's MUL Submitted Application's section of the MARA website
- An Bord Pleanála Planning Lists
- The DHLGH EIA Portal
- Bluewise Marine's Desktop study on Impact of geophysical and geotechnical site investigation surveys on fish and shellfish (2023).

Table 3-2 Development Applications Near MULA and FLAA

Name of Development & Developer	Licence ref	Type of Activity	Commencement Date	Licence Status	Approx. Distance from MULA (km)	Approx. Distance from FLA Area (km)
Oriel Offshore Wind Farm	OA15.319799	Marine development Application to ABP for the construction of the Oriel Offshore Wind Farm and Associated infrastructure.	Unknown	Application lodged on the 24/05/2024	36.79	23.26
Arklow Bank Wind Park SSE Renewables	OC27.315796	Marine development Application to ABP for the construction of the Arklow Bank 2 Offshore Wind Farm and Associated infrastructure.	Unknown	Consultation closed 25/01/2024	69.36	57.99
Microsoft Ireland Operations Ltd.	LIC230018	Geophysical survey and site investigations for a proposed subsea fibre optic cable having a landfall in Portmarnock, County Dublin to evaluate options for the route traversing the Irish Sea to	Q2 2024 – Mid 2024	Applied	Overlaps	Overlaps

Name of Development & Developer	Licence ref	Type of Activity	Commencement Date	Licence Status	Approx. Distance from MULA (km)	Approx. Distance from FLA Area (km)
		Abergele, Wales.				
North Irish Sea Array (NISA) Statkraft	LIC230001	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic, topographic, and Meteorological investigations	Q2 2024 – Mid 2024	Consultation	Overlaps	Overlaps
Lir Offshore Array Lir Offshore Array Ltd.	FS007392	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic, topographic, and Meteorological investigations	Summer 2022	Applied	Overlaps	Overlaps
Dublin Array RWE Renewables	FS007188	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic and Meteorological investigations	Unknown	Determined	9.74	Overlaps
Braymore Head (Setanta) SSE Renewables	FS006973	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic, topographic, and Meteorological investigations	Summer 2019 for five years	Determination	10.0	Overlaps
North Irish Sea Array (NISA) Statkraft	FS007031	Site investigation works likely consisting of	Summer 2020	Determination	10.33	Overlaps

Name of Development & Developer	Licence ref	Type of Activity	Commencement Date	Licence Status	Approx. Distance from MULA (km)	Approx. Distance from FLA Area (km)
		Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic and Meteorological investigations				
North Irish Sea Array (NISA) Statkraft	LIC230001	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic and Meteorological investigations	Q1 2024	Determination	10.33	Overlaps
Greystones Cobra / Flotation Energy	FS007367	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic, topographic, and Meteorological investigations	2023	Applied	16.95	Overlaps
North Irish Sea Array (NISA) Export cable Statkraft	FS007358	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic and Meteorological investigations	Summer 2024	Determination	17.24	Overlaps
Cooley Point Hibernian Atlantic /ESB	FS006852	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic and Meteorological investigations	Summer 2019 to Summer 2022	Determination	17.33	6.9

Name of Development & Developer	Licence ref	Type of Activity	Commencement Date	Licence Status	Approx. Distance from MULA (km)	Approx. Distance from FLA Area (km)
Sunrise Offshore Wind Farm Sunrise Wind Limited	FS007151	Site investigation works likely consisting of Geophysical, Geotechnical, Environment , Oceanographic and Meteorological investigations	2022 (2023) up to 5 years	Consultation	21.02	Overlaps
The Leinster Project Leinster Offshore Wind	FS007162	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic, topographic, and Meteorological investigations	Q2 2023 up to 2 years	Applied	22.43	14.52
Clogher Head Hibernian Atlantic / Parkwind / ESB	FS006787	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic and Meteorological investigations	Unknown	Determination	22.84	8.86
Réalt na Mara Offshore Wind Farm Limited Ocean Winds	FS007330	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological, Oceanographic, topographic, and Meteorological investigations	Spring 2023	Applied	24.17	9.82
Sea Stacks Offshore Windfarm ESB/Equinor	FS007134	Site investigation works likely consisting of Geophysical, Geotechnical, Archaeological, Ecological,	2022-2023	Consultation	24.46	7.80

Name of Development & Developer	Licence ref	Type of Activity	Commencement Date	Licence Status	Approx. Distance from MULA (km)	Approx. Distance from FLA Area (km)
		Oceanographic, topographic, and Meteorological investigations				
Banba Offshore Wind Farm Banba Wind Limited	FS007283	Site investigation works likely consisting of geophysical, geotechnical, environmental, metocean campaigns.	2022 (2023) up to 5 years	Consultation	25.87	9.99
Codling Wind Farm ESB/Fred Olsen Renewables	FS007546	Site investigation works likely consisting of Geophysical Geotechnical Fish & Shellfish surveys Benthic & Intertidal Surveys Archaeological surveys Metocean and Floating LiDAR Marine Mammal Acoustic POD survey	Q2 2023	Determination	32.02	8.11
Codling Wind Farm ESB/Fred Olsen Renewables	FS007045	Site investigation works likely consisting of Geophysical Geotechnical Fish & Shellfish surveys Benthic & Intertidal Surveys Archaeological surveys Metocean and Floating LiDAR Marine Mammal Acoustic POD survey	Q4 2020 / Q1 2021 for metocean and LIDAR campaign and Q1/2 2021 for other survey works which are expected to commence with geophysical surveys.	Determination	34.95	9.51
Benthic Ecology Survey in export Cable Corridor	FS007546	Benthic Ecology Survey		Applied	35.29	9.57

Name of Development & Developer	Licence ref	Type of Activity	Commencement Date	Licence Status	Approx. Distance from MULA (km)	Approx. Distance from FLA Area (km)
Mac Lir Offshore Wind,						
Laytown Beach Meath County Council	FS006602	Removal of the existing damaged gabion sea defence system and its replacement with a new sea defence system using a rock armour revetment.	unknown	Determination	36.5	
Oriel Wind Farm Parkwind / ESB	FS007383	Foreshore Licence application for geophysical, geotechnical, ecological and metocean site investigation works.	2018/2019	Determination	36.79	23.26
Maintenance Dredging Drogheda Port Company	FS007359	Maintenance dredging of the commercial estuary and seaward approaches to the River Boyne	2021	Determination	41.2	
Export Cable Route Wicklow Offshore Wind	FS007588	Foreshore Licence application for geophysical, geotechnical, ecological and metocean site investigation works.	Unknown	Applied	52.27	38.7
Latitude 52 Offshore Wnd Farm Site Investigations DP Energy	FS007232	Foreshore Licence application for geophysical, geotechnical, ecological and metocean site investigation works.	Unknown	Applied	55.47	49.75
Wicklow Sea Wind Site Investigations Wicklow Sea Wind Ltd	FS007163	Foreshore Licence application for geophysical, geotechnical, ecological and metocean site	Unknown	Consultation	60.40	51.41

Name of Development & Developer	Licence ref	Type of Activity	Commencement Date	Licence Status	Approx. Distance from MULA (km)	Approx. Distance from FLA Area (km)
		investigation works.				
Arklow Bank Wind Park Phase 2	FS007339	Site investigations likely consisting of Geotechnical surveys.	Unknown	Determination	69.36	57.99

The following offshore wind development planning applications, which will be submitted to An Board Pleanála in the near future at the time of writing been identified as being within the Cumulative Effects Spatial Scope and Cumulative Effects Temporal Scope of the Licence Area:

- Oriel Offshore Wind Farm – Marine Development Application - Bord Pleanála Case reference: OA15.319799.
- Arklow Bank 2 Offshore Wind Farm – Marine Development Application - Bord Pleanála Case reference:
- North Irish Sea Array Offshore Wind Farm – Marine Development Application - Bord Pleanála Case reference: VC06F.310329.

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

- Lir Offshore Array Ltd (Offshore Wind Farm (OWF))
- Statkraft North Irish Sea Array (NISA) Site Investigations Array Area (OWF)
- Statkraft North Irish Sea Array (NISA) Cable Route (OWF)
- SSE Renewables Braymore Point (now Setanta) (OWF)
- Cooley Point (OWF)
- Clogher Head (OWF)
- Leinster (OWF)
- Sunrise (OWF)
- Banba (OWF)

Other developments identified within the Cumulative Effects Spatial Scope and Cumulative Effects Temporal Scope of the FLA and MULA are:

- Microsoft Ireland Operations Ltd.

Whilst the exact schedule for activities is unknown, it is assumed there will be some spatial and temporal overlap; however, whilst activities may take place concurrently, it will not be continual throughout the site, limiting the potential for cumulative effect.

Given that there are no other projects and plans within the MULA and the various plans and projects located in the FLA, the limited scope and short-term, transient nature of the proposed survey works and existing background levels of disturbance, no significant in-combination or cumulative effects on European Sites are expected.

3.1.3 Transboundary In-Combination Effects

A review was undertaken to identify other activities and potential plans, projects, and activities in the surrounding area of the MULA in UK Waters which could have an in-combination effect with site investigation activities taking place within the MULA and FLAA. This was carried out on 10th of June 2024, and the review concluded that there were surveys and/or other activities which could potentially interact with the proposed site investigation works.

Table 3-2 Transboundary Plans and Projects

Name of development & developer	Licence ref	Type of activity	Commencement date	Licence Status	Approx. distance from MULA (km)
MaresConnect Limited	CML2331	Geophysical, Geotechnical and environmental surveys	Q1 2025	Determined	0
McMahon Design & Management Limited	RML2412	Marine Survey & Site Investigation Works SOBR2	2024-05-03 - 2024-12-16	Applied	0
McMahon Design & Management Limited	RML2413	Marine Survey & Site Investigation Works SOBR1	2024-05-03 - 2024-12-16	Applied	28
Stena Line Ports Ltd	DML1935	Holyhead Harbour Maintenance Dredging	2023-05-17 - 2028-12-31	Determined	40
Morlais renewable energy	ORML1938	Morlais Tidal Stream Demonstration Project	2021-12-14 - 2060-12-13	Determined	42.7
Mona Offshore Wind Limited	CML2315	Suction Bucked Foundation Trials	2023-07-12 - 2024-07-11	Determined	70.66
Ocean Ecology Limited	RML2319	Grab samples	2023-04-01	Determined	83

There are two marine licences in place that could potentially have in-combination effects with the site investigation works taking place at EEZ section of the MULA, the first marine licence is McMahon Design & Management Limited (RML2412). The second is MCL (CML2331), this is the UK marine licence for the MaresConnect project, it is possible that the same survey vessel will be undertaking the survey in UK waters as in Irish waters. In relation to RML2412, given that the site investigations for MaresConnect is due to take place in Q1 2025, and the marine licence RML2412 expires in December 2024, it is concluded that no significant in-combination or cumulative effects on European Sites are expected.

3.1.4 Potential Pressures

The OSPAR ICG-C potential pressures , and their definitions (OSPAR, 2011) are the following:

- **Visual (and above water noise) disturbance:** The disturbance of biota by anthropogenic activities, e.g. increased vessel movements, such as during construction phases for new infrastructure (bridges, cranes, port buildings etc), increased personnel movements, increased tourism, increased vehicular movements on shore etc disturbing bird roosting areas, seal haul out areas etc.
- **Underwater sound changes:** Increases over and above background noise levels (consisting of environmental noise (ambient) and incidental manmade/anthropogenic noise (apparent)) at a

particular location. Species known to be affected are marine mammals and fish. The theoretical zones of noise influence (Richardson *et al*., 1995) are Underwater noise (e.g. from shipping, underwater acoustic equipment) temporary or permanent hearing loss, discomfort & injury; response; masking and detection. In extreme cases noise pressures may lead to death.

- **In-combination effects:** Effects due to in-combination with other plans or projects.

Table 3-3 Potential Pressures, Zones of Influence and Protected Site Search Area

Receptor		Potential Pressure	Project Activity	Zone of influence (ZOI)
Birds		Visual and above water noise disturbance	Presence of survey vessel Geophysical surveys	**Radial distances from MULA** ▪ 10km Red-throated diver (pers coms Alex Robbins, Nature Scot, 13/07/2021) ▪ 4km divers and sea ducks (JNCC 2017) ▪ 2km all other seabird species (JNCC 2017) It is recognised that some seabirds from other SPAs will forage and loaf in the ZOI. However, disturbance will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate
Bats		Visual and above water noise disturbance	Presence of survey vessels	**<100 m and within MULA** Effects on the bats light emitting from survey vessels.
Cetacean, fish, pinnipeds and otter		Changes to underwater noise (impulsive sound)	Presence of survey vessels Geophysical surveys Geotechnical survey Environmental survey	**EDR of 5km for geophysical surveys** (JNCC, 2020).
Pinniped	Grey seal	Visual (and above water noise) disturbance	Presence of survey vessels	**500m to 900m** Studies conducted on disturbance of harbour seal to different vessel types found that the largest range was 50 m of a visual (and above water noise) disturbance (Paterson *et al.,* 2015; Calambokidis *et al.,* 1991). Between 900m and 1,500m, hauled out grey seals could be expected to detect the presence of vessels and at closer than 900m a flight reaction could be expected (Marine Scotland 2019, Scottish Executive, 2007).
	Harbour (common) seal			
Otter		Visual (and above water noise) disturbance	Presence of survey vessels	**250m** Guidance on visual disturbance of otter from survey activities found that beyond about 250m, visual disturbance from the proposed activity is unlikely to be an issue. It is expected that there are unlikely to be adverse disturbance on otter beyond these distances along the shoreline (Marine Scotland, 2019).

3.1.5 Potential Pressures Screened out of Assessment

- Siltation rate changes, including smothering (depth of vertical sediment overburden) has been screened out. This involves a change in the natural rates of siltation (increased or decreased) and the settling out of silt or sediment suspended in the water column. Geotechnical and

environmental surveys are expected to result in slightly elevated, localised siltation rates; however, it is predicted that marine processes within each of the SACs will ensure any sediment released into the water column will be rapidly dispersed. The impact of siltation rate changes is expected to be very localised and temporary and limited to the boundary of the MULA. There will be no spatial overlap with SACs with receptors/habitats that may be sensitive to this pressure.

- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion. This includes the disturbance of sediments where there is limited or no loss of substrate from the system as well as abrasion relating to the damage of the seabed surface layers (typically up to 50cm depth). Disturbance of sediments and benthic habitats can occur from anchoring, geotechnical and environmental sampling activities. The total seabed area affected by samples collected by the survey will be negligible in comparison to the size of the site; therefore, no LSE is predicted. Anchoring within the SACs during survey works is expected to be short term and temporary. The impacts of penetration and/or abrasion are expected to be very localised and temporary and limited to the boundary of the MULA. There will be no spatial overlap with SACs with receptors/habitats that may be sensitive to this pressure and the pressure will not impact the conservation objectives or status of the features. Anchor abrasion is expected to be negligible.
- Unplanned events (accidental oil or chemical spills).
  - The likelihood of a large oil spill occurring from a project vessel is extremely low and the risk is no greater than that for any other vessel in the region. All project vessels will be legally required to adhere to MARPOL Annex I requirements, and the Sea Pollution Acts, which prohibit the discharge of waste and other pollutants, and require the secure storage of fuels and other materials on board.
- Introduction or spread of non-indigenous species & translocations (competition).
  - Fouling organisms on vessel/rig hulls and in ship ballast tanks, introduction of invasive non-native species (INNS) may enter the marine environment. Should these introduced species survive and form established breeding populations, they can result in negative effects on the native biota. However, survey activity is unlikely to change the risk of the INNS as the vessels typically operate in a geographically localised area, and the risk from hull fouling is low, given the geographical working region and project vessels will be managed under the International Convention for the Control and Management of Ships' Ballast Water and Sediments standard.
- Underwater sound changes – Diving birds.
  - The likelihood of a noise sensitive diving bird being in the vicinity of a noise generating operation is very low due to the surface activity associated with such operations disturbing the birds prior to commencement of noise generation (BEIS, 2019; Fliessbach *et al*., 2019; Garthe & Hüppop, 2004; Leopold & Camphuysen, 2009).
  - Given the very low likelihood of interaction between the sound source and a diving bird due to the relatively short exposure time, the temporary and short-term nature of the survey work, the mobile nature of the surveys and the displacement of most diving species due to flushing disturbance, it can be determined that underwater noise would have no conceivable effect on diving seabirds in the vicinity including those which may forage in the area.
- Collision above and below water with static or moving objects not naturally found in the marine environment.
  - There is a risk that marine mammals which are the QIs of SACs could collide with survey vessels. There is also a risk to basking shark, which are known to spend significant time at the surface and are more vulnerable to collision. However, basking shark are not a QI of any protected site in Ireland. As of October 2022, basking shark were afforded official protection status under

Section 23(3) of the Wildlife Act 1976. This makes it an offence to hunt, injure or wilfully interfere or destroy the breeding or resting places of protected animals.

- Shipping collision is a recognised cause of marine mammal mortality worldwide. The key factor influencing the injury or mortality caused by collisions is the ship size and its travelling speed (Schoeman *et al*., 2020).
- A review of vessel collisions with marine animals undertaken by Schoeman *et al*. (2020) identified that most important influences on severity of any potential impact are vessel size and speed, with small vessels being more likely to cause injury. Reduction of speeds to less than 10 knots was observed to reduce the risk of lethal injury to marine animals by 50% (Vanderlaan and Taggart, 2007 within Schoeman *et al.*, 2020). Several organisations recommend reduction of vessel speeds to less than 10-13 knots to reduce the risk of collision with marine mammals, and other marine species (e.g. Federal Register, 2008; Ports of Auckland, 2015; JNCC, 2021).
- Vessels undertaking the surveys will be either stationary or travelling at a standard survey speed of approximately 5-7km/h, which is equivalent to approximately 2.7-3.8 knots, which is significantly slower than speeds associated with marine mammal collision risk. Additionally, the collision risk is lower than that posed by commercial shipping activity which typically operates at 14 knots. Therefore, risk of injury to marine mammals QIs from collision is very low, and the significance of any effects will be imperceptible.

4. IDENTIFICATION OF RELEVANT EUROPEAN SITES

A geographic information system (GIS) was used to map the boundaries of SACs and SPAs in relation to the MULA. All SACs and SPAs which are within the defined search areas for identified receptors have been listed along with their QIs / SCIs in Tables 4-1 to Table 4-4. A total of 102 sites were screened in this assessment.

For each European Site, potential effects to the QIs / SCIs were identified and it was determined whether there is the potential for an interaction between the proposed site investigation and the receptors i.e. whether there is a pressure-receptor pathway. This is determined by comparing information such as the extent of the zone of influence with information regarding the conservation feature e.g. species foraging distances, spatial extent of habitats etc. The interactions were defined as follows:

- Yes: A pathway between the proposed site investigation and the QI / SCI can be identified that is likely to result in an effect; or
- No: Either a pathway between the proposed site investigation and the QI / SCI cannot be identified or a pathway exists but there is no physical overlap of the impact and the QI / SCI.

For all QIs / SCIs where it is determined that there is a potential pressure receptor pathway, the likely significance of the effect has been assessed in light of the site's conservation objectives, where available, and with reference to relevant research. Information that informed this assessment has been provided in Section 2.5.

For all QIs / SCIs where it is determined that there is no pathway, the QIs / SCIs have not been included in further assessment as no interaction is anticipated. Screening has been undertaken without consideration of measures intended to avoid or reduce likely significant effects on the European Sites concerned (i.e. 'mitigation measures') consistent with CJEU ruling in People over Wind and Sweetman v Coillte.

4.1 Special Areas of Conservation

In March 2024 the DHLGH added new protection to 16 existing SAC's with harbour porpoise and bottlenose dolphin listed as QI's to the coastal SAC's (IWDG, 2024). This application considers the offshore (12nm to EEZ) section of the project which does not overlap with any protected sites. However, there are two SAC's which are located within 100km of the MULA that have been granted new protection for harbour porpoise, namely the Codling Fault Zone SAC and Lambey Island SAC, these have been assessed below.

Marine mammals present in the FLA area have been assessed as part of the FLA (FS007635) Supporting Information for Screening for Appropriate Assessment) which was granted before the inclusion of the cetaceans into the SAC's.

Guidance sets 20% as the threshold for the amount of habitat disturbed by underwater noise (Borsani *et al.*, 2023). Noise associated with operations will not exceed this, as assessed in Section 5.2.2. The assessment of likely significant effects to regional marine mammal populations found that there was no likely significant effect as any disturbance effects from noise associated with operations will be localised, temporary and transient. There will be no long-term effect or risk of injury to marine mammals from vibrocore sampling as part of the proposed site investigations as underwater noise generated by vibrocores during the proposed surveys will not exceed the threshold for injury to marine mammals.

MARESCONNECT INTERCONNECTOR
MARITIME USAGE LICENCE

PROTECTED SITES

Protected Sites Within 100km of Maritime Usage Area

Drawing No: P2578M-PROT-001 | A

250000 400000 6000000 5850000

Legend

- Maritime Usage Area
- 100km Buffer

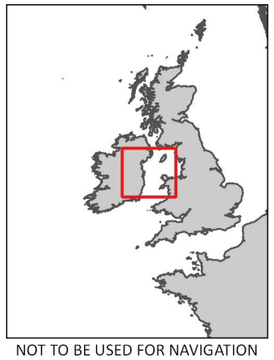
Adminstrative Boundaries

- 12nm Territorial Sea Limit
- EEZ

Environmental Designation

- SAC
- SPA

N



NOT TO BE USED FOR NAVIGATION

Date	2024-06-14 09:58:46
Coordinate System	WGS 84 / UTM zone 30N
WKID	EPSG:32630
Scale @A3	1:1,000,000
Data Sources	MarineRegions; DECC; JNCC; GEBCO; ESRI
File Reference	J:\P2578\Mxd_QGZ\00_OffshoreIreland\02_PROT \P2578M_PROT.qgz
Created By	[redacted]
Reviewed By	
Approved By	

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Table 4-1 SAC and Their Qualifying Interests to be Considered Further in the Screening Process

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
Codling Fault Zone SAC 003015	▪ Submarine structures made by leaking gases ▪	16.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**NO**
	▪ Harbour Porpoise (*Phocoena phocoena*)		Underwater sound changes	**Yes –** harbour porpoise may travel from SAC to the site and may be disturbed by the presence of vessels during the proposed site investigations and sound produced by the proposed site investigations	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Rockabill to Dalkey Island SAC 003000	▪ Reefs	19.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
	▪ Harbour Porpoise (*Phocoena phocoena*)		Underwater sound changes	**Yes –** harbour porpoise may travel from SAC to the site and may be disturbed by the presence of vessels during the proposed site investigations and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Lambay Island SAC 000204	▪ Reefs ▪ Vegetated sea cliffs of the Atlantic and Baltic coasts	22.0	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Grey Seal (*Halichoerus grypus*) ▪ Harbour Seal (*Phoca vitulina*) ▪ Harbour Porpoise (*Phocoena phocoena*)		Visual (and above water noise disturbance)	**Yes** – Hauled out seals within the site may be disturbed by the presence of vessels and by sound produced during the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
			Underwater sound changes	**Yes –** seal and harbour porpoise may travel from SAC to the site and may be disturbed by the presence of vessels during the proposed site investigations and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Rogerstown Estuary SAC 000208	▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Salicornia and other annuals colonising mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Mediterranean salt meadows (*Juncetalia maritimi*) ▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	27.7	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Fixed coastal dunes with herbaceous vegetation (grey dunes)					
Ireland's Eye SAC Site code	▪ Perennial vegetation of stony banks ▪ Vegetated sea cliffs of the Atlantic and Baltic coasts	29.2	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Howth Head SAC 000202	▪ Vegetated sea cliffs of the Atlantic and Baltic coasts ▪ European dry heaths	29.4	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Malahide Estuary SAC 000205	▪ Mudflats and sandflats not covered by seawater at low tide ▪ *Salicornia* and other annuals colonising mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Mediterranean salt meadows (*Juncetalia maritimi*) ▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) ▪ Fixed coastal dunes with herbaceous vegetation (grey dunes)	30.4	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Baldoyle Bay SAC 000199	▪ Mudflats and sandflats not covered by seawater at low tide ▪ *Salicornia* and other annuals colonising mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Mediterranean salt meadows (*Juncetalia maritimi*)	30.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
North Dublin Bay SAC 000206	▪ Mudflats and sandflats not covered by seawater at low tide ▪ Annual vegetation of drift lines ▪ Salicornia and other annuals colonising mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Mediterranean salt meadows (*Juncetalia maritimi*) ▪ Embryonic shifting dunes ▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) ▪ Fixed coastal dunes with herbaceous vegetation (grey dunes) ▪ Humid dune slacks ▪ Petalwort (*Petalophyllum ralfsii*)	32.9	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Boyne Coast and Estuary SAC 001957	▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Annual vegetation of drift lines ▪ *Salicornia* and other annuals colonising mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Embryonic shifting dunes ▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) ▪ Fixed coastal dunes with herbaceous vegetation (grey dunes)	37.7	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
South Dublin Bay SAC	▪ Mudflats and sandflats not covered by seawater at low tide	39.2	None	**No** – No pressures with potential to impact receptor present and no	**No** potential for in-combination effect as there is no pathway for	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
000210	▪ Annual vegetation of drift lines ▪ Salicornia and other annuals colonising mud and sand ▪ Embryonic shifting dunes			pressure receptor pathway identified.	effect with the proposed site investigations.	
Clogher Head SAC 001459	▪ Vegetated sea cliffs of the Atlantic and Baltic coasts ▪ European dry heaths	39.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
River Boyne And River Blackwater SAC 002299	▪ Alkaline fens ▪ Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) ▪ River Lamprey (*Lampetra fluviatilis*) ▪ Salmon (*Salmo salar*) ▪ Otter (*Lutra lutra*)	42.5	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Bray Head SAC 000714	▪ Vegetated sea cliffs of the Atlantic and Baltic coasts ▪ European dry heaths	45.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Ballyman Glen SAC 000713	▪ Petrifying springs with tufa formation (*Cratoneurion*) ▪ Alkaline fens	47.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Carlingford Shore SAC 002306	▪ Annual vegetation of drift lines ▪ Perennial vegetation of stony banks	48.3	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Dundalk Bay SAC 000455	▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide	48.9	None	**No** – No pressures with potential to impact receptor present and no	**No** potential for in-combination effect as there is no pathway for	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Perennial vegetation of stony banks ▪ *Salicornia* and other annuals colonising mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Mediterranean salt meadows (*Juncetalia maritimi*)			pressure receptor pathway identified.	effect with the proposed site investigations.	
Knocksink Wood SAC 000725	▪ Petrifying springs with tufa formation (*Cratoneurion*) ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles ▪ Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)	49.4	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Wicklow Mountains SAC 002122	▪ Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) ▪ Natural dystrophic lakes and ponds ▪ Northern Atlantic wet heaths with *Erica tetralix* ▪ European dry heaths ▪ Alpine and Boreal heaths ▪ Calaminarian grasslands of the *Violetalia calaminariae* ▪ Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) ▪ Blanket bogs (* if active bog) ▪ Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	51.7	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Calcareous rocky slopes with chasmophytic vegetation ▪ Siliceous rocky slopes with chasmophytic vegetation ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles ▪ Otter (*Lutra lutra*)					
The Murrough Wetlands SAC 002249	▪ Annual vegetation of drift lines ▪ Perennial vegetation of stony banks ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Mediterranean salt meadows (*Juncetalia maritimi*) ▪ Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* ▪ Alkaline fens	51.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Glen of the Downs SAC 000719	▪ Old sessile oak woods with Ilex and Blechnum in the British Isles	52.0	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Carlingford Mountain SAC 000453	▪ Northern Atlantic wet heaths with *Erica tetralix* ▪ European dry heaths ▪ Alpine and Boreal heaths ▪ Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) ▪ Blanket bogs (* if active bog) ▪ Transition mires and quaking bogs ▪ Alkaline fens	53.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) ▪ Calcareous rocky slopes with chasmophytic vegetation ▪ Siliceous rocky slopes with chasmophytic vegetation					
Glenasmole Valley SAC 001209	▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) ▪ Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) ▪ Petrifying springs with tufa formation (*Cratoneurion*)	55.2	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Carriggower Bog SAC 000716	▪ Transition mires and quaking bogs	56.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Rye Water Valley/Carton SAC 001398	▪ Petrifying springs with tufa formation (*Cratoneurion*) ▪ Narrow-mouthed Whorl Snail (*Vertigo angustior*) ▪ Desmoulin's Whorl Snail (*Vertigo moulinsiana*)	57.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Wicklow Reef SAC 002274	▪ Reefs	61.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
Red Bog, Kildare SAC 000397	▪ Transition mires and quaking bogs	68.0	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Magherabeg Dunes SAC 001766	▪ Annual vegetation of drift lines ▪ Embryonic shifting dunes ▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) ▪ Fixed coastal dunes with herbaceous vegetation (grey dunes) ▪ Petrifying springs with tufa formation (*Cratoneurion*)	69.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Deputy's Pass Nature Reserve SAC 000717	▪ Old sessile oak woods with Ilex and Blechnum in the British Isles	71.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Vale of Clara (Rathdrum Wood) SAC 000733	▪ Old sessile oak woods with Ilex and Blechnum in the British Isles	71.5	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Buckroney-Brittas Dunes And Fen SAC 000729	▪ Annual vegetation of drift lines ▪ Perennial vegetation of stony banks ▪ *Juncetalia maritimi* (Mediterranean salt meadows) ▪ Embryonic shifting dunes ▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) ▪ Fixed coastal dunes with herbaceous vegetation (grey dunes)	73.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) ▪ Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) ▪ Humid dune slacks ▪ Alkaline fens					
Ballynafagh Bog SAC 000391	▪ Active raised bogs ▪ Degraded raised bogs still capable of natural regeneration ▪ Depressions on peat substrates of the Rhynchosporion	77.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Ballynafagh Lake SAC 001387	▪ Alkaline fens ▪ Desmoulin's Whorl Snail (*Vertigo moulinsiana*) ▪ Marsh Fritillary (*Euphydryas aurinia*)	78.2	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Slaney River Valley SAC 000781	▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Mediterranean salt meadows (*Juncetalia maritimi*) ▪ Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles ▪ Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	80.9	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Freshwater Pearl Mussel (*Margaritifera margaritifera*) ▪ Sea Lamprey (*Petromyzon marinus*) ▪ Brook Lamprey (*Lampetra planeri*) ▪ River Lamprey (*Lampetra fluviatilis*) ▪ Salmon (*Salmo salar*) ▪ Otter (*Lutra lutra*)					
	▪ Twaite Shad (*Alosa fallax fallax*) ▪ Harbour Seal (*Phoca vitulina*)		Underwater sound changes	**Yes –** Twaite shad may travel from SAC to site and underwater noise from geophysical survey could disturb twaite shad during migration. Seals foraging within the site may be disturbed by the presence of vessels during the proposed site investigations and sound produced by the proposed site investigations. Atlantic salmon, sea lamprey, brook lamprey and river lamprey are not considered sensitive to underwater sound changes**.**	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
	▪ Harbour Seal (*Phoca vitulina*)		Visual (and above water noise disturbance)	**Yes** – seals may travel from SAC to the site and may be disturbed by the presence of vessels during the proposed site investigations and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Mouds Bog SAC 002331	▪ Active raised bogs ▪ Degraded raised bogs still capable of natural regeneration ▪ Depressions on peat substrates of the Rhynchosporion	82.3	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
Girley (Drewstown) Bog SAC 002203	▪ Degraded raised bogs still capable of natural regeneration	83.0	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Killyconny Bog (Cloghbally) SAC 000006	▪ Active raised bogs ▪ Degraded raised bogs still capable of natural regeneration	86.0	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Pollardstown Fen SAC 000396	▪ Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* ▪ Petrifying springs with tufa formation (*Cratoneurion)* ▪ Alkaline fens ▪ Geyer's Whorl Snail (*Vertigo geyeri*) ▪ Narrow-mouthed Whorl Snail (*Vertigo angustior*) ▪ Desmoulin's Whorl Snail (*Vertigo moulinsiana*)	86.5	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Mount Hevey Bog SAC 002342	▪ Active raised bogs ▪ Degraded raised bogs still capable of natural regeneration ▪ Depressions on peat substrates of the Rhynchosporion	90.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
The Long Derries, Edenderry SAC 000925	▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	91.2	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Kilpatrick Sandhills SAC	▪ Annual vegetation of drift lines ▪ Embryonic shifting dunes	93.0	None	**No** – No pressures with potential to impact receptor present and no	**No** potential for in-combination effect as there is no pathway for	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
001742	▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) ▪ Fixed coastal dunes with herbaceous vegetation (grey dunes) ▪ Atlantic decalcified fixed dunes *(Calluno-Ulicetea*)			pressure receptor pathway identified.	effect with the proposed site investigations.	
River Barrow And River Nore SAC 002162	▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Reefs ▪ Salicornia and other annuals colonising mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Mediterranean salt meadows (*Juncetalia maritimi*) ▪ Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] ▪ European dry heaths [4030] ▪ Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels ▪ Petrifying springs with tufa formation (Cratoneurion) ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles ▪ Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*)	95.9	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Desmoulin's Whorl Snail (*Vertigo moulinsiana*) ▪ Freshwater Pearl Mussel (*Margaritifera margaritifera*) ▪ White-clawed Crayfish (*Austropotamobius pallipes*) ▪ Sea Lamprey (*Petromyzon marinus*) ▪ Brook Lamprey (*Lampetra planeri*) ▪ River Lamprey (*Lampetra fluviatilis*) ▪ Salmon (*Salmo salar*) ▪ Otter (*Lutra lutra*) ▪ Killarney Fern (*Trichomanes speciosum*) ▪ Nore Pearl Mussel (*Margaritifera durrovensis*)					
	▪ Twaite Shad (*Alosa fallax fallax*)		Underwater sound changes	**Yes –** Twaite shad may travel from SAC to site and underwater noise from geophysical survey could disturb twaite shad during migration. Atlantic salmon, sea lamprey, brook lamprey and river lamprey are not considered sensitive to underwater sound changes**.**	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Holdenstown Bog SAC 001757	▪ Transition mires and quaking bogs	96.5	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Lough Bane And Lough Glass SAC 002120	▪ Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. ▪ White-clawed Crayfish (*Austropotamobius pallipes*)	97.4	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Table 4-2 SPAs and Their Qualifying Interests to be Considered Further in the Screening Process

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
North-West Irish Sea SPA 004236	▪ Red-throated Diver (*Gavia stellata*) ▪ Great Northern Diver (*Gavia immer*) ▪ Fulmar (*Fulmarus glacialis*) ▪ Manx Shearwater (*Puffinus puffinus*) ▪ Cormorant (*Phalacrocorax carbo*) ▪ Shag (*Phalacrocorax aristotelis*) ▪ Common Scoter (*Melanitta nigra*) ▪ Little Gull (*Larus minutus*) ▪ 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*) ▪ Kittiwake (*Rissa tridactyla*) ▪ Roseate Tern (*Sterna dougallii*) ▪ Common Tern (*Sterna hirundo*) ▪ Arctic Tern (*Sterna paradisaea*) ▪ Little Tern (*Sterna albifrons*) ▪ Guillemot (*Uria aalge*) ▪ Razorbill (*Alca torda*) ▪ Puffin (*Fratercula arctica*)	Within	Visual (and above water noise) disturbance	**Yes –** It is possible that survey activities could disturb breeding and nesting birds if present in the proposed site.	**Yes –** Proposed site investigations could potentially overlap with surveys for the other offshore developments in the area.	**Yes**
Rockabill SPA 004014	▪ Purple Sandpiper (*Calidris maritima*) ▪ Roseate Tern (*Sterna dougallii*) ▪ Common Tern (*Sterna hirundo*) ▪ Arctic Tern (*Sterna paradisaea*)	17.9	Visual (and above water noise) disturbance	**Yes –** It is possible that the Roseate Tern (max foraging distance 30km), Arctic Tern (max foraging distance 25km) and Common Tern (max foraging	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
				distance 18km) could be disturbed by survey activities.		
Lambay Island SPA 004069	▪ Fulmar (*Fulmarus glacialis*) ▪ Cormorant (*Phalacrocorax carbo*) ▪ Shag (*Phalacrocorax aristotelis*) ▪ Greylag Goose (*Anser anser*) ▪ Lesser Black-backed Gull (*Larus fuscus*) ▪ Herring Gull (*Larus argentatus*) ▪ Kittiwake (*Rissa tridactyla*) ▪ Guillemot (*Uria aalge*) ▪ Razorbill (*Alca torda*) ▪ Puffin (*Fratercula arctica*)	21.7	Visual (and above water noise) disturbance	**Yes –** It is possible that the fulmar (max foraging distance 100km), cormorant (max foraging distance of 25km), lesser black-backed gull (max foraging distance of 127km), herring gull (max foraging distance of 59km), kittiwake (max foraging distance of 156km), razorbill (max foraging distance of 88km), puffin (max foraging distance of 137km) and guillemot (max foraging range of 73km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Skerries Islands SPA 004122	▪ Cormorant (*Phalacrocorax carbo*) ▪ Shag (*Phalacrocorax aristotelis*) ▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Purple Sandpiper (*Calidris maritima*) ▪ Turnstone (*Arenaria interpres*) ▪ Herring Gull (*Larus argentatus*)	26.0	Visual (and above water noise) disturbance	**Yes –** It is possible that the cormorant (max foraging distance of 25km), herring gull (max foraging distance of 59km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Rogerstown Estuary SPA 004015	▪ Greylag Goose (*Anser anser*) ▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Shelduck (*Tadorna tadorna*) ▪ Shoveler (*Anas clypeata*) ▪ Oystercatcher (*Haematopus ostralegus*)	27.5	Visual (and above water noise) disturbance	**No** – Birds identified as being sensitive to the proposed site investigations are nesting birds and individuals within 2km of the MULA. It is bird species from this site that could be foraging in the zone of influence. However,	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Ringed Plover (*Charadrius hiaticula*) ▪ Grey Plover (*Pluvialis squatarola*) ▪ Knot (*Calidris canutus*) ▪ Dunlin (*Calidris alpina*) ▪ Black-tailed Godwit (*Limosa limosa*) ▪ Redshank (*Tringa totanus*) ▪ Wetland and Waterbirds			disturbance will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate. Therefore, the proposed site investigations are not capable of undermining the site's conservation objectives. This SPA and qualifying interests are intertidal and foraging ranges are unlikely to overlap with the MULA.		
Ireland's Eye SPA 004117	▪ Cormorant (*Phalacrocorax carbo*) ▪ Herring Gull (*Larus argentatus*) ▪ Kittiwake (*Rissa tridactyla*) ▪ Guillemot (*Uria aalge*) ▪ Razorbill (*Alca torda*)	28.7	Visual (and above water noise) disturbance	**Yes –** It is possible that the cormorant (max foraging distance of 25km), herring gull (max foraging distance of 59km), kittiwake (max foraging distance of 156km), razorbill (max foraging distance of 88km) and guillemot (max foraging range of 73km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Howth Head Coast SPA 004113	▪ Kittiwake (*Rissa tridactyla*)	29.2	Visual (and above water noise) disturbance	**Yes –** It is possible that the kittiwake (max foraging distance of 156km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Malahide Estuary SPA 004025	▪ Great Crested Grebe (*Podiceps cristatus*) ▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Shelduck (*Tadorna tadorna*) ▪ Pintail (*Anas acuta*)	31.2	Visual (and above water noise) disturbance	**No** – Birds identified as being sensitive to the proposed site investigations are nesting birds and individuals within 2km of the MULA. It is bird species from this site that could be foraging in the	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Goldeneye (*Bucephala clangula*) ▪ Red-breasted Merganser (*Mergus serrator*) ▪ Oystercatcher (*Haematopus ostralegus*) ▪ Golden Plover (*Pluvialis apricaria*) ▪ Grey Plover (*Pluvialis squatarola*) ▪ Knot (*Calidris canutus*) ▪ Dunlin (*Calidris alpina*) ▪ Black-tailed Godwit (*Limosa limosa*) ▪ Bar-tailed Godwit (*Limosa lapponica*) ▪ Redshank (*Tringa totanus*) ▪ Wetland and Waterbirds			zone of influence. However, disturbance will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate. Therefore, the proposed site investigations are not capable of undermining the site's conservation objectives. This SPA and qualifying interests are intertidal and foraging ranges are unlikely to overlap with the MULA.		
Baldoyle Bay SPA 004016	▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Shelduck (*Tadorna tadorna*) ▪ Ringed Plover (*Charadrius hiaticula*) ▪ Golden Plover (*Pluvialis apricaria*) ▪ Grey Plover (*Pluvialis squatarola*) ▪ Bar-tailed Godwit (*Limosa lapponica*) ▪ Wetland and Waterbirds	32.3	Visual (and above water noise) disturbance	**No** – Birds identified as being sensitive to the proposed site investigations are nesting birds and individuals within 2km of the MULA. It is bird species from this site that could be foraging in the zone of influence. However, disturbance will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate. Therefore, the proposed site investigations are not capable of undermining the site's conservation objectives. This SPA and qualifying interests are intertidal and foraging ranges are unlikely to overlap with the MULA.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
North Bull Island SPA 004006	▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Shelduck (*Tadorna tadorna*) ▪ Teal (*Anas crecca*) ▪ Pintail (*Anas acuta*) ▪ Shoveler (*Anas clypeata*) ▪ Oystercatcher (*Haematopus ostralegus*) ▪ Golden Plover (*Pluvialis apricaria*) ▪ Grey Plover (*Pluvialis squatarola*) ▪ Knot (*Calidris canutus*) ▪ Sanderling (*Calidris alba*) ▪ Dunlin (*Calidris alpina*) ▪ Black-tailed Godwit (*Limosa limosa*) ▪ Bar-tailed Godwit (*Limosa lapponica*) ▪ Curlew (*Numenius arquata*) ▪ Redshank (*Tringa totanus*) ▪ Turnstone (*Arenaria interpres*) ▪ Black-headed Gull (*Chroicocephalus ridibundus*) ▪ Wetland and Waterbirds	32.8	Visual (and above water noise) disturbance	**No** – Birds identified as being sensitive to the proposed site investigations are nesting birds and individuals within 2km of the MULA. It is bird species from this site that could be foraging in the zone of influence. However, disturbance will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate. Therefore, the proposed site investigations are not capable of undermining the site's conservation objectives. This SPA and qualifying interests are intertidal and foraging ranges are unlikely to overlap with the MULA.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
River Nanny Estuary and Shore SPA 004158	▪ Oystercatcher (*Haematopus ostralegus*) ▪ Ringed Plover (*Charadrius hiaticula*) ▪ Golden Plover (*Pluvialis apricaria*) ▪ Knot (*Calidris canutus*) ▪ Sanderling (*Calidris alba*) ▪ Herring Gull (*Larus argentatus*) ▪ Wetland and Waterbirds	35.7	Visual (and above water noise) disturbance	**Yes –** It is possible that the herring gull (max foraging distance of 59km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
South Dublin Bay and River Tolka Estuary SPA 004024	▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Oystercatcher (*Haematopus ostralegus*) ▪ Ringed Plover (*Charadrius hiaticula*) ▪ Grey Plover (*Pluvialis squatarola*) ▪ Knot (*Calidris canutus*) ▪ Sanderling (*Calidris alba*) ▪ Dunlin (*Calidris alpina*) ▪ Bar-tailed Godwit (*Limosa lapponica*) ▪ Redshank (*Tringa totanus*) ▪ Black-headed Gull (*Chroicocephalus ridibundus*) ▪ Roseate Tern (*Sterna dougallii*) ▪ Common Tern (*Sterna hirundo*) ▪ Arctic Tern (*Sterna paradisaea*) ▪ Wetland and Waterbirds	37.9	Visual (and above water noise) disturbance	**No** – Birds identified as being sensitive to the proposed site investigations are nesting birds and individuals within 2km of the MULA. It is bird species from this site that could be foraging in the zone of influence. However, disturbance will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate. Therefore, the proposed site investigations are not capable of undermining the site's conservation objectives. This SPA and qualifying interests are intertidal and foraging ranges are unlikely to overlap with the MULA.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Boyne Estuary SPA 004080	▪ Shelduck (*Tadorna tadorna*) ▪ Oystercatcher (*Haematopus ostralegus*) ▪ Golden Plover (*Pluvialis apricaria*) ▪ Grey Plover (*Pluvialis squatarola*) ▪ Lapwing (*Vanellus vanellus*) ▪ Knot (*Calidris canutus*) ▪ Sanderling (*Calidris alba*) ▪ Black-tailed Godwit (*Limosa limosa*) ▪ Redshank (*Tringa totanus*) ▪ Turnstone (*Arenaria interpres*) ▪ Little Tern (*Sterna albifrons*)	37.9	Visual (and above water noise) disturbance	**No** – Birds identified as being sensitive to the proposed site investigations are nesting birds and individuals within 2km of the MULA. It is bird species from this site that could be foraging in the zone of influence. However, disturbance will be limited in extent and duration and there is sufficient space in the surrounding environment for birds to temporarily relocate. Therefore, the proposed site investigations are not capable of undermining the site's	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Wetland and Waterbirds			conservation objectives. This SPA and qualifying interests are intertidal and foraging ranges are unlikely to overlap with the MULA.		
Dalkey Islands SPA 004172	▪ Roseate Tern (*Sterna dougallii*) ▪ Common Tern (*Sterna hirundo*) ▪ Arctic Tern (*Sterna paradisaea*)	39.0	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Dundalk Bay SPA 004026	▪ Great Crested Grebe (*Podiceps cristatus*) ▪ Greylag Goose (*Anser anser*) ▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Shelduck (*Tadorna tadorna*) ▪ Teal (*Anas crecca*) ▪ Mallard (*Anas platyrhynchos*) ▪ Pintail (*Anas acuta*) ▪ Common Scoter (*Melanitta nigra*) ▪ Red-breasted Merganser (*Mergus serrator*) ▪ Oystercatcher (*Haematopus ostralegus*) ▪ Ringed Plover (*Charadrius hiaticula*) ▪ Golden Plover (*Pluvialis apricaria*) ▪ Grey Plover (*Pluvialis squatarola*) ▪ Lapwing (*Vanellus vanellus*) ▪ Knot (*Calidris canutus*) ▪ Dunlin (*Calidris alpina*) ▪ Black-tailed Godwit (*Limosa limosa*) ▪ Bar-tailed Godwit (*Limosa lapponica*)	44.4	Visual (and above water noise) disturbance	**Yes –** It is possible that the herring gull (max foraging distance of 100km) and common gull (max foraging distance of 50km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Curlew (*Numenius arquata*) ▪ Redshank (*Tringa totanus*) ▪ Black-headed Gull (*Chroicocephalus ridibundus*) ▪ Common Gull (*Larus canus*) ▪ Herring Gull (*Larus argentatus*) ▪ Wetland and Waterbirds					
The Murrough SPA 004186	▪ Red-throated Diver (*Gavia stellata*) ▪ Greylag Goose (*Anser anser*) ▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Wigeon (*Anas penelope*) ▪ Teal (*Anas crecca*) ▪ Black-headed Gull (*Chroicocephalus ridibundus*) ▪ Herring Gull (*Larus argentatus*) ▪ Little Tern (*Sterna albifrons*) ▪ Wetland and Waterbirds	47.4	Visual (and above water noise) disturbance	**Yes –** It is possible that the herring gull (max foraging distance of 100km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
River Boyne and River Blackwater SPA 004232	▪ Kingfisher (*Alcedo atthis*)	48.3	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Carlingford Lough SPA 004078	▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Wetland and Waterbirds	48.5	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
Wicklow Mountains SPA 004040	▪ Merlin (*Falco columbarius*) ▪ Peregrine (*Falco peregrinus*)	51.7	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Stabannan-Braganstown SPA 004091	▪ Greylag Goose (*Anser anser*)	56.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Wicklow Head SPA 004127	▪ Kittiwake (*Rissa tridactyla*)	64.8	Visual (and above water noise) disturbance	**Yes –** It is possible that the kittiwake (max foraging distance of 156km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Poulaphouca Reservoir SPA 004063	▪ Greylag Goose (*Anser anser*) ▪ Lesser Black-backed Gull (*Larus fuscus*)	66.4	Visual (and above water noise) disturbance	**Yes –** It is possible that the lesser black-backed gull (max foraging distance of 127km) could be disturbed by survey activities.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**

Table 4-3 Screening Transboundary SACs

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
North Anglesey Marine / Gogledd Môn Forol SAC UK0030398	▪ Harbour porpoise (*Phocoena phocoena*)	0	Underwater noise changes	**Yes** – Harbour porpoise may travel from SAC to site to forage and may be disturbed by the presence of vessels and sound produced by the proposed site investigations.	**Yes –** Proposed site investigation could potentially overlap with geophysical surveys for the other offshore developments in the area.	**Yes**
Croker Carbonate Slabs SAC UK0030381	▪ Submarine structures made by leaking gases	3.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Glannau Ynys Gybi/ Holy Island Coast SAC UK0013046	▪ Vegetated sea cliffs of the Atlantic and Baltic Coasts ▪ European dry heaths ▪ Northern Atlantic wet heaths with *Erica tetralix*	46.5	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Pisces Reef Complex SAC **UK0030379**	▪ Reefs	48.5	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Bae Cemlyn/ Cemlyn Bay SAC UK0030114	▪ Coastal lagoons ▪ Perennial vegetation of stony banks	52.9	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Murlough SAC UK0016612	▪ Fixed coastal dunes with herbaceous vegetation (grey dunes) ▪ Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)	55.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Sandbanks which are slightly covered by sea water all the time ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Embryonic shifting dunes ▪ "Shifting dunes along the shoreline with Ammophila arenaria (""white dunes"")" ▪ Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) ▪ Marsh fritillary butterfly *Euphydryas* (*Eurodryas, Hypodryas) aurinia*					
	▪ Harbour seal (*Phoca vitulina*)		Visual and above water noise disturbance	**Yes** – Harbour seal may travel from SAC to site to forage and may be disturbed by the presence of vessels and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
			Underwater noise changes	**Yes** – Harbour seal may travel from SAC to site to forage and may be disturbed by the presence of vessels and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
North Channel SAC UK0030399	▪ Harbour porpoise (*Phocoena phocoena*)	57.3	Underwater noise changes	**Yes** – Harbour porpoise may travel from SAC to site to forage and may be disturbed by the presence of vessels and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Eastern Mournes SAC UK0016615	▪ Northern Atlantic wet heaths with Erica tetralix ▪ European dry heaths ▪ Alpine and Boreal heaths ▪ Siliceous alpine and boreal grasslands ▪ Blanket bogs (* if active bog) * Priority feature ▪ Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) ▪ Siliceous rocky slopes with chasmophytic vegetation	57.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Llyn Dinam SAC UK0030186	▪ Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	58.2	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Rostrevor Wood SAC UK0030268	▪ Old sessile oak woods with Ilex and Blechnum in the British Isles	60.4	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Y Twyni o Abermenai i Aberffraw/ Abermenai to	▪ Embryonic shifting dunes	67.0	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
Aberffraw Dunes SAC UK0020021	▪ Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) ▪ Fixed coastal dunes with herbaceous vegetation (grey dunes) ▪ Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) ▪ Humid dune slacks ▪ Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation ▪ Petalwort (*Petalophyllum ralfsii*) ▪ Shore dock (*Rumex rupestris*)					
Corsydd Mn/ Anglesey Fens SAC UK0012884	▪ Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. ▪ Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* ▪ Alkaline fens ▪ Northern Atlantic wet heaths with *Erica tetralix* ▪ Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	67.2	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Geyer's whorl snail (*Vertigo geyeri*) ▪ Southern damselfly (*Coenagrion mercurial*) ▪ Marsh fritillary butterfly *Euphydryas* (*Eurodryas, Hypodryas*) *aurinia*					
Derryleckagh SAC UK0016620	▪ Transition mires and quaking bogs ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles	70.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Glannau Mn: Cors heli / Anglesey Coast: Saltmarsh SAC UK0020025	▪ Salicornia and other annuals colonizing mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Estuaries ▪ Mudflats and sandflats not covered by seawater at low tide	70.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Lecale Fens SAC UK0030180	▪ Alkaline fens	71.3	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Slieve Gullion SAC UK0030277	▪ European dry heaths	71.7	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
Ballykilbeg SAC UK0030319	▪ Marsh fritillary butterfly *Euphydryas* (*Eurodryas, Hypodryas*) *aurinia*	73.2	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
West Wales Marine / Gorllewin Cymru Forol SAC UK0030397	▪ Harbour porpoise (*Phocoena phocoena*)	74.4	Underwater noise changes	**Yes** – Harbour porpoise may travel from SAC to site to forage and may be disturbed by the presence of vessels and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Strangford Lough SAC UK0016618	▪ Mudflats and sandflats not covered by seawater at low tide ▪ Coastal lagoons ▪ Large shallow inlets and bays ▪ Reefs ▪ Annual vegetation of drift lines ▪ Perennial vegetation of stony banks ▪ Salicornia and other annuals colonizing mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	75.2	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
	▪ Harbour seal (*Phoca vitulina*)		Visual (and above water noise) disturbance	**Yes –** Hauled out seals within the site may be disturbed by the presence of vessels and by sound produced during the proposed site investigations	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
			Underwater sound changes	**Yes –** Harbour seal may travel from SAC to site to forage and may be disturbed by the presence of vessels and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
Hollymount SAC UK0030169	▪ Alluvial forests *with Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles	76.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC UK0013117	▪ Sandbanks which are slightly covered by sea water all the time ▪ Estuaries ▪ Coastal lagoons ▪ Large shallow inlets and bays ▪ Reefs ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Salicornia and other annuals colonizing mud and sand ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) ▪ Submerged or partially submerged sea caves ▪ Otter (*Lutra lutra*)	76.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Grey seal (*Halichoerus grypus*)		Visual (and above water noise) disturbance	**Yes –** Hauled out seals within the site may be disturbed by the presence of vessels and by sound produced during the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**Yes**
	▪ Bottlenose dolphin (*Tursiops truncates*) ▪ Grey seal (*Halichoerus grypus*)		Underwater sound changes	**Yes –** seal and cetaceans may move from SAC to the site and may be disturbed by the presence of vessels during the proposed site investigations and sound produced by the proposed site investigations.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**yes**
Turmennan SAC UK0030291	▪ Transition mires and quaking bogs	82.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Aughnadarragh Lough SAC UK0030318	▪ Marsh fritillary butterfly *Euphydryas* (*Eurodryas, Hypodryas*) *aurinia*	91.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Glan-traeth SAC UK0030042	▪ Great crested newt (*Triturus cristatus*)	72.9	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC UK0030202	▪ Sandbanks which are slightly covered by sea water all the time ▪ Mudflats and sandflats not covered by seawater at low tide ▪ Reefs ▪ Large shallow inlets and bays	73.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name & Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
	▪ Submerged or partially submerged sea caves					
Afon Gwyrfai a Llyn Cwellyn SAC UK0030046	▪ Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* ▪ Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation ▪ Atlantic salmon (*Salmo salar*) ▪ Floating water-plantain (*Luronium natans*) ▪ Otter (*Lutra lutra*)	80.6	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Clogwyni Pen Llyn/ Seacliffs of Lleyn SAC UK0030271	▪ Vegetated sea cliffs of the Atlantic and Baltic Coasts	83.4	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Corsydd Llyn/ Lleyn Fens SAC UK0030187	▪ Alkaline fens ▪ Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* ▪ Desmoulin's whorl snail (*Vertigo moulinsiana*) ▪ Geyer's whorl snail (*Vertigo geyeri*)	83.5	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Table 4-4 Screening Transboundary SPAs

Site Name &Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
Irish Sea Front SPA UK9020328	▪ Manx shearwater (*Puffinus puffinus*)	9.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Anglesey Terns / Morwenoliaid Ynys Môn SPA UK9013061	▪ Arctic tern (*Sterna paradisae*) ▪ Common tern (*Sterna hirundo*) ▪ Roseate tern (*Sterna dougallii*) ▪ Sandwich tern (*Sterna sandvicensis*)	33.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA UK9013121	▪ Manx Shearwater (*Puffinus puffinus*) ▪ Chough (*Pyrrhocorax pyrrhocorax*)	46.3	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Liverpool Bay / Bae Lerpwl SPA UK9020294A	▪ Red-throated diver (*Gavia stellata*) ▪ Common scoter (*Melanitta nigra*) ▪ Little gull (*Hydrocoloeus minutus*) ▪ Common tern (*Sterna hirundo*) ▪ Little tern (*Sterna albifrons*)	67.1	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Killough Bay SPA UK9020221	▪ Light-bellied Brent Goose (*Branta bernicla hrota)*	68.4	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**
Strangford Lough SPA UK9020111	▪ Sandwich Tern (*Sterna sandvicensis*) ▪ Common Tern (*Sterna hirundo*) ▪ Arctic Tern (*Sterna paradisaea*) ▪ Waterbird assemblage	71.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

Site Name &Code	Qualifying Interests	Distance to MULA (km)	Potential Pressures	Likelihood of interaction between site investigation works and designating feature(s)	Potential for In-combination effects	Considered for Screening (Yes or No)
Outer Ards SPA UK9020271	▪ Golden plover (*Pluvialis apricaria)* ▪ Arctic Tern (*Sterna paradisaea*) ▪ Light-bellied Brent Goose (*Branta bernicla hrota*) ▪ Ringed plover (*Charadrius hiaticula*) ▪ Turnstone (*Arenaria interpres*)	79.8	None	**No** – No pressures with potential to impact receptor present and no pressure receptor pathway identified.	**No** potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	**No**

5. ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

An initial screening identified 102 European protected sites within the defined search areas, as listed in Tables 4-1 to 4-4. Tables 4-1 to 4-4 identified that there are 26 pressure-receptor pathways existing for 21 of the sites; for the remaining 81 sites, there is no spatial or temporal overlap between the proposed site investigations and QIs/SCIs of the site and therefore there can be no conceivable or likely significant effect.

Tables 4-1 to 4-4 identified that there are three pressures from the proposed site investigations that could affect the QIs / SCIs of European Sites. These are:

- Visual (and above water noise) disturbance
- Underwater sound changes
- In-combination effects

This section describes the possible pressures and potential effects of the proposed site investigations on the Qis and SCIs and assesses the potential for a likely significant effect (LSE).

One source of disturbance has been identified:

- Disturbance from presence of vessels during the proposed site investigations and sound produced by the proposed site investigations and survey vessel movements.

5.1 Visual (and above water noise) Disturbance

Visual disturbance is only relevant to species that respond to visual cues, for hunting, behavioural responses or predator avoidance, and that have the visual range to perceive cues at distance. It is particularly relevant to fish, birds, reptiles and mammals that depend on sight but less relevant to benthic invertebrates (ICG-C, 2011).

MARSea identification of pressure benchmarks lists the following:

- Daily duration of transient visual cues exceeds 10% of the period of site occupancy by the feature.

One source of disturbance has been identified:

- Disturbance from survey vessel movements.

Tables 4-1 to 4-4 identified a pressure-receptor pathway between the proposed site investigations and the QIs / SCIs of 16 of the European Sites for visual (and above water noise) disturbance.

Table 5-1 SACs Screened in for the Potential Pressure Visual (and above noise) Disturbance

Designated Site	Qualifying Interests	Distance to MULA (km)	Conservation Objectives
Lambay Island SAC	Grey Seal (*Halichoerus grypus*) Harbour Seal (*Phoca vitulina*)	22.0	To maintain the favourable conservation condition of Grey Seal To maintain the favourable conservation condition of Harbour Seal

Designated Site	Qualifying Interests	Distance to MULA (km)	Conservation Objectives
Slaney River Valley SAC	Harbour Seal (*Phoca vitulina*)	80.9	To maintain the favourable conservation condition of Harbour Seal
Murlough SAC	Harbour Seal (*Phoca vitulina*)	55.8	To maintain (or restore where appropriate) Harbour (Common) Seal *Phoca vitulina* to favourable condition.
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	Grey Seal (*Halichoerus grypus*)	76.6	To maintain (or restore) Grey Seal to favourable conservation status
Strangford Lough SAC	Harbour Seal (*Phoca vitulina*)	75.2	To maintain (or restore where appropriate) Harbour (Common) Seal *Phoca vitulina* to favourable condition.

Table 5-2 SPAs Screened in for the Potential Pressure Visual (and above water noise) Disturbance

Designated Site	Qualifying Interests	Distance to MULA (km)	Conservation Objectives
North-West Irish Sea SPA	Red-throated Diver (Gavia stellata) Great Northern Diver (Gavia immer) Fulmar (Fulmarus glacialis) Manx Shearwater (Puffinus puffinus) Cormorant (Phalacrocorax carbo) Shag (Phalacrocorax aristotelis) Common Scoter (Melanitta nigra) Little Gull (Larus minutus) 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) Kittiwake (Rissa tridactyla) Roseate Tern (Sterna dougallii) Common Tern (Sterna hirundo) Arctic Tern (Sterna paradisaea) Little Tern (Sterna albifrons) Guillemot (Uria aalge) Razorbill (Alca torda) Puffin (Fratercula arctica)	Within	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA
Rockabill SPA	Roseate Tern (Sterna dougallii) Common Tern (Sterna hirundo) Arctic Tern (Sterna paradisaea)	17.9	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA

Designated Site	Qualifying Interests	Distance to MULA (km)	Conservation Objectives
Lambay Island SPA	Fulmar (Fulmarus glacialis) Cormorant (Phalacrocorax carbo) Lesser Black-backed Gull (Larus fuscus) Herring Gull (Larus argentatus) Kittiwake (Rissa tridactyla) Guillemot (Uria aalge) Razorbill (Alca torda) Puffin (Fratercula arctica)	21.7	To maintain or restore the favourable conservation condition of the bird species
Skerries Islands SPA	Cormorant (Phalacrocorax carbo) Herring Gull (Larus argentatus)	26.0	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA
Ireland's Eye SPA	Cormorant (Phalacrocorax carbo) Herring Gull (Larus argentatus) Kittiwake (Rissa tridactyla) Guillemot (Uria aalge) Razorbill (Alca torda)	28.7	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA
Howth Head Coast SPA	Kittiwake (Rissa tridactyla)	29.2	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA
River Nanny Estuary and Shore SPA	Herring Gull (Larus argentatus)	35.7	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA To maintain the favourable conservation condition of the wetland habitat in River Nanny Estuary and Shore SPA as a resource for the regularly occurring migratory waterbirds that utilise it
Dundalk Bay SPA	Common Gull (Larus canus) Herring Gull (Larus argentatus)	44.4	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA
The Murrough SPA	Herring Gull (Larus argentatus)	47.4	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA
Wicklow Head SPA	Kittiwake (Rissa tridactyla)	64.8	To maintain or restore the favourable conservation

Designated Site	Qualifying Interests	Distance to MULA (km)	Conservation Objectives
			condition of the bird species listed as Special Conservation Interests for this SPA
Poulaphouca Reservoir SPA	Lesser Black-backed Gull (Larus fuscus)	66.4	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA

Birds

The most vulnerable receptor to this disturbance would be nesting and breeding birds during the breeding season (February to October) within 2km (4km for diving birds, 10km for red-throated diver) of the proposed site investigations. The potential effect to be assessed is that breeding, and nesting birds are disturbed by the presence of survey vessels and equipment. Both visual and noise disturbance could result from the presence of the vessels and equipment. Prolonged disturbance could result in impaired breeding, disruption to incubation, increased nest failures due to predation and nest abandonment (Valente and Fischer, 2011). These factors could affect the demographic characteristics of the population.

Birds with large foraging distances and overwintering birds within 2km (4km for diving birds, 10km for red-throated diver) of the proposed MULA also have the potential to be disturbed by the presence of survey vessels and equipment use. Visual and noise disturbance can occur within the ZOI resulting in a reduction in the time spent feeding due to higher vigilance, taking flight thus increasing energetic costs and avoidance of habitat which would have been suitable for feeding/roosting potentially leading to the use of poorer quality areas (Nolet *et al*., 2002; Burton, Rehfisch and Clark, 2003; Yasué, 2005; Thiel *et al*., 2011; Ross and Liley, 2014).

The extent to which a seabird responds to disturbance is dependent upon factors including period of breeding cycle during which disturbance occurs; duration, type and intensity of the disturbance; presence of opportunistic predators; and the degree of habituation with the disturbance (Garthe & Hüppop, 2004; Showler *et al*., 2010; Fliessbach *et al*., 2019). Some seabirds are more resilient to disturbance than others. The Joint Statutory Nature Conservation Bodies (SNCB) Interim Displacement Advice Note (2017) categorises species by their sensitivity to disturbance and their habitat specialisation, when offshore. This advice note has been used in the assessments below to inform the assessment of LSE.

The survey is a transient activity allowing birds to return to areas within the survey corridor within a matter of hours. The proposed survey will not reduce the natural range of qualifying seabirds, nor will it have a significant effect on the habitat that the species require to maintain the population. All vessels will be slow moving (as discussed above) and the addition of several project vessels is unlikely to be noticed against existing vessel activity in the areas.

Screening Conclusion: No likely significant effects / AA is not required.

Marine Mammals

There is potential that pinnipeds within 100km (grey seal) and 50km (harbour seal) could be disturbed by the presence of vessels and site investigation activities. Four relevant sites were identified, namely:

- Lambay Island SAC
- Slaney River Valley SAC

- Murlough SAC
- Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC
- Strangford Lough SAC

Seals typically can be disturbed at haul-out sites at a distance of 900m or less (Brassuer and Reijnders, 1994). The designated sites above are located more than 900m from the MULA, the closest of which, Lambay Island SAC, is located 22km from the MULA; therefore, survey activities are unlikely to result in the disturbance of seals at haul-out sites.

The presence of survey vessels will not affect the breeding, moulting and resting behaviour of seals within the SACs and the population composition of these sites will not be affected, due to the distance of MULA from haul-out sites. While any individuals present within the waters of the MULA may be disturbed by the survey activities, this disturbance effect will be temporary. As the area is also busy for vessel and fishing traffic within the SAC, there is a degree of background noise which seals will already be accustomed to. Therefore, site investigation works will not cause disturbance at a level which will adversely affect the harbour seal population at the site and will not prevent harbour seal from accessing suitable habitat.

Taking into account the discussion above it has been concluded that the proposed site investigations are not capable of undermining the conservation objectives of Lambay Island SAC, Strangford Lough SAC, Murlough SAC, Slaney River Valley SAC and/or Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC, therefore there will be no LSEs on this site.

Screening Conclusion: No likely significant effects / AA is not required.

5.2 Underwater Noise Changes

Tables 4-1 to 4-4 identified a pressure-receptor pathway between the proposed site investigations and the QIs / SCIs of 11 of the European Sites for underwater noise changes.

Table 5-3 SACs Screened in for the Potential Pressure Visual (and above water noise) Disturbance

Designated Site	Qualifying Interests	Distance to MULA (km)	Conservation Objectives
Codling Fault Zone SAC	▪ Harbour Porpoise (*Phocoena phocoena*)	16.8	To maintain the favourable conservation condition of Harbour porpoise
Rockabill to Dalkey Island SAC	▪ Harbour Porpoise (*Phocoena phocoena*)	19.1	To maintain the favourable conservation condition of Harbour porpoise
Lambay Island SAC	▪ Grey Seal (*Halichoerus grypus*) ▪ Harbour Seal (*Phoca vitulina*) ▪ Harbour Porpoise (*Phocoena phocoena*)	22	To maintain the favourable conservation condition of Grey Seal To maintain the favourable conservation condition of Harbour Seal To maintain the favourable conservation condition of Harbour porpoise

Designated Site	Qualifying Interests	Distance to MULA (km)	Conservation Objectives
Slaney River Valley SAC	▪ Twaite Shad (*Alosa fallax fallax)* ▪ Harbour Seal (*Phoca vitulina*)	80.9	To restore the favourable conservation condition of Twaite shad To maintain the favourable conservation condition of Harbour Seal
River Barrow And River Nore SAC	▪ Twaite Shad (*Alosa fallax fallax*)	95.9	To restore the favourable conservation condition of Twaite shad
North Anglesey Marine / Gogledd Môn Forol SAC	▪ Harbour porpoise (*Phocoena phocoena*)	0	To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters
Murlough SAC	▪ Harbour seal (*Phoca vitulina*)	55.8	To maintain (or restore where appropriate) Harbour (Common) Seal *Phoca vitulina* to favourable condition.
North Channel SAC	▪ Harbour porpoise (*Phocoena phocoena*)	57.3	To ensure that the integrity of the site is maintained and that it makes an appropriate contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters.
West Wales Marine / Gorllewin Cymru Forol SAC	▪ Harbour porpoise (*Phocoena phocoena*)	75.2	To ensure that the integrity of the site is maintained and that it makes an appropriate contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters.
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	▪ Bottlenose dolphin (*Tursiops truncates*) ▪ Grey seal (*Halichoerus grypus*)	76.6	To restore the favourable conservation condition of Bottlenose dolphin and grey seal.
Strangford Lough SAC	▪ Harbour seal (*Phoca vitulina*)	75.2	To maintain (or restore where appropriate) Harbour (Common) Seal *Phoca vitulina* to favourable condition.

5.2.2 Marine Mammals

Exposure to anthropogenic sounds can induce a range of behavioural effects to permanent injury in marine mammals. Loud and prolonged noise may mask communicative or hunting vocalisations, preventing social interactions and effective hunting. Where the threshold of hearing is temporarily damaged, it is considered a Temporary Threshold Shift (TTS), and the animal is expected to recover. If there is permanent damage (PTS) where the animal does not recover, social isolation and a restricted ability to locate food may occur, potentially leading to the death of the animal (Southall *et al*., 2007).

Southall *et al*. (2019) separated marine mammals into auditory groups based on their functional hearing sensitivity. The generalised hearing ranges of these groups are provided by the National Marine Fisheries Services (NMFS) (2018) as summarised in Table 5-4.

Table 5-4 Marine Mammal Groups Based on Auditory Bandwidth

Group (based on auditory bandwidth)	Species observed within and in proximity to the Maritime Usage Licence Area	Auditory range
Low-frequency cetaceans (LF)	Minke whale, Humpback whale, Fin whale	7Hz – 35kHz
High frequency cetaceans (HF)	Short-beaked common dolphin, Common bottlenose dolphin, White-beaked dolphin, Long-finned pilot whale, Northern bottlenose whale	150Hz – 160kHz
Very high frequency cetaceans (VHF)	Harbour porpoise	275Hz – 86kHz
Phocid carnivores in water (PCW)	European otter and seals	60Hz – 39kHz

The thresholds for the onset of PTS and TTS, as published in Southall *et al*. (2019) are provided in Table 5-5. These reflect the current peer-reviewed published state of scientific knowledge.

Table 5-5 Injury Thresholds for Marine Mammals from Impulsive (Sound Pressure Level (SPL), unweighted) and Continuous (Sound Exposure Level (SEL), weighted) Sound

Auditory group	Impulsive noise		Continuous noise	
	SPL (unweighted) – dB re 1 µPa (peak)		SEL (24 hr, weighted) – dB re 1 µPa-2s	
	PTS onset	TTS onset	PTS onset	TTS onset
LF	219	213	199	179
HF	230	224	198	178
VHF	202	196	173	153
PCW	232	226	219	199

5.2.2.2 Geophysical Survey

The geophysical survey includes the use of multi-beam echo-sounders (MBES), side scan sonars (SSS), Ultra-short baseline (USBL) positioning beacons and sub bottom profilers (SBP). One of the most important environmental concerns related to the proposed site investigations is the potential effects

of underwater sound on marine mammals. Pinnipeds have evolved to use sound as an important aid in navigation, communication and hunting (Richardson, 1995). It is generally accepted that exposure to anthropogenic sound can induce a range of effects on pinnipeds. These range from insignificant effects to behavioural changes, non-injurious type effects (including masking of biologically relevant sound signals, such as communication signals), and in extreme circumstances can lead to physical injury and death if the sound source is sufficiently intense.

In order to evaluate the potential of the geophysical survey to cause harm to marine mammals, an assessment has been conducted using the American National Marine Fisheries Service (NMFS) (2018) thresholds for the onset of PTS and TTS. The approach separates marine mammals into five groups based on their functional hearing, namely: low-frequency cetaceans; mid frequency cetaceans; high frequency cetaceans; pinnipeds (Phocid) in water; and pinnipeds (Otariid) in water. Table 5-6 presents the species identified as present in the survey area according to their functional hearing category.

Table 5-6 Marine Mammal Auditory Bandwidth

Group	Low-frequency cetaceans	Mid-frequency cetaceans	High-frequency cetaceans	Pinnipeds (Phocid) in water
Generalised hearing range (NMFS 2018)	7Hz – 35kHz	150hz – 160kHz	275Hz – 160kHz	50Hz – 86kHz
Species	Baleen whales	Most toothed whales, dolphins	Certain toothed whales, porpoises	True seals
Species potentially in application area during April to October	Minke whale Humpback whale Fin whale	Short-beaked common dolphin Bottlenose dolphin Striped dolphin Risso's dolphin White-beaked dolphin Long-finned pilot whale Killer whale	Harbour porpoise	Grey seal Harbour seal

Source: NFMS (2018)

As a worst-case scenario it is possible that marine mammals could be disturbed by the sub-bottom profiler (SBP). Most sound energy generated by SBP will be directed towards the seabed and the pulse duration is very short with the survey constantly moving. Lower frequencies generated by SBP are within the hearing range of marine mammals, therefore this type of equipment could have localised, temporary effects on marine mammal behaviour. The UK Department for Business, Energy & Industrial Strategy (BEIS) undertook noise modelling as part of a review of consented offshore wind farms in the Southern North Sea SAC which was based on the maximum source levels and bandwidths obtained from a range of SBP's. The results of the noise modelling demonstrated that for harbour porpoise in particular the onset of permanent threshold shift (PTS) could arise from between 17 m and 23 m from source and potential behavioural effects within 2.4 km and 2.5 km (BEIS, 2020). This was a worst-case scenario and the use of a Chirper (a type of SBP) with a peak sound pressure level (SPL) of 267 dB re 1 µPa-m.

The zone of ensonification based on the above geophysical survey methods are within proximity to the source, therefore marine mammals would need to be present in close proximity to the survey vessel and remain within the localised zone of ensonification for an extended period of time to experience injurious effects.

The proposed geophysical survey will be a one-off event and will progress slowly along the proposed survey corridor. Animals will have sufficient time to avoid the survey spread, and it is unlikely that they will swim under operating equipment. If a marine mammal were to find itself within the EDR of 5 km given for geophysical surveys (JNCC, 2020), it is calculated they would be able to move out of this EDR in less than 1 hour.

5.2.2.3 Geotechnical Survey

The frequencies at which the peak sound pressure levels of the proposed vibrocore surveys are within the audible bandwidth for low-frequency cetaceans. As the frequency is outside of the auditory bandwidth for mid-frequency cetaceans, high frequency cetaceans and pinnipeds, there is unlikely to be a significant impact from continuous noise to these species.

Southall *et al*., 2019 determined that the Sound Exposure Levels (SEL) (24 hr weighted) for continuous noise to cause a TTS in low-frequency cetaceans is 178dB re 1 µPa-2s or 199dB re 1 µPa-2s for a Permanent Threshold Shift (PTS). VC are only used for short durations, typically up to 10 minutes until the VC is submerged and a sample can be taken. Therefore, for 93 VC samples there will be approximately up to 16 hours of underwater noise generated across the 2–4-month survey period. For marine mammals to experience a TTS from the vibrocoring, they would have to be continuously exposed to the noise at approximately 15m for 12 hours (NMFS, 2018). For marine mammals to experience PTS from VC sampling, an individual would have to be continuously within approximately 1km of the sound source for 48 hours (NMFS, 2018). As the noise generated is short in duration and intermittent, underwater noise generated by vibrocores during the proposed surveys will not exceed the threshold for injury to marine mammals. Additionally, marine mammals will likely move away from a sound source at a speed of 1.5m/s (Otani *et al*., 2000, Lepper *et al*., 2012) from a sound source level. This is considered conservative as there is data (McGarry *et al*., 2017, Kastelein *et al*., 2019, van Beest *et al*., 2018) to suggest that animals will, at least initially, move away at much higher speeds (e.g. harbour porpoise at 1.9m/s, Kastelein *et al*., 2019). Marine mammals would, therefore, move outside of the radius for TTS and PTS radius within a minute and would not be at risk of TSS or PTS from the vibrocoring noise.

Based on the above discussion, any disturbance effects from noise associated with operations will be localised, temporary and transient. There will be no long-term effect or risk of injury to marine mammals from vibrocore sampling as part of the proposed site investigations.

Screening Conclusion: No likely significant effects / AA is not required.

5.2.3 Annex II Fish Species

Tables 4-1 to 4-4 identified a pressure-receptor pathway for the pressure underwater sound changes between the geophysical survey and two European Sites for which the QIs are twaite shad. These sites are:

- Slaney River Valley SAC
- River Barrow And River Nore SAC

It is recognised that fish are mobile species and therefore Annex II listed migratory species have the potential to cross the MULA during the survey operations. Twaite shad are sensitive to noise changes and therefore potentially vulnerable to the proposed site investigations.

Twaite shad occur in coastal waters and in estuaries along the southeast coast of Ireland. Twaite shad are anadromous, migrating to freshwater to spawn in early summer (May to July). At maturity (3 years old for males and 5 years old for females), they stop feeding and congregate in the estuaries of suitable rivers in April and May. Upstream migration from the estuaries appears to be triggered by temperature, with peak migratory activity occurring at water temperatures of 10–14°C. Given that twaite shad reach maturity at age 3-5, twaite shad are likely to be found in coastal areas of the MULA all year round, with the greatest density likely to be observed during the May-July migration.

The ability of fish to hear noise is dependent on their hearing structures, which indicate their sensitivity to sound. Sound pressure is only detected by those species possessing a swim bladder; the otolith organ, located directly behind the brain, acts as a particle motion detector and where linked to the swim bladder, converts sound pressure into particle motion, which is detected by the inner ear. High sensitivity hearing species such as clupeids (twaite shad) have specialisations of the auditory apparatus where the swim bladder and inner ear are intimately connected and are able to detect frequencies to over 3kHz; with optimum sensitivity between 300Hz-1kHz (Nedwell *et al*., 2004).

Different fish species react differently to sound. The typical behavioural response to sounds by fish might range from no change in behaviour, to a mild awareness (startle response) to larger movements of temporary displacement for the duration of the sound (Popper and Hastings, 2009). Popper *et al*., (2014) identified that there is no direct evidence of permanent injury to fish species from shipping and other continuous noise (such as the near-continuous noise produced by geophysical equipment).

5.2.3.1 Geophysical Survey

Most noise from a geophysical survey is generated at frequencies greater than 1kHz, above the auditory capacity of fish (generally between 0.2Hz to 1kHz). In addition, sound from survey equipment is targeted towards the seabed, meaning that effects to fish are only expected if they are within the immediate zone of ensonification below the survey vessel.

Shad and herring are members of the Clupeiformes family. Herring has a hearing range between 30Hz and 4kHz, with a peak frequency of between 30Hz and 1kHz (Nedwell *et al*., 2004). Teague & Clough (2011) observed that young-of-year twaite shad showed significant reactions at frequencies between 30 and 60kHz, peaking at 45kHz.

Acoustic Thresholds for onset of permanent and temporary threshold shift (NMFS 2016) spreading model was used for this assessment to calculate the distance at which sound generated by the survey activities will attenuate to below the injury and disturbance thresholds. It assumes that sound is spread geometrically away from the source but does not account for attenuation or directional sources; it therefore provides conservative estimates. It also does not take into consideration the conditions within the application area, such as bathymetry, water depth or sediment type and thickness.

Table 5-7 Impulsive Sound Sources

Geophysical Equipment type	Purpose	Frequency (kHz)	Source level SPL (peak) in dB re 1 µPa@1m	Source
Multibeam Echosounder (MBES)	A remote sensing acoustic device typically attached to a vessel's hull. The purpose is to map the water depth to seabed (bathymetry).	Typically 400 for this water depth but systems range from 200 – 500	210 - 245	Danson (2005), Hopkins (2007), Genesis (2011), Lurton and DeReutier (2011), BEIS

Geophysical Equipment type	Purpose	Frequency (kHz)	Source level SPL (peak) in dB re 1 µPa@1m	Source
				(2020), (Jiménez-Arranz *et al*., 2020)
Side Scan Sonar (SSS)	Typically towed at an altitude or 10-15m, sends and receives dual frequency acoustic pulses to detect objects (pipelines, shipwrecks etc) and enable classification of surficial marine geology (sediment type, outcrops, bedforms)	Typically 300 – 900 with high resolution models 600/1600	200 - 240	(2014), BOEM (2019), BEIS (2020), (Jiménez-Arranz *et al*., 2020), Edgetech (2022)
Sub-Bottom Profiler (SBP)	Typically hull mounted or towed at the surface, sends short pulses to the seafloor and are used to image geological layers and sediment thicknesses beneath the seabed. Types of SBP systems include Pingers, Boomers, Sparkers and Chirp, which have different frequencies.	Overall: 0.5 – 40 Pingers: 2.5 - 7 Boomers: 0.3 – 6 Sparker: 0.3 - 5 Chirp: 3-40	196 – 247	Danson (2005), King (2013), BOEM (2016), BEIS (2020), (Jiménez-Arranz *et al*., 2020), Innomar, (2022)
Magnetometer/ Gradiometer	Passive equipment which detects ferromagnetic anomalies in the seafloor such as pipelines, cables, debris and unexploded ordnance	No sound emitted	No sound emitted	N/A
Ultra-short baseline (USBL)	A USBL system has a hull mounted transducer with a transceiver attached to survey equipment. It uses low frequency	19-34	184-202	Jiménez-Arranz *et al*., 2020

Geophysical Equipment type	Purpose	Frequency (kHz)	Source level SPL (peak) in dB re 1 µPa@1m	Source
	acoustic sound to verify subsea positioning.			

Based on these sensitivities, shad are not sensitive to the very high frequencies associated with MBES (albeit with some overlap at low frequency operation) and SSS surveys. It is likely however, they will hear the low frequency noise and sense particle vibration from SBP, USBL systems, drilling and vibrocoring. All proposed surveys will operate at frequencies outside of the range of young shad and, therefore, they will not be impacted by them. It has been suggested that the ability of the Alosids, including shad, to detect ultrasound evolved to assist in avoiding predation by echo-locating predators, e.g., toothed whales (Popper *et al*., 2004; Teague & Clough, 2011). As such, underwater sound may act as an acoustic deterrent for shad and suggests that shad exhibit avoidance behaviour in response to underwater noise. It is, therefore, expected that twaite shad may avoid the sound source.

Based on the hearing capabilities of shad and the survey sound sources, the shad hearing range has the potential to overlap with the MBES and SBP, however the mortality/injury threshold will only be exceeded within close proximity of the sound source. Popper et. al. (2014) states the maximum distance for a lethal effect or physical injury on a fish with a swim bladder (such as twaite shad) at a SPL level of 207 dB re 1 µPa is 12 metres. For the MBES and SBP survey work, the vessel will be transiting slowly along survey lines and fish will also be in motion, therefore, the zone of injury will be transient, and it is unlikely that any fish will stay close to the sound source. Typical behavioural responses suggest that twaite shad will move away from the sound source (Popper *et al*., 2004; Teague & Clough, 2011) and the slow vessel speed will facilitate this behavioural response. Additionally, underwater sound from the geophysical survey equipment is targeted in relatively narrow beams towards the seabed, therefore, fish are only at risk of injury if immediately within the zone of ensonification (area filled with sound) below the sound source.

Vessel density in the MULA is relatively moderate, however there is consistent fishing and cargo traffic movements in the MULA all year round. Therefore, it is likely that existing background noise levels from shipping along the coast will mask the disturbance effect to twaite shad from the survey vessel.

In relation to the impulsive, high frequency sounds that will be produced as part of the geophysical survey, it has been found that pacific herring (another member of the Clupidae family) display no behavioural response to high frequency sounds from sonar or echo sounders (, Zhao and Liu, 2015). As such, it is likely that twaite shad will show no visible behavioural response to these survey methods.

For the deeper penetration, a sub bottom profiler or similar could be used to achieve high quality data at the required depth. Sub-bottom Profiler systems are used to produce images of the geological sub-structures of the seabed. The most appropriate sub-bottom system will be chosen to reflect the geological conditions on site. Boomers are a typically used sub bottom profiler that can penetrate to depths of up to 50 m into the seabed depending on the geological conditions on site. Boomers generate impulsive sound in the frequency range 300 Hz to 10 kHz, with source levels of 215 dB re 1µPa (0-peak) equivalent to 214dB re 1µPa2.s (peak) or 208dB re 1µPa2.s (rms) (data for AA301 Boomer Applied Acoustics, 2020). A USBL system will also be used to verify subsea positioning. This system has a hull mounted transducer with a transceiver attached to survey equipment and using low frequency acoustic sound. USBL systems generate sound in the frequency range 19 to 34 kHz, with source levels of 184 to 202dB re 1 µPa at 1m (Jiménez-Arranz *et al*., 2020).

An assessment of the potential impacts on fish species from this technique has been provided below.

Generally, fish species with specialisations for sound pressure detection (e.g. a swim bladder) can hear higher frequencies (between 200Hz – 3kHz) than fishes lacking morphological adaptations, which can detect sound at lower frequencies between 100Hz to 1kHz (Carroll *et al*., 2017).

The values for fish with swim bladders which are involved in hearing have been given in Table 5-8, as these are the most sensitive category of fish.

Table 5-8 Injury and Disturbance Thresholds for Impulsive Sound

Type of Animal	Mortality and potential mortal injury	Impairment	
		Recoverable injury	Temporary Threshold Shift (TSS)
Fish: swim bladder involved in hearing (primarily pressure detection)	>207 dB re 1 µPa (peak)	>207 dB re 1 µPa (peak)	186dB re 1 µPa2.s

Popper *et al*. (2014) Table 7.4.

The frequency range of boomers overlaps with the hearing ranges of fish, and, therefore, may be audible to some fish species and cause disturbance. The peak SPL for boomers may also exceed the Popper *et al*. (2014) threshold for injury and mortality to fish given in Table 5-8. However, the fish would have to be within 83 m of the sound source. For injury to occur, the fish would have to be within 3.3 m of the sound source.

Fish are likely to leave the survey area during the survey activities horizontally or move to deeper water, away from the noise source (Løkkeborg and Soldal, 1993; Engas *et al*., 1993, 1996). Therefore, it is unlikely that fish will experience significant impact other than temporary displacement from the immediate area surrounding the geophysical survey activity. Additionally, geophysical surveys progress relatively quickly, typically 1m/s (approximately 2 knots) and the maximum time that any point within an 83m radius of the survey vessel would experience noise levels above the thresholds is less than 5 minutes. The impact to fish will be temporary and transient. Therefore, there is unlikely to be a significant impact to fish the proposed surveys.

During the geophysical survey, the continued noise within 24-hour operations means it is likely that the most hearing sensitive fish species e.g. twaite shad will demonstrate temporary avoidance behaviour from early on and remain outside the ZOI for the duration of the operation. The potential ZOI is transient as it moves slowly in a constant direction along the principal survey line orientation.

Popper and Hastings. (2009) review paper suggests that some fish will move away from a loud sound source by swimming away. Slotte *et al*. (2004), undertook surveys of Atlantic herring and blue whiting during seismic surveys. It was observed that abundances of fish were higher outside than inside the seismic shooting area, suggesting that fish are exhibiting short-term avoidance behaviour from the survey noise.

Nedwell *et al*. (2012) reviewed herring sensitivity to sources of noise from non-pulse cable laying operations (i.e. cable lay and trenching) and proposed effect ranges. Clupeids are expected to show strong avoidance behaviour (i.e. reaction by virtually all individuals) within 8 m of the works, whilst significant avoidance (85% of individuals will react to noise) is expected within 66 m.

A number of studies which have estimated fish distribution in open sea fisheries have also suggested that fish leave survey areas during seismic survey activities horizontally or move to deeper water, away from the noise source (Løkkeborg and Soldal, 1993; Engas *et al*., 1993, 1996).

Based on the above, it is predicted that fish will avoid the area once operations have started and are extremely unlikely to move towards the sound source. The works will not lead to any long-term

displacements as they are transient and brief. Individuals are expected to return once the operation has passed through.

5.2.3.2 Geotechnical Survey

Vibrocores are used to retrieve continuous sediment samples by penetrating the seabed with a core barrel fitted with a liner using vibrational energy. A pneumatic or electric vibrahead vibrates the tube, causing the sediment to liquify which facilitates penetration into the sediment. These vibrations emit low levels of noise, with a frequency of between 30Hz and 50Hz, and a Sound Pressure Level (SPL) of 188 dB (rms) re 1 µPa @ 1m (Chorney *et al*., 2011).During soft sediment coring, in the Swansea survey, the highest sound pressure level recorded (at 23m from the JUB) was 107db re 1µPa (peak) at 10Hz. For hard rock drilling the highest sound pressure level was also 107dB re 1µPa (peak) at 10Hz but it was recorded at 7.5m from the JUB (Willis *et al*., 2010).

Noise measurements during geotechnical site investigations involving shallow core drilling to 16-17m in sand and mudstone, recorded source levels of 142–145 dB re 1 µPa rms @ 1 m (30–2000 Hz) (Erbe and McPherson 2017).

The frequencies at which the peak sound pressure levels of the proposed vibrocore surveys are within the audible range for herring, and therefore are assumed to overlap the audible range for twaite shad. However, it is below the optimal hearing range, so is unlikely to cause significant disturbance to twaite shad. Additionally, given that spawning occurs upstream in the relevant rivers, outside the ZOI of the survey, the survey will not affect twaite shad spawning habitat, their distribution and population structure, nor will it cause a deterioration in water quality.

Popper *et al*. (2014) determined that continuous sound can cause a Temporary Threshold Shift (TTS) in hearing specialist fish, such as twaite shad, when exposed for more than 158 dB re 1 µPa rms for 12 hours or more. Recoverable injury may occur with exposure to 170 dB re 1 µPa rms for more than 48 hours. VCs are only used for short durations, typically around 10 minutes until the VC is submerged and a sample can be taken. Therefore, for 93 VC samples there will be approximately up to 16 hours of underwater noise generated across the 2 - 4-month survey period. For a hearing specialised fish such as twaite shad to experience TTS from VC sampling, an individual would have to continuously be within approximately 15m for 12 hours (NMFS, 2018). To cause injury to twaite shad, an individual would have to be continuously within approximately 2m of the sound source for 48 hours (NMFS, 2018). As the noise generated is short in duration and intermittent, underwater noise generated by vibrocores during the proposed surveys will not exceed the threshold for TTS or injury to twaite shad.

Any disturbance effects from noise associated with operations will be localised, brief and transient. There will be no long-term effect on the distribution of the species and migration to and from rivers will not be impeded.

Given that spawning occurs upstream in the relevant rivers, outside the ZOI of the survey, the survey will not affect twaite shad spawning habitat, their distribution and population structure, nor will it cause a deterioration in water quality.

Screening Conclusion: No likely significant effects / AA is not required.

5.3 In-combination Effects

5.3.1 In-Combination Effects Irish Waters

Other projects and plans in the MULA and FLAA have been identified (Table 3-2) to determine if they could interact with the proposed site investigations to have an in-combination effect.

The proposed MaresConnect geophysical, geotechnical and environmental surveys within the MULA and FLAA have the potential to interact with such projects within both the MUL and FLAA.

In terms of the MULA other plans and projects that are within the MULA are:

- Microsoft Ireland Operations Ltd Site Investigations (LIC230018)
- North Irish Sea Array Site Investigations (LIC230001)
- Lir Offshore Array Ltd (FS007392)

In terms of the Foreshore Licence Application area there are 8 plans and/or projects that overlap with the Foreshore Licence application area these are:

- Microsoft Ireland Operations Ltd Site Investigations (LIC230018)
- North Irish Sea Array (NISA) Windfarm, off Louth, Meath and Dublin (LIC23001)
- Lir Offshore Array, off Louth, Meath and Dublin (FS007392)
- SSE Renewables, Braymore Point (Setanta), Dublin (FS006973)
- North Irish Sea Array (NISA) Windfarm, Export Cable Route (FS007358)
- Greystones (OWL) Offshore Windfarm (FS007367)
- North Irish Sea Array (NISA) Windfarm, off Louth, Meath and Dublin (FS007031)
- Sunrise Wind Ltd (FS007151)
- RWE Renewables, Dublin Array (FS007188)

Whilst the exact schedule for activities is unknown, it is assumed there will be some spatial and temporal overlap; however, whilst activities may take place concurrently, it will not be continual throughout the site, limiting the potential for cumulative effect.

The limited scope and short-term, transient nature of the proposed survey works and existing background levels of disturbance, no significant in-combination or cumulative effects on European Sites are expected.

5.3.2 In-Combination Effects UK waters

There are two marine licences in place that could potentially have in-combination effects with the site investigation works taking place at EEZ section of the MULA, the first marine licence is McMahon Design & Management Limited (RML2412). The second is MCL (CML2331), this is the UK marine licence for the MaresConnect project, it is possible that the same survey vessel will be undertaking the survey in UK waters as in Irish waters. In relation to RML2412, given that the site investigations for MaresConnect is due to take place in Q1 2025, and the marine licence RML2412 expires in December 2024. Given the limited scope and short-term, transient nature of the proposed survey works and existing background levels of disturbance, no significant in-combination or cumulative effects on European Sites are expected.

6. SCREENING DETERMINATION STATEMENT AND CONCLUSIONS

To determine whether the proposed site investigations will have an LSE on any European Sites, either individually or in-combination with other plans or projects, screening for AA was carried out.

The screening assessed 102 European Sites that were either within the direct zone of influence of the proposed site investigations or contain mobile QIs / SCIs which could potentially travel into the MULA.

It was identified that the proposed site investigations could induce the following pressures on QIs / SCIs which required assessment for Likely Significant Effect:

Pressures associated with the proposed site investigations were identified and included:

- Visual disturbance and above water noise; and
- Underwater sound changes.

The assessment was undertaken in respect of the MULA alone, as well as in combination with the entirety of the survey works within the Irish EEZ. In addition, other projects and plans in the area were identified and assessed to determine if they could interact with the proposed site investigations within the Irish EEZ to have an in-combination effect. It was determined that no significant in-combination or cumulative effects on European Sites are expected.

Initial screening of the 102 European Sites identified 27 pressure-receptor pathways between the proposed site investigations and the QIs / SCIs of 22 European Sites (Tables 4-1 to 4-4). Of these 22 sites, assessment for likely significant effects concluded that the proposed site investigations will not have a significant effect on the conservation objectives of any European Sites and an Appropriate Assessment will not be required. In conclusion, it is the considered opinion of the authors of this report that the proposed survey works, either alone or in combination with other plans or projects (including the proposed survey works to be carried out pursuant to the Foreshore Licence) are not likely to have significant effects on any European Site and the authors have no reasonable scientific doubt as to that conclusion.

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