

CLARUS OFFSHORE WIND FARM LIMITED

Investigative Foreshore Licence Application for Site Investigations: Reference FS006886

Supporting Information for Screening for Appropriate Assessment and Natura Impact Statement



P2399_R5061_Rev3 | April 2022

DOCUMENT RELEASE FORM

Clarus Offshore Wind Farm Limited

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Rev No	Date	Reason	Author	Checker	Authoriser
Rev 0	13/11/2020	Draft for Client Review	[REDACTED]	[REDACTED]	[REDACTED]
Rev 0.1	15/12/2020	Addressing client comments	[REDACTED]	[REDACTED]	[REDACTED]
Rev 2	19/11/2021	Update to FLAA	[REDACTED]	[REDACTED]	[REDACTED]
Rev 3	07/04/2022	Addressing Foreshore Unit comments	[REDACTED]	[REDACTED]	[REDACTED]

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GLOSSARY

AA

Appropriate Assessment

ATC

Around the Coast

Birds Directive

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

COWF

Clarus Offshore Wind Farm

DAHG

Department of Arts, Heritage and the Gaeltacht

DHLGH

Department of Housing, Local Government and Heritage

DEHLG

Department of the Environment, Heritage and Local Government

EU

European Union

EPS

European Protected Species

European Site

Sites designated under the Birds or Habitats Directive to protect habitats and species

FLAA

FLAA

GIS

Geographic Information System

Habitats Directive

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

IROPI

Imperative Reasons of Overriding Public Interest

JNCC

Joint Nature Conservation Committee

JUB

Jack-Up Barge

LSE

Likely Significant Effect

MU

Management Unit

MBES

Multi-Beam Echo Sounder

NPWS

National Parks & Wildlife Service

NE

Natural England

NM

Nautical Miles

QI

Qualifying Interest

SCI

Special Conservation Interest

SOSW

Scope of Survey Works

SSSI

Site of Special Scientific Interest

SPL

Sound Pressure Level

SAC

Special Area of Conservation

SPA

Special Protection Area

ZOI

Zone of Influence

1. INTRODUCTION

1.1 Introduction

Clarus Offshore Wind Farm Limited, a subsidiary project company of DP Energy Ireland, is investigating the feasibility of developing an offshore wind farm off the west coast of Ireland, the Clarus Offshore Wind Farm (COWF).

The Foreshore Licence Application Area (FLAA) covers the area within territorial waters (from the 12 nautical mile (NM) limit to the high-water mark along both County Kerry and County Clare), which contains the Cable Investigation Area associated with the COWF. The FLAA covers 93,622 hectares (ha) and is illustrated in Map 1 (Figure 1-1).

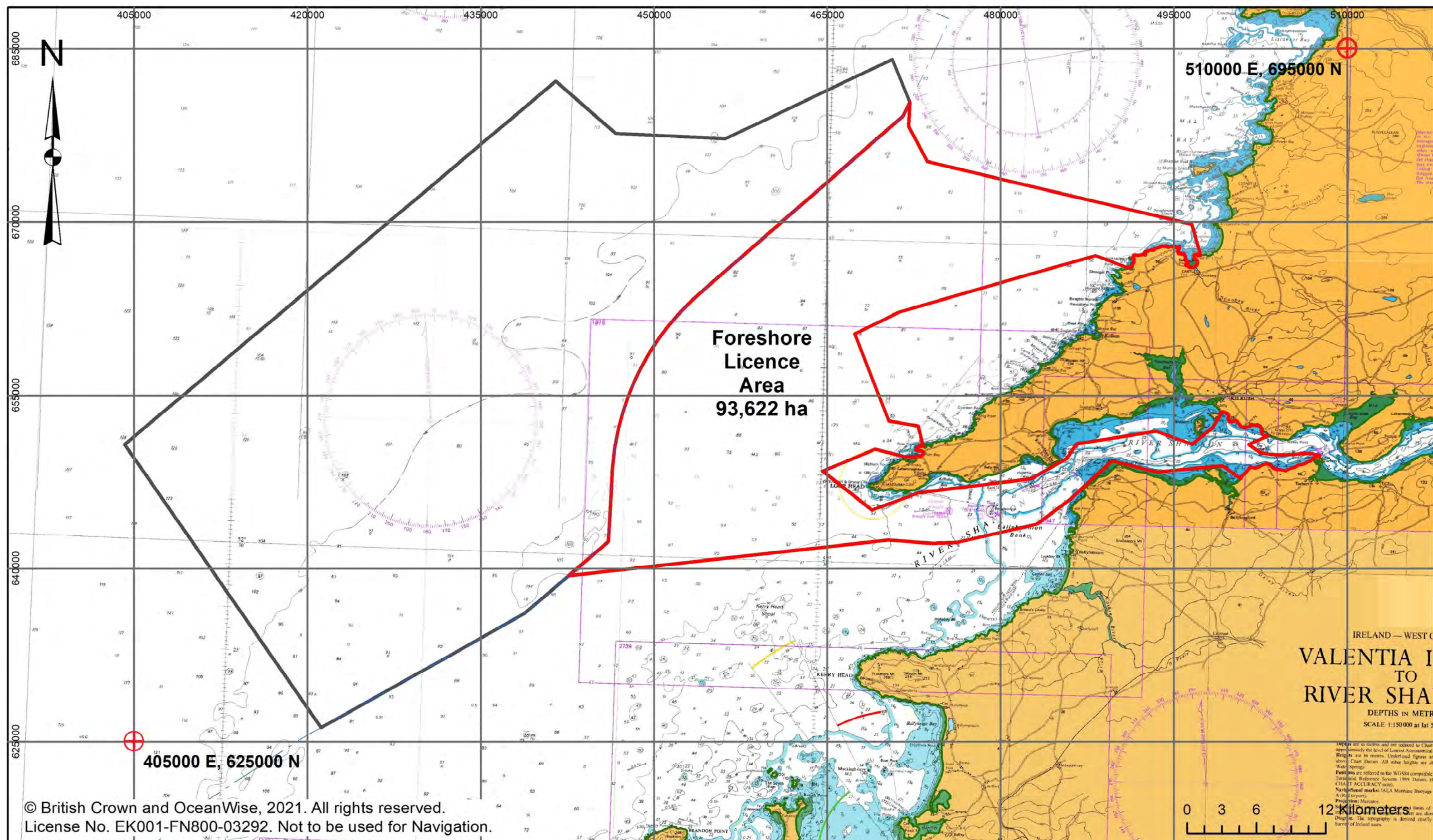
Clarus Offshore Wind Farm Limited intends to carry out the proposed site investigations within this FLAA, under Foreshore Licence application F5006886, to investigate potential export cable corridors and landfall areas, and to assess the associated seabed. The results of the proposed site investigations will be used to select optimal cable route(s), landfall option(s) and provide baseline data for future environmental appraisal, Environmental Impact Assessment Report and subsequent environmental impact assessments by the Competent Authority.

The area under investigation for the wind turbine array (the Array Investigation Area) lies beyond the 12 nautical mile limit (i.e. outwith the State foreshore). Under existing legislation, a Foreshore Licence is required for site investigation works within the State foreshore, i.e. inside the 12 nautical mile limit. The Array Investigation Area is shown as 'Contiguous Project Area' in Figure 1-1. The following European sites lay wholly or partially within the FLAA: Lower River Shannon Special Area of Conservation (SAC) (site code: IE002165), Kilkee Reefs SAC (site code: IE002264), Carrowmore Dunes SAC (site code: IE002250), Mid-Clare Coast SPA (site code: IE004182), River Shannon and River Fergus Estuaries SPA (site code: IE004077), Loop Head SPA (site code: IE004119).

As the proposed site investigation works are not directly connected with or necessary to the management of these European sites, it is regarded as necessary that the project be subject to the Appropriate Assessment (AA) process.

The AA process will be undertaken by the Department of Housing, Local Government and Heritage (DHLGH). This report has been submitted as a supporting document for the Foreshore Licence application and the information contained within is provided to support the DHLGH when undertaking the Appropriate Assessment. A Natura Impact Statement (NIS) has been prepared by Intertek on behalf of Clarus Offshore Wind Farm Limited, in accordance with relevant guidance, to inform the AA process. The Stage 2 NIS can be found in Section 5 of this report.

A Foreshore Licence is sought solely for the proposed site investigations which will be temporary and short-term. Undertaking the proposed site investigations does not guarantee that an offshore wind farm and associated infrastructure will be developed. The construction of a wind farm will be subject to a full Environmental Impact Assessment (EIA) as per EU Directive 2014/52/EU. As part of the EIA process, the construction phase of the project will be subject to Screening, Scoping and Consultation.



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Foreshore Licence Map 1

Clarus Offshore Wind Farm

File Number: FS006886

- Legend**
- Foreshore Licence Application Area
 - Contiguous Project Area
 - High Water of Medium Tides
 - Irish Territorial Sea 12 nm Limit

Ver	Date	Drawn by	Checked	Approved
V2	30/09/2021			
Map prepared by: MEngSc in Environmental Engineering, PGD in Sustainable Energy, HDGGIS				
Filename: C003IE_FIG_ClarusOffshoreWindFarm_V2.0_20210930				Size A3
Scale: 1:420,000		Printed @ A3		
Coordinate System: IREN95 Irish Transverse Mercator Projection: Transverse Mercator				

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1.2 Legislative Context

The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC) 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 European Sites. 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. Sites which have been submitted to the European Union, but which have not formally been adopted, e.g. candidate SACs, proposed SPAs and Sites of Community Importance, also form part of the network and are treated as if fully designated.

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 Article 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 Investigative Foreshore Licence Application by Part 5 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011), (as amended). 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.”

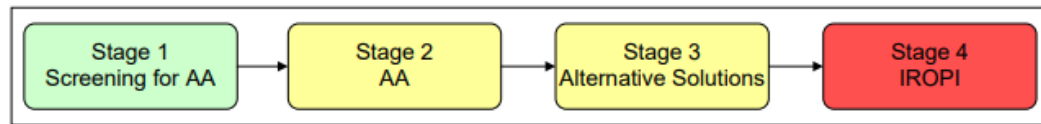
Regulations 42(6) and 42(7) provide for the outcome of screening for Appropriate Assessment as follows:

“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.”

Pursuant to the Foreshore Acts 1933 – 2011 (the “Foreshore Acts”), this document will be submitted to the Marine Planning Policy and Development Section of the Department of Housing, Local Government and Heritage to support this Investigative Foreshore Licence Application.

The European Commission’s methodological guidance (EC 2001) outlines a four-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 four stages are shown in Figure 1-2 and described below.

Figure 1-2 Stages of AA



1.2.2 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.

1.2.3 Stage 2 – Appropriate Assessment (AA)

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 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”.

1.2.4 Stage 3 – Alternative Solutions

This stage examines any alternative solutions or options that could enable the plan or project to proceed without adverse effects on the integrity of a European Site. Demonstrating that all reasonable alternatives have been considered and assessed, and that the least damaging option has been selected, is necessary to progress to Stage 4.

1.2.5 Stage 4 – Imperative Reasons for Overriding Public Interest (IROPI)/Derogation

Stage 4 is the main derogation process of Article 6(4) which examines whether there are Imperative Reasons of Overriding Public Interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a European Site to proceed in cases where it has been established that no less damaging alternative solution exists.

The extra protection measures for Annex I priority habitats come into effect when making the IROPI case. IROPI reasons that may be raised for sites hosting priority habitats are those relating to human

health, public safety or beneficial consequences of primary importance to the environment. In the case of other IROPI for Annex I priority habitats, the opinion of the European Commission is necessary and should be included in the AA. Compensatory measures must be proposed and assessed. The European Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister for Housing, Local Government and Heritage.

1.3 Aim of this Report

The aim of this report is to inform the AA 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. The effects of the proposed site investigations on the European Sites are considered in the context of the SPA and SAC conservation objectives and specifically on the habitats and species for which the European Sites have been designated. If significant effects are likely then effects are examined to determine if they will either alone, or in combination with other plans or projects effect the integrity of the European Site.

This report provides a description of the proposed site investigations (Section 2) and a baseline description of the receiving environment (Section 3). Section 4 of this document undertakes the Stage 1- Screening for Appropriate Assessment. This section identifies the potential receptors of the proposed site investigations (Section 4.2.1), the potential pressures on the receiving environment that could arise from the proposed site investigations (Section 4.2.2) and potential in-combination effects of this project with other plans/projects in the nearby vicinity. Screening of relevant European sites is then conducted to determine if there is any connectivity between the proposed site investigations and any European sites (Section 4.3). Any sites screened in are brought through to Section 4.4, which considers the potential for likely significant effect (LSE) on the conservation objectives of these sites as a result of proposed site investigations.

Section 5 of this document contains the Stage 2 - Natura Impact Statement. Should any LSE be identified in Section 4.4, those site(s) will be assessed further in Section 5 to determine whether the integrity of the site(s) will be adversely affected and if necessary, proposes mitigation to reduce the significance of effects.

This report has been prepared in accordance with current guidance:

- The European Commission 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 "Marine Natura Impact Statements in Irish Special Areas of Conservation: A Working Document, April 2012."
- The Department of Environment, Heritage and Local Government (DEHLG) Guidance "Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities, 11 February 2010."
- The European Commission Guidance "Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, November 2001".

2. DESCRIPTION OF THE PROPOSED SITE INVESTIGATIONS

2.1 Overview of Proposed Site Investigations

This section provides an overview of the proposed site investigations. Full detail on the proposed site investigations are provided with the document submitted in support of the Investigative Foreshore Licence Application as Schedule of Survey Works.

The proposed site investigations (geophysical, geotechnical, wind resource and metocean, archaeological and ecological surveys) will enable:

- Detailed mapping of shallow geological and seabed character;
- Reconnaissance level mapping of seabed relief and features (i.e. areas of reef, sandwaves and exposed archaeology etc);
- Greater understanding of bird, marine mammal and reptile species abundance and distribution in the area;
- Greater understanding of metocean conditions; and
- Baseline environmental mapping (i.e. habitats and species).

The information gained from the proposed site investigations would be used to minimise uncertainty in ground conditions at an early design stage and optimise cable routeing within the Cable Investigation Area.

Depending on the results of the proposed site investigations, other consents and permissions required to develop, install, operate and ultimately decommission an offshore wind energy project and associated export cables may be sought via the appropriate channels at a future date. Data acquired during the proposed site investigations would be used to inform environmental assessments in support of any required applications by providing information on the baseline environment and allowing potential effects to be assessed, and subsequently, appropriate mitigation measures to be developed. This data may also be used at a later date to provide a baseline against which to monitor post construction effects of construction, operation and decommissioning.

2.2 Survey Schedule

The intention is to commence the proposed site investigation activities as soon as feasible following award of a Foreshore Licence, with a staged programme of site investigations to capitalise on suitable weather windows over this time period, likely during Spring and Summer. This phased approach will progress the overall development towards detailed design stage. The exact mobilisation dates for the site investigation activities will not be known until a Foreshore Licence has been secured and the process of procuring the contractor is complete.

While a multi-year licence is sought, most survey activities will only occur over a period of weeks, with the exception of the metocean devices (LiDAR, ADCPs and Wave Buoys) which may be deployed for longer. The time spent at each individual location will be a maximum of hours for other site investigation activities such as Boreholes, CPTs, Vibrocores, Gravity Coring, Grab Sampling etc.

2.3 Geophysical Survey

Objective: The purpose of the proposed geophysical surveys is to determine the geophysical characteristics of the FLAA. The geophysical surveys will involve:

- Mapping the water depth to the seabed (bathymetry) within the FLAA.
- Mapping the seabed and sub-surface to optimise cable routing within the FLAA. This will also enable assessment of cable burial depth.
- Planning the scope and positioning of the geotechnical sampling programme within the FLAA.
- Identifying marine habitat areas within which the benthic survey could be undertaken.
- Determining sensitive marine habitats that may need to be avoided during geotechnical and environmental sampling and potential infrastructure installation.
- Providing the geophysical data from which a marine archaeological assessment can be undertaken to inform future Environmental Impact Assessment as part of any future consenting process.

Location: At present, it is not known where any potential export cable will be located. For the purpose of this Foreshore Licence Application, it has been assumed that the geophysical surveys will be conducted across any part of the FLAA. However, it is possible that the geophysical surveys may be restricted to potential export cable routes.

Equipment: Indicative equipment for the geophysical surveys is set out below:

- a. Multibeam Echosounder (MBES) - MBES is a remote sensing acoustic device typically attached to a vessel's hull. The purpose of an MBES is to map the water depth to seabed (bathymetry). Multibeam Echo Sounder Seafloor Backscatter will also be recorded. The exact equipment for use will be known following the appointment of survey contractor. The R2 Sonic 2024 or the Kongsberg EM2040 may be taken as typical examples of equipment that could be used.
- b. Side Scan Sonar - The side scan sonar will be a dual frequency hydrographic sonar with a lowest operating frequency of not less than 100 kHz. The higher frequency of the side scan sonar will be between 300 and 900 kHz.
- c. Sub-bottom Profiler – The Innomar parametric SES-2000 or similar will be used for the shallow investigation, in order to achieve appropriate resolution (1 to 5cm). For the deeper penetration, a boomer sub bottom profiler or similar is to be used to achieve high quality data at the required depth. Additionally, for the deeper penetration, both single channel seismic and multi-channel seismic data is to be acquired.
- d. Magnetometry/Gradiometry - The marine magnetometer will be of the Caesium Vapour type and capable of recording variations in magnetic field strength during survey to an accuracy of $\pm 0.5\text{nT}$.

Survey points and spacing: The swathe width for each piece of equipment will vary depending on water depth. It is anticipated that the width of each swathe will allow for a 50% overlap between each swathe.

Vessel: Geophysical survey vessels are typically between 15m and 60m in length and typically have an endurance of approximately 14 days. These vessels are likely to use a local port for mobilisation and replenishment.

2.4 Geotechnical Survey

Objective: The purpose of the proposed geotechnical survey is to evaluate the nature and mechanical properties of the superficial seabed sediments and intertidal sediments within the FLAA.

Overview: Geotechnical sampling will comprise of the following:

- a. Up to 130 no. Vibrocore Samples
- b. Up to 130 no. Cone Penetration Tests (CPT)

c. Up to approximately 6 no. Boreholes

Location: At present, it is not known where the final export cable route will be located. Figure 2-1, Map 2 below, presents a high-level indication of potential geotechnical sample locations. However, given that these sample locations are indicative, for assessment purposes, it is assumed that geotechnical samples could be undertaken anywhere within the FLAA.

Vessel: Geotechnical survey vessels are typically between 55m and 90m in length and typically have an endurance of approximately 28 days. The port of mobilisation for the geotechnical survey vessels will depend on where those vessels are deployed for preceding work packages. As such, the port of mobilisation may be Irish, UK, or another European location.

Survey points and spacing: The exact location, quantity, type, and penetration of the geotechnical samples will be determined following interpretation of geophysical survey data. This will be undertaken on board the survey vessel, if the geophysical and benthic surveys are undertaken as one campaign. Proposed geotechnical sample locations will be communicated to the Underwater Archaeology Unit in the Department of Housing, Local Government and Heritage for approval ahead of works commencing. Proposed locations will be accompanied by an assessment of the geophysical data by a qualified and experienced marine archaeologist.

Equipment: Geotechnical sampling will comprise:

d. Up to 130 no. Vibrocore Samples

Method: A vibrocore will be used to retrieve a soil sample by penetrating the seabed with a tube using a vibration mechanism.

Location: To be determined following review of geophysical data but indicative locations are provided in Figure 2-1, Map 2 below. For assessment purposes, it has been assumed that a vibrocore will be deployed every 1 km along a preferred cable route. As a preferred cable route is not yet known, the sampling locations presented in Figure 2-1, Map 2 are indicative only, noting that there are more sample positions on this figure than have been indicated above (in overview). The number of samples on the map do not represent the final number that will be acquired.

Dimensions: A vibrocore can penetrate up to 6m into the seabed and can have a diameter of 150mm. Therefore, sample volumes will be up to 0.11m³. For 130 collected samples, the worst-case volume of sediment removed will be approximately 14.3m³.

Equipment: Indicatively, a high-performance corer (HPC) or a modular vibrocorer is proposed to be used for this activity.

e. Up to 130 no. Cone Penetration Tests (CPT)

Method: A CPT will be used to test the characteristics of the soil by pushing an instrumented cone into the ground at a constant speed, with continuous measurement of the cone end resistance, the friction along the sleeve of the cone and the pore water pressure.

Location: To be determined following review of geophysical data but indicative locations are provided in Figure 2-1, Map 2 below. For assessment purposes it is assumed that a CPT will be deployed every 1km, co-located with the vibrocore. As a preferred cable route is not yet known, the CPT sample locations presented in Figure 2-1, Map 2 are indicative, noting that there are more sample positions indicated on this figure than have been indicated above (in overview). The number of samples on the map do not represent the final number that will be acquired.

Dimensions: A CPT can achieve penetrations of up to 40m. No sediment will be removed from the seabed for CPT.

Equipment: The exact equipment for use will be known following the appointment of survey contractor. A deck mounted CPT is proposed to be used for this activity. A Seacalf seabed CPT system may be taken as a typical example of equipment that could be used.

- f. Up to approximately 6 no. Boreholes

Method: A borehole is a method of drilling into the seabed to recover samples and to enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string. The drill string is then rotated to commence boring. Tools are lowered into the drill string to recover samples or conduct in-situ soil and rock testing.

Location: It is assumed that a preferred cable route may not be known prior to undertaking survey works. Therefore, the borehole sample quantities have been calculated based on three potential cable routes likely to be under consideration at the time of survey works commencing. It is also assumed that the boreholes could be located anywhere within the FLAA.

Dimensions: Each borehole will acquire a core sample up to 112mm in diameter, creating a hole (and therefore a seabed footprint) 143mm in diameter (0.016m²). Assuming a borehole depth of 25m (the likely maximum depth), the core sample removed will have a volume of approximately 0.25m³. Risings dispersed around the drill site will have a volume of approximately 0.15m³. Assuming cuttings will form a simple cone with an 18° slope angle around the drill head, it has been estimated that cuttings will cover an area of 1.82m². The borehole will be left to collapse naturally following completion of drilling where the cuttings are likely to fall back down the hole.

Equipment: The up to approximately six boreholes will be drilled from a jack-up barge (JUB) using a percussion and a rotary corer. The number of legs used by the JUB will be dependent on seabed conditions, current strength and wave action. Each leg has a seabed footprint of approximately 2.54m².

The total expected seabed footprint of the geotechnical borehole sampling is set out in Table 2-1.

Table 2-1 Calculated footprint for 6 boreholes

Activity	Seabed footprint (m ²)
Jack-up barge legs (worst case assumes 4 legs deployed)	60.96
Borehole extraction*	0.096
Drill cuttings	10.92
Total	71.88m²

*Footprint from borehole extraction is not included within the total as it is assumed that this will be within the area of seabed disturbed by drill cuttings

2.5 Ecological Survey

Objective: The purpose of the proposed ecological surveys is to map the distribution and extent of marine benthic habitats, to identify the extent and distribution of intertidal biotopes, and to identify the distribution and abundance of birds, marine mammals and reptiles.

Location: Ecological sampling will be undertaken within the FLAA. At this time, it is not known where the potential export cable route will be located, therefore, it is currently estimated that three cables routes will be surveyed. Map 26 below assumes that the sample stations could be positioned anywhere within the FLAA and is indicative only.

Survey points and spacing: The exact location and quantity of the stations will be determined following interpretation of geophysical survey data. This will be undertaken on board the survey

vessel, if the geophysical and benthic surveys are undertaken as one campaign. For assessment purposes, it is assumed that an environmental station will be located every 2km along the preferred cable route or where there is a change in habitat type but could occur anywhere within the FLAA.

Equipment: Indicative equipment for the environmental surveys includes the following:

- g. 65 no. Grab stations (195 grab samples)

Method: A grab sampler will be used to retrieve a soil sample of the seabed by the lowering of a mechanical grab. The grab will be launched from a vessel crane or A-frame. It is likely that three grab samples will be taken at each station; two for faunal analysis and one for sediment and chemical analysis.

Dimensions: Each grab samples a volume of approximately 0.1m³. Grabs are required to obtain a sample greater than 5cm in depth, to try and achieve this, samples will be repeated for up to three attempts. If three samples are taken at each of 65 stations, then grab sampling will remove approximately 19.5m³ of sediment.

Location: Yet to be determined but indicative locations (informed by EMODnet habitat data) are provided in Figure 2-1, Map 2.

- h. Drop-down camera and video transects

Method: Approximately four still photographs will be acquired at each environmental station. Additional photographs or video footage will be acquired along transects to characterise sensitive habitats and features.

Dimensions: This technique involves no intrusive seabed sampling.

Location: To be determined following interpretation of geophysical data. This will be undertaken on board the survey vessel, if the geophysical and benthic surveys are undertaken as one campaign

Equipment: The exact equipment for use will be known following the appointment of survey contractor. A SeaSpyder using Canon EOS 100D Digital Still Camera may be taken as a typical example of equipment that could be used for this activity, or similar with dedicated strobe and an integrated video system capable of performing full HD recordings.

- i. Intertidal

Objective: The aim of the intertidal surveys will be to identify and map the extent and distribution of intertidal biotopes.

Method: Intertidal floral and faunal surveys at proposed cable landfall locations to include transects, quadrats and core sampling.

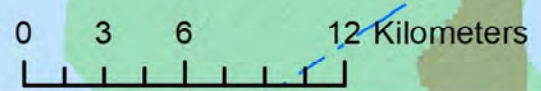
Location: The exact location of the intertidal surveys will not be known until a preferred export cable route and landfall have been identified. At this time, it is assumed that the cable landfall site could be located anywhere along the coast within the FLAA.

- d. Bird, Marine Mammal and Reptile Survey

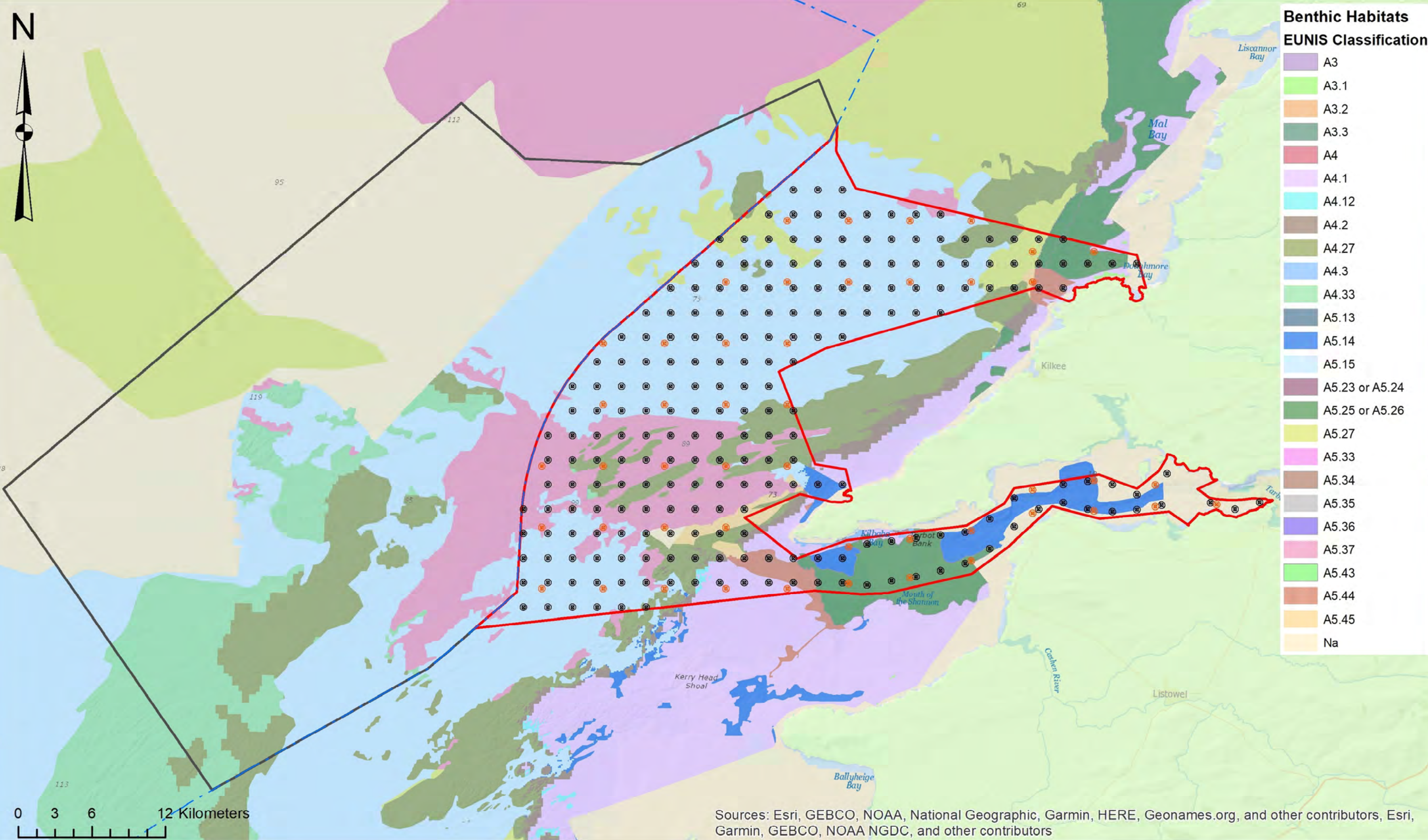
Objective: The purpose of the proposed bird, marine mammal and reptile survey is to record the species type and distribution of marine mammal, turtle and bird species observed in the FLAA.

Method: Boat based marine mammals/reptile and seabird surveys including towed hydrophonic acoustic array and static acoustic monitoring using C-PODS. Aerial and drone surveys may also be utilised.

Location: To be determined based on the results of the geophysical and geotechnical surveys.



- Benthic Habitats**
EUNIS Classification
- A3
 - A3.1
 - A3.2
 - A3.3
 - A4
 - A4.1
 - A4.12
 - A4.2
 - A4.27
 - A4.3
 - A4.33
 - A5.13
 - A5.14
 - A5.15
 - A5.23 or A5.24
 - A5.25 or A5.26
 - A5.27
 - A5.33
 - A5.34
 - A5.35
 - A5.36
 - A5.37
 - A5.43
 - A5.44
 - A5.45
 - Na



Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Clarus Offshore Wind Farm

Map 26

Indicative Sampling Locations

- Legend**
- Foreshore Licence Application Area
 - Contiguous Project Area
 - Indicative Grab Sample Locations
 - Indicative CPT/Borehole/Vibrocore Locations
 - Irish Territorial Sea 12 nm Limit
- Data source: EMODnet

Ver	Date	Drawn by	Checked	Approved
V1	13/10/2021	AM	EW	SDP
Map prepared by: Agnieszka Matysik, MEngSc in Environmental Engineering, PGD in Sustainable Energy, HDGGIS				
Filename: C003IE_FIG_IndicativeSamplingLocations_V1.0_202110				Size A3
Scale: 1:400,000		Printed @ A3		
Coordinate System: IRENET95 Irish Transverse Mercator Projection: Transverse Mercator				



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2.6 Wind Resource and Metocean Survey

Objective: The purpose of the proposed wind resource and metocean survey is to investigate wind, wave and tidal conditions within the FLAA.

Equipment: The exact equipment for use will be known following a procurement process. Up to two SEAWATCH Wind LiDAR Buoys or similar (with marker buoys next to each), up to five Acoustic Doppler Current Profilers (ADCP) and up to two Waverider buoys are proposed to be used for this activity.

Method: The LiDAR buoys will be moored using a mooring chain and a concrete anchor (subject to the supplier's preferred methodology). The buoys will be moored to the seabed for a duration of approximately 12 to 36 months and will be powered by solar panels and micro wind turbine generators. The buoys are typically yellow in colour and will be clearly marked with two navigation lights (typically flashing amber, 5 flashes every 20 seconds, nominal range 3-6 nautical mile (NM) visibility and fitted with a Radar reflector). The ADCPs will be deployed via a vessel on-board crane and will sit on the seabed. Waverider buoys are weighted to the seafloor using a chain, with the chain having a footprint of approximately 1.5m x 1.5m. The buoys are typically yellow in colour and include an amber LED with a programable ODAS flash sequence with three NM visibility.

Location: Exact details of the LiDAR buoys, Waverider buoys and ADCP deployment locations within the FLAA, associated mooring arrangement and installation vessel will not be available until a contract has been awarded.

2.7 General Requirements

The survey contractor and vessels will comply with international and national statute as appropriate. In addition, the following standard environmental procedures/protocols will be followed during the survey campaign:

- All vessels will comply with the latest International Maritime Organization (IMO), Safety of Life at Sea (SOLAS) and environmental requirements for their classification and with any national requirement of the territorial or offshore waters to be operated in.
- The contractor will take particular care when handling or storing hazardous materials, radiation sources and chemicals.
- Liquid or non-liquid pollutants or waste material will not be dumped, thrown, or otherwise disposed of into the sea.
- All refuse and materials shall be kept onboard the vessel and safely disposed of onshore according to the MARPOL Convention.
- All substances handled and/or used whilst undertaking the works will be handled, used, stored, and documented in accordance with assessments and recommendations of the Control of Substances Hazardous to Health (COSHH) Regulations 1994.
- Where Fuels, Oils and Lubes are required to be stored on boats, suitable containers will be used and stowed to allow ventilation and safe dissipation of any accidental leaked gas and retention of any leaked liquid.
- No liquid will be discharged into the water at any stage of the work on site. No smoking will be permitted in the vicinity of fuel in storage or when in use.
- In line with ICPC Recommendations, geotechnical and environmental sampling locations will be positioned a minimum of 250m from third-party assets e.g. pipelines. All asset owners will be contacted prior to survey to determine if proximity agreements are required.

- Commissioners for Irish Lights (CIL) standard navigational safety requirements will be adhered to with regards to positioning, mooring, marking and lighting of all equipment deployed under the Foreshore Licence.
- Removal of all equipment deployed under the Foreshore Licence and return of the seabed to its original condition.

3. ENVIRONMENTAL BASELINE

An understanding of the potential effects from an operation on the environment requires a clear understanding of the present state of the environmental baseline. For the purposes of this report, this section focuses on the environmental receptors which have the potential to be affected by the proposed site investigations.

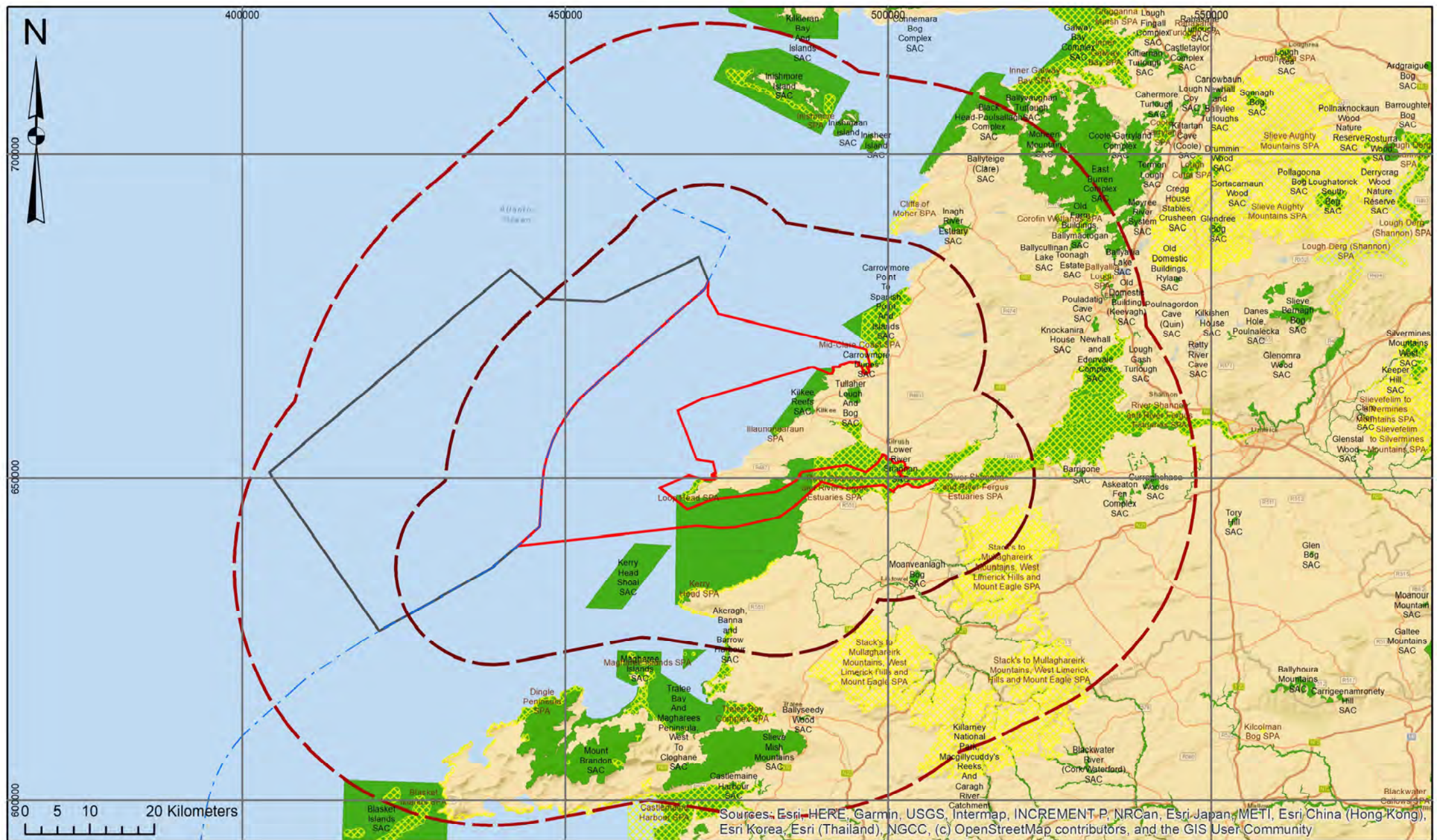
The description of the environment is based on publicly available data sources, as referenced in the text.

3.1 Protected Sites

All Natura 2000 sites (SACs and SPAs) within 15km of the FLAA are shown on Figure 3-1, Map 3 (Section 4.3) and are listed in Table 3-1. The determination of the search area for protected sites is described in Section 4.2.2.

Table 3-1 Natura 2000 sites within 15km

Designation	Site Code & Name
SAC	IE002165 Lower River Shannon
SAC	IE002264 Kilkee Reefs
SAC	IE001021 Carrowmore Point to Spanish Point And Islands
SAC	IE002250 Carrowmore Dunes SAC
SAC	IE002263 Kerry Head Shoal
SPA	IE004189 Kerry Head
SPA	IE004114 Illaunonearaun
SPA	IE004182 Mid-Clare Coast
SPA	IE004077 River Shannon and River Fergus Estuaries
SPA	IE004119 Loop Head
SPA	IE004161 Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle
SPA	IE004188 Tralee Bay Complex



Clarus Offshore Wind Farm

Map 6

Natura 2000

Legend

- Irish Territorial Sea 12 nm Limit
 - Foreshore Licence Application Area
 - FLAA 15km Buffer
 - FLAA 40km Buffer
 - SPA
 - SAC
 - Contiguous Project Area
- Data source: NPWS, DCCAE

Ver	Date	Drawn by	Checked	Approved
V1	30/09/2021	AM	EW	SDP
Map prepared by: Agnieszka Matysik, MEngSc in Environmental Engineering, PGD in Sustainable Energy, HDGGIS				
Filename: C:\03E_FIG_Natura2000_V1_0_20210930				Size A3
Scale: 1:750,000		Printed @ A3		
Coordinate System: IRENET95 Irish Transverse Mercator Projection: Transverse Mercator				



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3.2 Intertidal and Benthic Communities

Intertidal and benthic ecology comprises the habitats and species (flora and fauna) present in, on or closely associated with the seabed. A high-level assessment of the key sensitive intertidal and benthic habitats and species within the FLAA has been made by reviewing the European Marine Observation Data Network (EMODnet) Seabed Habitats project (www.emodnet-seabedhabitats.eu). This provides broad-scale predictive mapping based on physical hydrographic information within different habitats areas and water depths (EMODnet 2021).

This data is predictive rather than definitive; however, it does provide some indication to the types of benthic habitats that may be found within the FLAA. The habitats identified within the FLAA, along with their European Nature Information System (EUNIS) code, are listed in Table 3-2 and shown in Figure 3-2, Map 4.

Table 3-2 Intertidal and benthic communities

EUNIS code	EUNIS name	Typical fauna
A3	Infralittoral rock and other hard substrata	Broadscale habitat
A3.1	Atlantic and Mediterranean high energy infralittoral rock	Rocky habitats in the infralittoral zone subject to exposed to extremely exposed wave action or strong tidal streams. Typically, the rock supports a community of kelp <i>Laminaria hyperborea</i> with foliose seaweeds and animals, the latter tending to become more prominent in areas of strongest water movement. The depth to which the kelp extends varies according to water clarity. The sublittoral fringe is characterised by dabberlocks <i>Alaria esculenta</i> .
A4	Circalittoral rock and other hard substrata	Broadscale habitat
A4.1	Atlantic and Mediterranean high energy circalittoral rock	Occurs on extremely wave-exposed to exposed circalittoral bedrock and boulders subject to tidal streams ranging from strong to very strong. Typically found in tidal straits and narrows. The high energy levels found within this habitat complex are reflected in the fauna recorded. Sponges such as <i>Pachymatisma johnstonia</i> , <i>Halichondria panicea</i> , <i>Esperiopsis fucorum</i> and <i>Myxilla incrustans</i> may all be recorded. Characteristic of this habitat complex is the dense 'carpet' of the hydroid <i>Tubularia indivisa</i> . The barnacle <i>Balanus crenatus</i> is recorded in high abundance on the rocky substrata. On rocky outcrops, <i>Alcyonium digitatum</i> is often present. In EUSeaMap broad-scale predictive mapping this habitat is classified as 'circalittoral rock and biogenic reef'. It is therefore possible that EC Habitats Directive Annex listed habitat biogenic reef maybe observed in these areas.
A4.12	Sponge communities on deep circalittoral rock	Occurs on deep (commonly below 30m depth), wave-exposed circalittoral rock subject to negligible tidal streams. The sponge component of this biotope is the most striking feature. <i>Phakellia ventralabrum</i> , <i>Axinella infundibuliformis</i> , <i>Axinella dissimili</i> and <i>Stelligera stuposa</i> dominate. Other sponge species frequently found on exposed rocky coasts are also present in low to moderate abundance. These include <i>Cliona celata</i> , <i>Polymastia boletiformis</i> , <i>Haliclona viscosa</i> , <i>Pachymatisma johnstonia</i> , <i>Dysidea fragilis</i> , <i>Suberites carnosus</i> , <i>Stelligera rigida</i> , <i>Hemimycale columella</i> and <i>Tethya aurantium</i> .
A4.2	Atlantic and Mediterranean moderate energy circalittoral rock	Mainly occurs on exposed to moderately wave-exposed circalittoral bedrock and boulders, subject to moderately strong and weak tidal streams. This habitat type contains a broad range of biological subtypes, from echinoderms and crustose communities (A4.21) to Sabellaria reefs (A4.22) and circalittoral mussel beds (A4.24).
A4.27	Faunal communities on deep moderate energy circalittoral rock	These communities populate hard substrata with low hydrodynamics and strong sedimentation.
A4.3	Atlantic and Mediterranean low energy circalittoral rock	Occurs on wave-sheltered circalittoral bedrock and boulders subject to mainly weak/very weak tidal streams. The biotopes identified within this habitat type are

EUNIS code	EUNIS name	Typical fauna
		often dominated by encrusting red algae, brachiopods (<i>Neocrania anomala</i>) and ascidians (<i>Ciona intestinalis</i> and <i>Ascidia mentula</i>).
A4.33	Faunal communities on deep low energy circalittoral rock	No description available.
A5.13	Infralittoral coarse sediment	Moderately exposed habitats with coarse sand, gravelly sand, shingle and gravel in the infralittoral, are subject to disturbance by tidal steams and wave action. Such habitats found on the open coast or in tide-swept marine inlets are characterised by a robust fauna of infaunal polychaetes such as <i>Chaetozone setosa</i> and <i>Lanice conchilega</i> , cumacean crustacea such as <i>Iphinoe trispinosa</i> and <i>Diastylis bradyi</i> , and venerid bivalves. Habitats with the lancelet <i>Branchiostoma lanceolatum</i> may also occur.
A5.14	Circalittoral coarse sediment	Tide-swept circalittoral coarse sands, gravel and shingle generally in depths of over 15-20m. This habitat may be found in tidal channels of marine inlets, along exposed coasts and offshore. This habitat, as with shallower coarse sediments, may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. Certain species of sea cucumber (e.g. <i>Neopentadactyla</i>) may also be prevalent in these areas along with the lancelet <i>Branchiostoma lanceolatum</i> .
A5.15	Deep circalittoral coarse sediment	Offshore (deep) circalittoral habitats with coarse sands and gravel or shell. This habitat may cover large areas of the offshore continental shelf although there is relatively little quantitative data available. Such habitats are quite diverse compared to shallower versions of this habitat and generally characterised by robust infaunal polychaete and bivalve species. Animal communities in this habitat are closely related to offshore mixed sediments and in some areas settlement of horse mussel (<i>Modiolus modiolus</i>) larvae may occur and consequently these habitats may occasionally have large numbers of juvenile <i>M. modiolus</i> . In areas where the mussels reach maturity their byssus threads bind the sediment together, increasing stability and allowing an increased deposition of silt leading to the development of the biotope A5.622.
A5.25 or A5.26	Circalittoral fine sand or Circalittoral muddy sand	<p>A5.25 - Clean fine sands with less than 5% silt/clay in deeper water, either on the open coast or in tide-swept channels of marine inlets in depths of over 15-20 m. The habitat may also extend offshore and is characterised by a wide range of echinoderms (in some areas including the sea urchin (<i>Echinocyamus pusillus</i>), polychaetes and bivalves. This habitat is generally more stable than shallower, infralittoral sands and consequently supports a more diverse community.</p> <p>A5.26 - Circalittoral non-cohesive muddy sands with the silt content of the substratum typically ranging from 5% to 20%. This habitat is generally found in water depths of over 15-20m and supports animal-dominated communities characterised by a wide variety of polychaetes, bivalves such as <i>Abra alba</i> and <i>Nucula nitidosa</i>, and echinoderms such as <i>Amphiura</i> spp and <i>Ophiura</i> spp., and <i>Astropecten irregularis</i>. These circalittoral habitats tend to be more stable than their infralittoral counterparts and as such support a richer infaunal community.</p>
A5.27	Deep circalittoral sand	Offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. Very little data is available on these habitats however they are likely to be more stable than their shallower counterparts and characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms.
A5.37	Deep circalittoral mud	In mud and cohesive sandy mud in the offshore circalittoral zone, typically below 50-70 m, a variety of faunal communities may develop, depending upon the level of silt/clay and organic matter in the sediment. Communities are typically dominated by polychaetes but often with high numbers of bivalves such as <i>Thyasira</i> spp., echinoderms and foraminifera.
A5.44	Circalittoral mixed sediments	Mixed (heterogeneous) sediment habitats in the circalittoral zone (generally below 15-20 m) including well mixed muddy gravelly sands or very poorly sorted mosaics of shell, cobbles and pebbles embedded in or lying upon mud, sand or gravel. Due to the variable nature of the seabed a variety of communities can develop which are often very diverse. A wide range of infaunal polychaetes, bivalves, echinoderms and burrowing anemones such as <i>Cerianthus lloydii</i> are often present in such habitat and the presence of hard substrata (shells and stones) on the surface enables epifaunal species to become established, particularly hydroids such as <i>Nemertesia</i> spp and

EUNIS code	EUNIS name	Typical fauna
		<i>Hydrallmania falcata</i> . The combination of epifauna and infauna can lead to species rich communities. Coarser mixed sediment communities may show a strong resemblance, in terms of infauna, to biotopes within the A5.1. However, infaunal data for this habitat type is limited to that described under the biotope A5.443, and so are not representative of the infaunal component of this habitat type.
A5.45	Deep circalittoral mixed sediments	Offshore (deep) circalittoral habitats with slightly muddy mixed gravelly sand and stones or shell. This habitat may cover large areas of the offshore continental shelf although there is relatively little data available. Such habitats are often highly diverse with a high number of infaunal polychaete and bivalve species. Animal communities in this habitat are closely related to offshore gravels and coarse sands and in some areas populations of the horse mussel (<i>Modiolus modiolus</i>) may develop in these habitats.

Source: EMODnet (2021)

The seabed sediments and habitats within the FLAA are variable and reflective of the different sedimentation processes within the area. The sediments within the most upstream part of the Shannon Estuary of the FLAA are not classified within the EUNIS system and a habitat description for these sediments is not available. The seabed sediments within the mouth of the Shannon Estuary are largely comprised of high energy circalittoral coarse sediment (A5.14) and circalittoral fine sand (A5.25) or circalittoral muddy sand (A5.26). These habitats are characteristic for tidal channels of marine inlets and may be characterised by robust infaunal polychaetes, echinoderms, mobile crustacea and bivalves.

Within the outer reaches of the Shannon Estuary and along the coast is an area classified as circalittoral rock (A4.1). Along the coastline there is also a band of A4.2 – Atlantic and Mediterranean moderate energy circalittoral rock which runs almost parallel to A4.1. These habitats are likely to be dominated by sponges, hydroids, barnacles and potentially Sabellaria reef and mussel beds.

Further out from the shore, there is a large area roughly parallel to the coastline of faunal communities on deep moderate energy circalittoral rock (A4.27). These communities populate hard substrata with low hydrodynamics and strong sedimentation. The rest of the FLAA is primarily dominated by, deep circalittoral coarse sediment (A5.15) and deep circalittoral mud (A5.37). These sediments are likely to be characterised by polychaetes, bivalves and echinoderms. There is also an isolated area of A5.27 near the northwest corner of the application, which is continued outside of the FLAA.

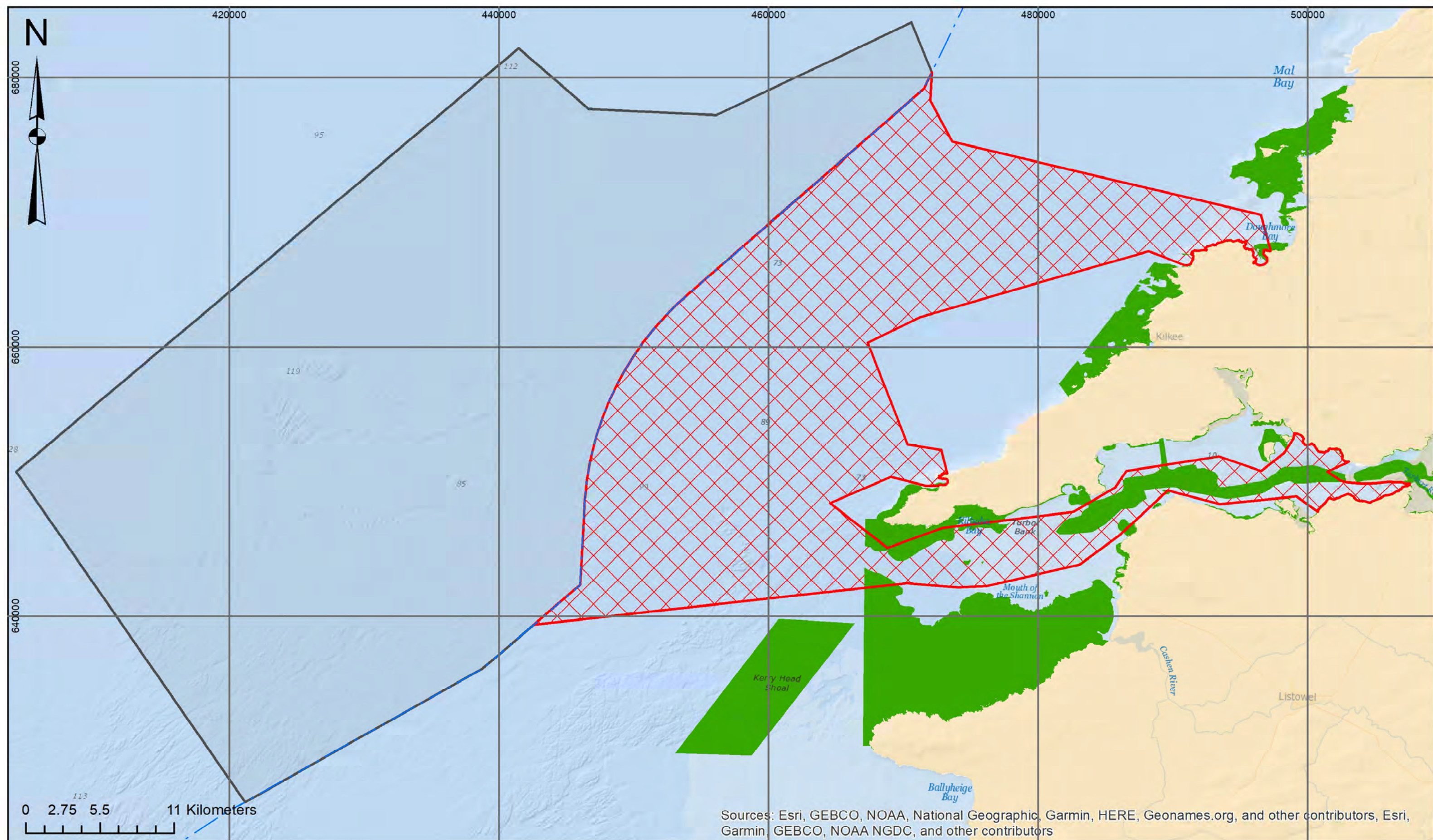
3.2.2 Reefs

The FLAA overlaps with three protected sites that are designated for the Qualifying Interest, Annex I reefs namely; Lower River Shannon SAC, Kilkee Reefs SAC, and Carrowmore Dunes SAC (Figure 3-3, Map 5).

The Lower River Shannon SAC supports a wide range of reef habitat, including the following reef community types: Furoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone- dominated subtidal reef community; and Laminaria- dominated community complex (NPWS, 2012).

Almost the entirety of the Kilkee Reefs SAC is covered by subtidal reef habitat. The exposed nature of the site provides ideal conditions for extensive, dense blue mussel (*Mytilus edulis*) beds in the lower mid-shore (NPWS, 2014b). Moving seaward, the shallow sublittoral reefs are steeply sloping and extremely or moderately exposed to wave action. These reef communities may be very species rich, with many algal, kelp and sponge species present, along with sea fans and sea slugs as the depth increases. At depths below 25 m the reefs have animal-dominated communities with sparse algae.

Within Carrowmore Dunes SAC there are two reef communities, intertidal reef complex and Laminaria-dominated community complex which are largely located to the north and southwest of the site (NPWS 2013).



Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Clarus Offshore Wind Farm

Map 7

Reefs

Legend

- Foreshore Licence Application Area
- Contiguous Project Area
- Cable Investigation Area
- Reefs (1170)
- Irish Territorial Sea 12 nm Limit

Data source: NPWS, DCCAE, EMODnet

Ver	Date	Drawn by	Checked	Approved
V1	30/09/2021	AM	EW	SDP
Map prepared by: Agnieszka Matysik, MEngSc in Environmental Engineering, PGD in Sustainable Energy, HDGGIS				
Filename: C003IE_FIG_Reefs_V1.0_20210930				Size A3
Scale: 1:360,000		Printed @ A3		
Coordinate System: IRENET95 Irish Transverse Mercator Projection: Transverse Mercator				



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3.3 Birds

The coastal sea cliffs, estuaries and offshore islands of Ireland are host to nationally and internationally important bird species, with many areas designated as SPAs.

At least 45 species of seabird (including divers and grebes) have been recorded during at-sea surveys in Irish waters, of which 24 seabird species regularly breed around Ireland (Cummins, Lauder and Tierney, 2019, Pollock et al 2008, Mackey et al 2004). This includes globally important populations of Manx shearwater, Storm petrel and Roseate Tern (Cummins, Lauder and Tierney, 2019). In addition, a further 59 species of waterfowl and wader regularly occur at coastal sites around Ireland such as estuaries; including 5 grebe species, 2 heron species, 26 species of wildfowl and 26 wader species (Crowe 2005). Some of these species are migratory and are present only during migration periods in spring and autumn; others come to Ireland to breed or to spend the winter, while some are resident all year round.

The FLAA lies within or near the following SPAs, designated for breeding and over-wintering bird species:

- Kerry Head SPA
- Illaunonearaun SPA
- Mid-Clare Coast SPA
- River Shannon and River Fergus Estuaries SPA
- Loop Head SPA
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA
- Tralee Bay Complex SPA

3.4 Fish

3.4.1 Spawning and Nursery Grounds

Offshore gravelly sediments on the Irish continental shelf are dominated by elasmobranchs (rays, skates and sharks), gurnards, haddock, hake, pollock, large whiting and a few flatfish species. Soft, muddy sediments have higher numbers of gadoids and lower densities of plaice and dab than found in shallower sandy areas. Pelagic species such as mackerel, horse mackerel and herring are present within Irish waters largely on a seasonal basis, migrating between spawning and feeding grounds (DCENR 2015). Fish communities present within coastal areas include juvenile flatfish and sandeel over sandy sediments, with seasonal influxes of sprat, herring, juvenile gadoids and mullet. Rocky shore fish assemblages are diverse and dominated by small species such as wrasses, gobies and blennies, as well as juvenile pollock and saithe (DCENR 2015).

The waters off the southwest coast of Ireland from Waterford Harbour around to Slyne Head, including the entire FLAA, have been designated a Biologically Sensitive Area (BSA) by the European Union (Marine Institute 2020c)). This is in recognition of the important juvenile fish nursery areas off the coast of Ireland as determined by UK Scottish, Irish and French groundfish surveys. The FLAA is within the spawning and nursery grounds for ten commercially important fish species (Map 9). A summary of the spawning and nursery periods for nine of these commercially important fish species is outlined in Table 3-3. The FLAA is a spawning ground for Atlantic herring (*Clupea harengus*) and haddock (*Melanogrammus aeglefinus*) (see Table 3-3 below). As indicated by Figure 3-5, Map 7, the FLAA is also within the nursery grounds of white-bellied angler monk (*Lophius piscatorius*) and black-bellied angler monk (*Lophius budegassa*), however no data on spawning and nursery period is available for this species.

Table 3-3 Summary of spawning and nursery periods for commercially important fish species within the FLAA

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
White-bellied Anglerfish (<i>Lophius piscatorius</i>) (N) †	N	N	N	N	N	N	N	N				
Atlantic Cod (<i>Gadus morhua</i>) (N)	N	N	N	N	N	N						
European Hake (<i>Merluccius merluccius</i>) (N)	N	N	N	N	N	N	N	N				
Haddock (<i>Melanogrammus aeglefinus</i>) (S) (N)		SN*	SN*	SN*	SN	N	N					
Atlantic herring (<i>Clupea harengus</i>) (S)								S	S	S	S	
Horse Mackerel (<i>Trachurus trachurus</i>) (N)			N	N	N	N	N	N	N	N		
Atlantic mackerel (<i>Scomber scombrus</i>) (N) †			N	N	N	N	N	N	N			
Megrim (<i>Lepidorhombus whiffiagonis</i>) (N)	N	N	N	N	N	N						
Whiting (<i>Merlangius merlangus</i>) (N)		N	N	N	N	N	N	N				

Key = S = Spawning, N = Nursery, SN = Spawning and Nursery, Blank = No Data, † High intensity nursery and *peak spawning period.

Grey shading indicates likely survey period.

Source: Coull et al. (1998); ICES (2009). Ellis et al. (2012). Marine Institute (2020a), O'Sullivan et al 2013.

Note: Black bellied angler fish has not been included as there is currently no reference for this species spawning or nursery period.

3.4.2 EC Habitats Directive Annex II Species

The EC Habitats Directive Annex II listed species, sea lamprey (*Petromyzon marinus*), river lamprey (*Petromyzon marinus*), brook lamprey (*Lampetra planeri*) and Atlantic salmon (*Salmo salar*) are listed as Qualifying Interests of the Lower River Shannon SAC. Additionally, sea lamprey, river lamprey and Atlantic salmon are listed as Qualifying Interests of the Castlemaine Harbour SAC. All of these (except for brook lamprey) are migratory species that may be found in the FLAA at certain times of the year:

- Sea lamprey – late April to early June
- River lamprey – September to June
- Atlantic salmon – May to June and autumn months

Source: (National Biodiversity Data Centre 2020)

Brook lamprey only inhabit fresh water and therefore will not be observed in the FLAA.

Species, such as Atlantic salmon and sea and river lamprey have a lower sensitivity to sound (in comparison to Twaite shad another Annex II fish species) as their swim bladder is located far from the ear (Popper et al 2014). The hearing of these species only involves particle motion and not sound pressure, and they are therefore less susceptible to impacts from the proposed site investigations. These species are susceptible to internal injury (barotrauma) from a rapid pressure change, i.e. unexploded ordnance detonation, which does not form part of the proposed site investigations (Popper et al 2014). Of the SACs within a 40km radius designated for migratory fish species, none of

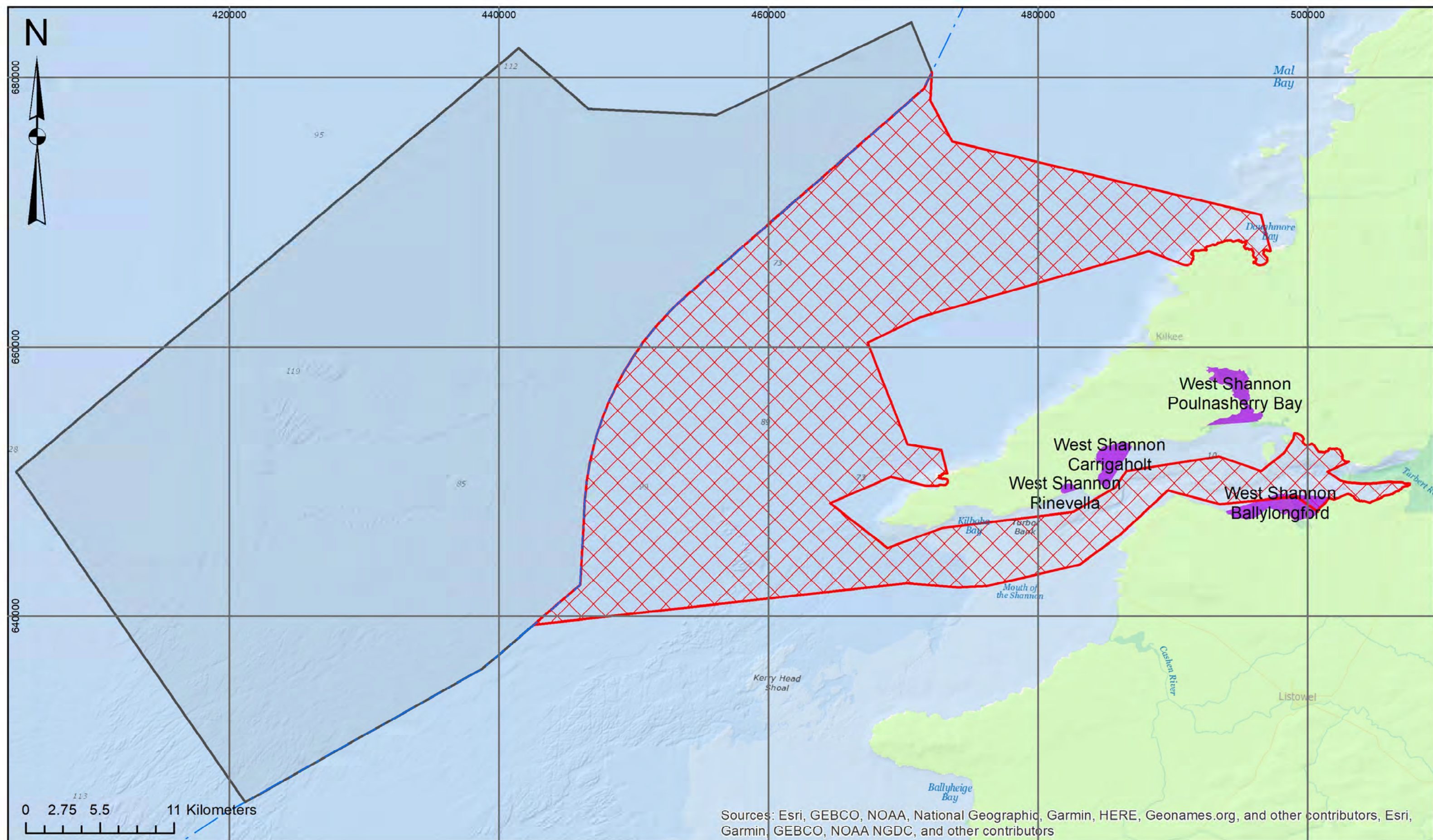
these protected sites list Twaite shad as a Qualifying Interest. The determination of the search area for protected sites is described in Section 4.2.2.

Brown, or edible, crabs and lobster are distributed throughout the continental shelf area to the north and west of Ireland and the rocky areas of the Irish Sea. Populations of scallop and queen scallop may also occur in areas of gravelly sediments (DCENR 2015).

3.4.3 Aquaculture and Shellfish Waters

There are two aquaculture sites which (partially) overlap the FLAA: Shannon Estuary Oysters and Ballylongford Bay Mussels, see Figure 3-6, Map 8.

The FLAA is located within the West Shannon Ballylongford designated shellfish waters and adjacent to the West Shannon Carrigaholt designated shellfish waters. The FLAA is also located 1.88km from the West Shannon Rinevella designated shellfish waters, see Figure 3-4, Map 6.








Clarus Offshore Wind Farm

Map 8

Designated Shellfish Waters

Legend

-  Foreshore Licence Application Area
-  Contiguous Project Area
-  Cable Investigation Area
-  Designated Shellfish Waters
-  Irish Territorial Sea 12 nm Limit

Data source: DHLGH

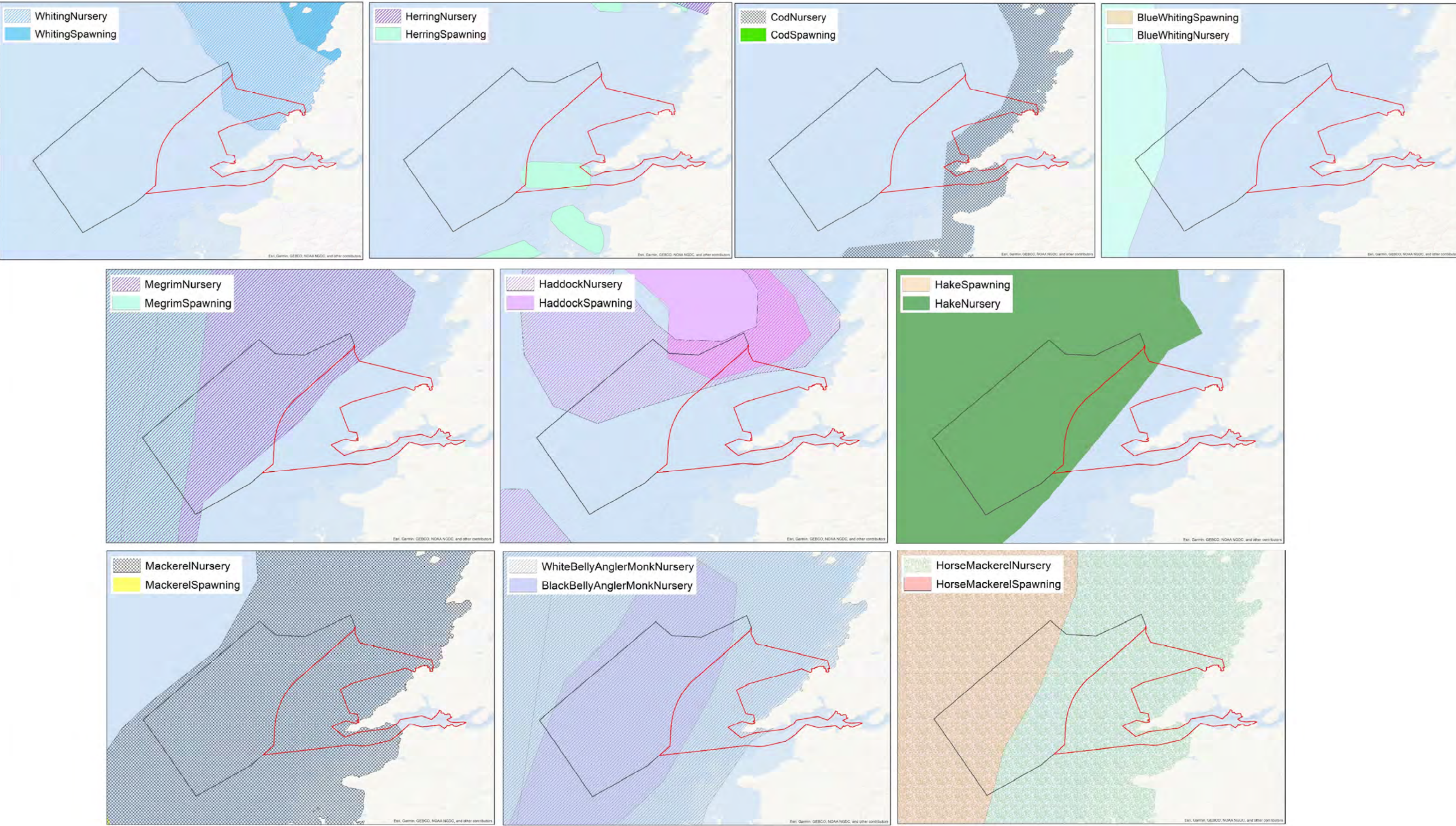
Ver	Date	Drawn by	Checked	Approved
V1	30/09/2021	AM	EW	SDP
Map prepared by: Agnieszka Matysik, MEngSc in Environmental Engineering, PGD in Sustainable Energy, HDGGIS				
Filename: C003IE_FIG_DSW_V1.0_20210930				Size A3
Scale: 1:360,000		Printed @ A3		
Coordinate System: IRENET95 Irish Transverse Mercator Projection: Transverse Mercator				



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Clarus Offshore Wind Farm

Map 9

Fish Spawning and Nursery

Legend

- Foreshore Licence Application Area
- Contiguous Project Area

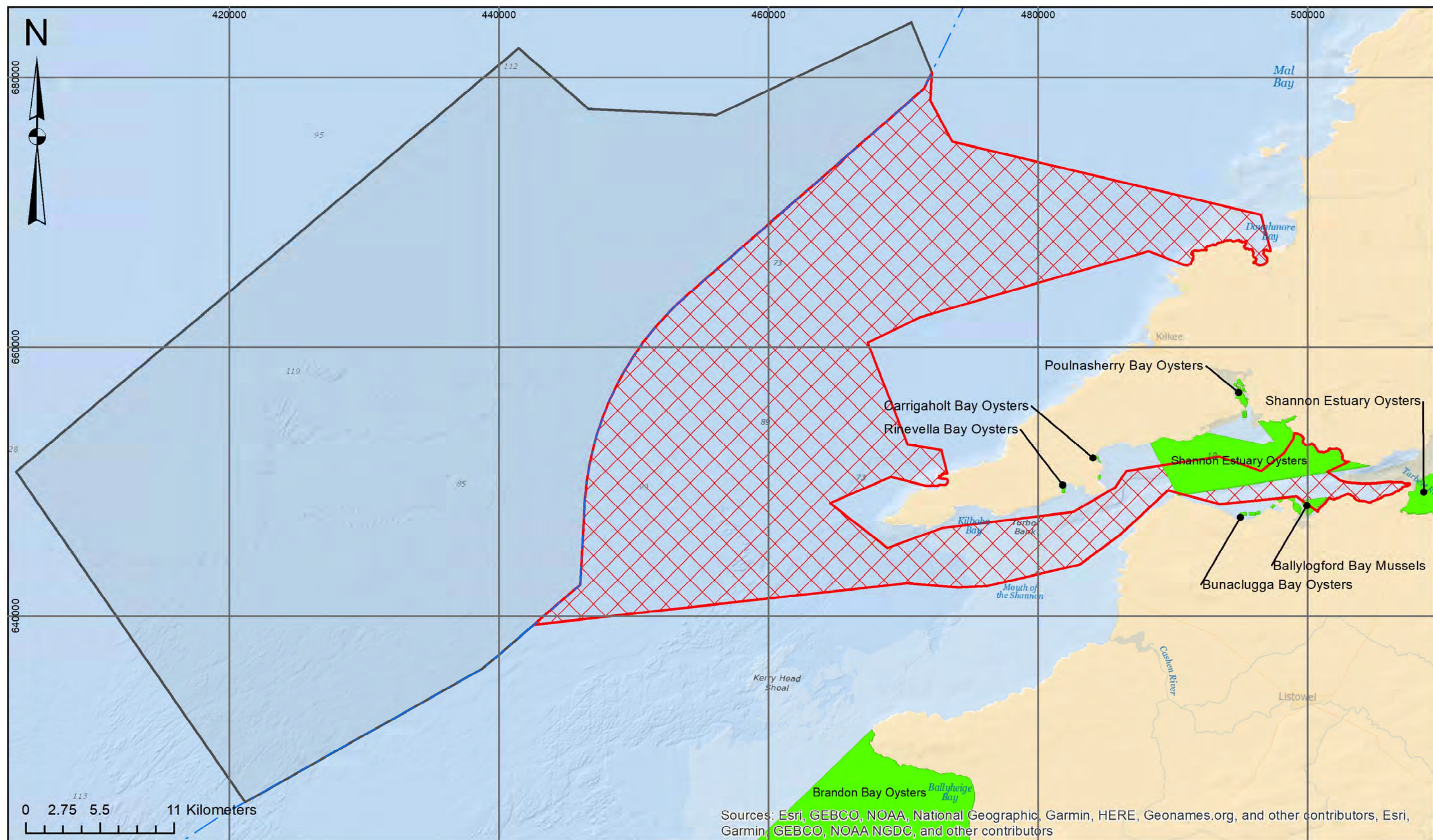
Data from the Species distribution Sea Fisheries theme accessed through Ireland's Marine Atlas at atlas.marine.ie.
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap Contributors, and the GIS User Community

Ver	Date	Drawn by	Checked	Approved
V1	30/09/2021	AM	EW	SDP
Map prepared by: Agnieszka Matysik, MEngSc in Environmental Engineering, PGD in Sustainable Energy, HDGGIS				
Filename: C003IE_FIG_FishSpawningNursery_V1.0_20210930				Size A3
Scale: 1:420,000		Printed @ A3		
Coordinate System: IREN95 Irish Transverse Mercator Projection: Transverse Mercator				



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Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Clarus Offshore Wind Farm

Map 11

Aquaculture

Legend

- Foreshore Licence Application Area
- Contiguous Project Area
- Cable Investigation Area
- Aquaculture Site
- Irish Territorial Sea 12 nm Limit

Aquaculture Licence GIS Dataset from the Department of Agriculture, Food and the Marine; accessed through opendata@agriculture.gov; 02/02/2021

Ver	Date	Drawn by	Checked	Approved
V1	30/09/2021	AM	EW	SDP
Map prepared by: Agnieszka Matysik, MEngSc in Environmental Engineering, PGD in Sustainable Energy, HDGGIS				
Filename: C003IE_FIG_Aquaculture_V1_0_20210930				Size A3
Scale: 1:360,000		Printed @ A3		
Coordinate System: IRENET95 Irish Transverse Mercator Projection: Transverse Mercator				



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3.5 Marine Mammals

Marine mammals present in the FLAA are cetaceans (whales, dolphins and porpoises) and pinnipeds (seals), with European otter also recorded on the surrounding coastline by the National Biodiversity Data Centre (National Biodiversity Data Centre 2020).

Of the 24 species of cetacean recorded in Irish waters, approximately 10 of these have been recorded off the west coast and may be present in the FLAA at least on a seasonal basis. The common bottlenose dolphin and harbour porpoise are the only whale and dolphin species which are listed as Annex II and frequently sighted within the FLAA. The sightings of these species are listed in Table 3-4. Common bottlenose dolphin are the most abundant and commonly sighted species in the area. In addition, the FLAA overlaps the Lower River Shannon SAC, a Qualifying Interest of which is bottlenose dolphin.

The Irish Whale and Dolphin Group (IWDG) website (<http://www.iwdg.ie/>) has 370 records of cetacean sightings either within the FLAA or within an approximately 20km radius of the FLAA for the period November 2019 to October 2021. Annex II species identified include harbour porpoise and common bottlenose dolphin (Annex IV species have been assessed in the supporting documenting 'Risk Assessment for Annex IV Species', Document reference: P2399_R5461) Observations of species within and in the surrounding water of the FLAA have been included in Table 3-4.

Most cetaceans are wide-ranging, and individuals encountered within Irish waters form part of a much larger biological population whose range extends into adjacent jurisdictions. As a result, management units (MUs) have been outlined for seven of the common regularly occurring species following advice from the Sea Mammals Research Unit (SMRU) and the International Council for the Exploration of the Sea (ICES). These provide an indication of the spatial scales at which effects of anthropogenic activities should be taken into consideration. The relevant MUs are listed in Table 3-4.

Table 3-4 Sightings and strandings for commonly occurring cetaceans within the FLAA and surrounding waters

Species	Frequency of sightings*	IWDG sightings (November 2019 – October 2021)***	Applicable MU****	Abundance of animals in MU****
Toothed whales (odontocetes)				
Common bottlenose dolphin (<i>Tursiops truncatus</i>)	Common year round but most frequent in summer.	76 sightings some of which are within the FLAA. Recorded during all months of the year.	West Coast of Ireland. Shannon Estuary	No data available
Harbour porpoise (<i>Phocoena phocoena</i>)	Common from June through the autumn. Peak period in July and August. Low numbers recorded for the remainder of the year.	29 sightings some of which are within the FLAA. Recorded during all months of the year.	Celtic and Irish Seas	47,229
Baleen whales (mysticetes)				

Sources: * Marine Institute (2020b) and Reid et al. (2003); ** National Biodiversity Data Centre (2020); *** IWDG (2020) **** ICES Management Units D (Irish seas) and DECC (2016).

All cetaceans are European Protected Species (EPS) protected under Annex IV of the EC Habitats Directive (92/43/EEC), which lists species of Community Interest in need of strict protection. It is an offence to deliberately capture, kill, injure, or disturb animals classed as EPS. In addition, harbour porpoise, bottlenose dolphin, grey seal and common/harbour seal are listed under Annex II of the Habitats Directive, which lists species whose conservation requires designation of SAC.

In 1997, the Habitats Directive was transposed into Irish national law through Statutory Instrument (S.I.) Number 94/1997 - European Communities (Natural Habitats) Regulations 1997. These were subsequently revised and consolidated in S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011, which covers the terrestrial environment and marine waters up to the 12 NM limit.

The Investigative FLAA is within the Celtic and Irish Sea MU for harbour porpoise (*Phocoena phocoena*). Within the MU there are five SACs designated for the conservation of harbour porpoise; Rockabill to Dalkey Island SAC and the Roaringwater Bay and Islands SAC in Irish waters; and the Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC, West Wales Marine / Gorllewin Cymru Forol SAC; North Anglesey Marine/ Gogledd Môn Forol SAC in UK waters (JNCC 2020a). As harbour porpoise are highly mobile species, animals from these European Sites may be visitors to the FLAA.

The FLAA also overlaps the Lower River Shannon SAC which is designated for populations of common bottlenose dolphin (*Tursiops truncatus*). The Shannon Estuary is a typical and important habitat for the species. Research has shown that the dolphins are resident, occur throughout the year and that the estuary is an important calving area (Berrow et al. 1996; Ingram 2000). The latest summer abundance estimate for the Lower River Shannon SAC is 139 (± 15 standard error (SE)) (Rogan et al. 2018), with smaller numbers using the estuary in the wintertime (Rogan et al. 2018; Englund et al., 2008). Within the framework of the species' range, current population definition and its ecology, the Shannon Estuary is therefore a critical habitat for bottlenose dolphins (Rogan et al 2002) in both a national and a European context.

Two species of seal are resident within Irish waters and are present in the FLAA; grey seal (*Halichoerus grypus*) and harbour (or common) seal (*Phoca vitulina*). Ireland's Marine Atlas identifies the coastline of the FLAA as within the distribution of Ireland's populations of both grey and harbour seal. Russel et al (2017) provide grey seal densities in the FLAA as <1 animals per 25km^2 whilst harbour seal densities are lower at <1 animal per 25km^2 . National Biodiversity Data Centre (2020) records with over 100 records for both harbour and grey seal within the FLAA. In addition, grey seal pups have been recorded at Loop Head at the mouth of the Shannon Estuary (Cadha et al 2005), indicating a potential haul out site.

The closest SACs to the FLAA that list grey seal as a Qualifying Interest are the Blasket Islands SAC (41km southwest of the FLAA) and Slyne Head Islands SAC (63km northwest of the FLAA). The closest SAC for harbour seal is the Kilkieran Bay and Islands SAC, 40 km north of the FLAA.

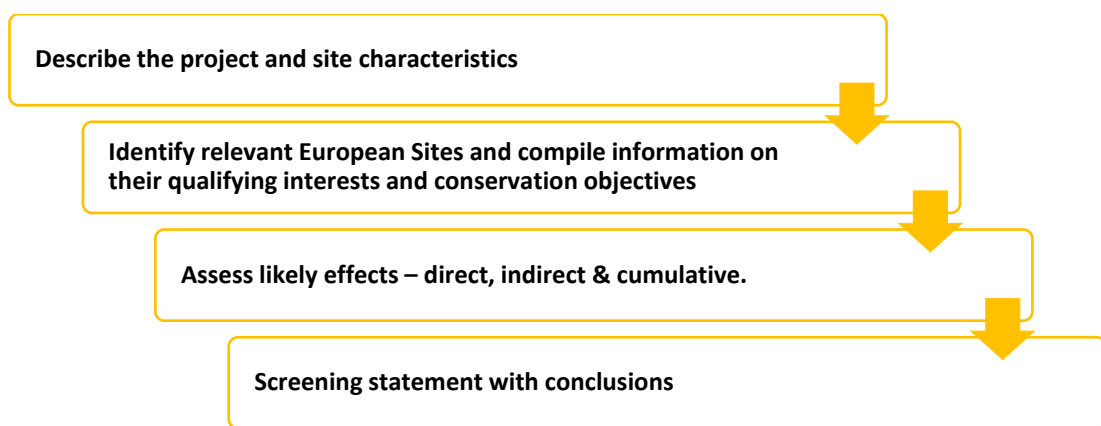
European Otter (*Lutra lutra*) are protected within Ireland under the Wildlife Amendment Act (2000) where it is now illegal to hunt, disturb, or intentionally kill otters. The otter is also listed on Annex II and Annex IV of the EU Habitats Directive (92/43/EEC). A review of the National Biodiversity Data Centre (<https://maps.biodiversityireland.ie/>) data for 2005 to 2021 showed occurrences of otter and otter signs along the coastline adjacent to the FLAA (National Biodiversity Data, 2021). Otter are also listed as a Qualifying Interest of the Lower River Shannon SAC.

4. STAGE 1 – SCREENING FOR APPROPRIATE ASSESSMENT (AA)

4.1 Approach to AA Screening

This AA screening has been undertaken according to guidance set out in the National Parks & Wildlife Service (NPWS) and DEHLG (2010) and following the process illustrated in Figure 4-1. It has considered all case law relevant to the Habitats Directive summarised in the recently issued European Commission Guidance (EC 2018) and has been undertaken without consideration of the application of mitigation.

Figure 4-1 AA Screening Process



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

4.2 Identification of Relevant European Sites

The potential for a European to be significantly affected depends on whether receptors which are designating features of a European Site:

- a. Can come into contact with the proposed site investigations; and
- b. Are sensitive to the proposed site investigations to the extent that the activity is likely to have an adverse effect on the conservation objectives for the features.

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 effects the proposed site investigations could have on these receptors and what the zone of influence for these receptors is, i.e. how far from the survey could a receptor be potentially affected;
3. Define search area for relevant sites using zone of influence and expert judgement.
4. Screen SACs and SPAs within these search areas to identify Qualifying Interests (QIs) / Special Conservation Interests (SCIs) and assess whether Interest Features of the European Site could be significantly affected by the proposed site investigations; and
5. Assess whether any SACs and SPAs further afield from the survey area have mobile QIs / SCIs which may travel into the zone of influence and have the potential to be significantly affected.

4.2.1 Identification of sensitive receptors

The receptors which could potentially be affected by the marine surveys and could be the QIs / SCIs of European Sites in the region are:

- Benthic habitats;
- Fish;
- Birds;
- Marine mammals; and
- Marine reptiles.

4.2.2 Identification of potential effects, defined zones of influence and search area

The 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 zone of influence (ZOI) – spatial extent over which effects may extend – has also been defined.

Irish Guidance (DEHLG, 2010) states that all sites within 15km should be screened. However, this approach does not take into consideration the mobility of the receptor and the zone of influence of the activities proposed. Therefore, although all European Sites with marine components within 15km of the FLAA have been screened, consideration has also been given to how sensitive receptors could be affected and what the zone of influence is likely to be in defining the search area for relevant European Sites.

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

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

- During the geotechnical and ecological surveys from the very small removal of sediment samples;
- Through very localised brief smothering by the deposition of risings from the geotechnical boreholes; and
- Through smothering by positioning of equipment on the seabed e.g. Jack-Up Barge (JUB) legs, or concrete anchors.

Given that sampling points have not been determined (positions shown on maps included with this application are indicative only), the zone of influence for benthic communities has been assumed to be the entire FLAA. Relevant sites would include SACs designated for Annex I habitats which support benthic communities. Therefore, only SACs designated for benthic habitats which the FLAA intersects have been screened for Annex I habitats.

Fish have the potential to be affected by the proposed site investigations from changes in underwater sound. Effects may range from temporary behavioural changes, or temporary hearing loss, through to migration pathways being impeded by a noise barrier. Of the migratory Annex II species known to occur in Irish waters, twaite shad (a member of the clupeid / herring family) are the only ones known to be highly sensitive to underwater noise changes. Nedwell et al (2012) show that clupeids will show strong avoidance behaviour at a distance of up to 66m for a noise source. However, there is the potential that the noise could also impede migration from rivers near the FLAA. European Sites within

40km of the FLAA have therefore been screened for the presence of twaite shad as a Qualifying Interest feature.

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. The most vulnerable birds to disturbance would be nesting birds in the breeding season in the immediate vicinity of the survey. 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 zone of influence of disturbance on nesting birds has been assessed as up to 2km from the FLAA.

To allow for the mobility of bird species which could forage into the zone of influence, all SPAs within 15km have been screened. While individuals from other sites outwith 15km may potentially be found foraging within the FLAA, they will not be found in significant numbers and so the site integrity of their original site will not be affected. The Special Conservation Interests have then been studied to determine the potential for interaction with the proposed survey works.

Marine mammals have the potential to be affected by changes in underwater noise. EC Habitats Directive Annex II listed species present in the FLAA include grey seal, harbour seal, European otter, common bottlenose dolphin and harbour porpoise.

The UK JNCC have established an effective deterrent range (EDR) of 5km for geophysical surveys (JNCC 2020) for cetaceans. The EDR represents the limit range at which disturbance effects have been detected (for example avoidance behaviour) specifically for harbour porpoise (Crocker & Fratantonio 2016, Crocker et al. 2019). Relevant sites would therefore include SACs designated for marine mammals within 5km of the FLAA. 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) could be present in the FLAA. The MU for harbour porpoise is the Celtic and Irish Sea; for common bottlenose dolphin two MUs are relevant, the West Coast of Ireland MU and Shannon Estuary MU (JNCC, 2015);
- Grey seal are known to travel large distances to forage, with individuals from the west coast of Ireland travelling around the coast to Northern Ireland and even Scotland in some instances (DECC, 2016);
- Harbour seal are not known to make trips greater than 50km from haul out sites (DECC, 2016)
- Otters are known to have a home range of 20km (NatureScot, 2020).

In summary, Table 4-1 defines the search areas used to identify relevant European Sites for screening.

Table 4-1 Search areas and zone of influence

Interest feature	Species	Search Area	Zone of influence
Fish	Twaite shad	40km	66m
Birds	Most bird species	15km	2km
	Divers, seaduck	15km	4km
Cetacean	Harbour porpoise	Celtic and Irish Sea MU	5km (disturbance)
	Bottlenose dolphin	West Coast of Ireland MU and Shannon Estuary MU	
Pinniped	Grey seal	West Coast of Ireland & Northern Ireland	

Interest feature	Species	Search Area	Zone of influence
	Harbour seal	50km	
European otter		FLAA + 20km	250m

4.2.3 In-combination effects

A search of Foreshore Licence Applications for surveys or other projects which could interact with the proposed site investigations was conducted using the Department of Housing, Local Government and Heritage (DHLGH) 'Applications and Determinations' webpage¹ on 04 November 2021. Commercial fisheries, shipping interests and recreational use have been scoped 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 FLAA were also not considered as they will not interact with the proposed site investigations.

As outlined in Table 3-5, two projects were identified on the DHLGH website which could potentially interact with the proposed site investigations. However, through membership of Wind Energy Ireland, and an internet search, Clarus Offshore Wind Farm Ltd. are aware of six additional proposed projects that could potentially overlap the FLAA. These are described below and where spatial information is available, this is shown in Map 3.

Other installations/projects within/in the vicinity of the FLAA include the Ballybunion metocean buoy found within the FLAA and the Sceirde (Skerd) Rocks wind farm project (FS006361) found >46km north of the FLAA in Bertraghboy Bay (see Figure 4-1, Map 24). These installations/projects have been scoped out of further assessment as there is no pathway for effect between them and the proposed site investigations.

Table 4-2 Foreshore Licence Applications (currently listed on DHLGH's website) which overlap with the FLAA

Name of development	Licence ref	Type of activity	Commencement date	Licence Status	Distance from FLAA (km)
ESB Moneypoint Ecological Survey Ballymacrinan Bay	FS007141	Ecological survey in the form of nine grab samples for infauna and granulometric analysis to help characterise subtidal habitat and benthic communities	Between 01/07/2020 to 31/10/2020	Approved 6th October 2020	Within FLAA
Eirgrid Cross Shannon 400 kV Electricity Cable	FS007083	The installation of submarine electricity cables across the Lower Shannon Estuary	Construction 2022 for operation by end of 2023	In progress (public consultation complete)	Within FLAA

ESB Moneypoint Ecological Survey - Ballymacrinan Bay

A Foreshore Licence (reference FS007141) was approved on the 6th October 2020 for an ecological survey. The ecological survey proposed consists of the collection of nine grab samples for infauna and granulometric analysis to help characterise subtidal habitat and benthic communities. The sampling is required solely for compliance with an Environmental Protection Agency (EPA) Industrial Emissions Licence, with a survey of the habitats and communities of Ballymacrinan Bay required to be conducted every two years. Survey activities will occur over a two-day period. The application for a Foreshore

¹ <https://www.gov.ie/en/collection/f2196-foreshore-applications-and-determinations/#2008>

Licence stated that works would commence between the 1st of July and 31st October 2020. As the Licence was approved on the 6th of October 2020, it is likely that the survey works have now concluded. As the surveys are required bi-annually, the next surveys will likely be carried out in a similar period in 2022.

Eirgrid Cross Shannon 400kV Electricity Cable

Eirgrid is developing a submarine cable that will link the electricity substation at Kilpaddoge in North Kerry to the Moneypoint generating station in Clare. This project overlaps the FLAA in the upper Shannon Estuary. Planning approval was received from An Bord Pleanála in June 2021 and the cable is planned to be constructed in 2022 to be fully operational in later 2023.

Moneypoint One and Moneypoint Two projects – ESB

ESB is proposing to develop an offshore wind farm approximately 16km off the coast of Co. Kerry and Co. Clare. The development is set to be installed in two phases with the first phase, Moneypoint One (located with the FLAA) covering an area of 70km² with an estimated capacity of 400MW. Moneypoint Two (located approximately 15km from FLAA) is expected to have a capacity of 1GW-1.5GW and cover an area of 200km². The Moneypoint Offshore Wind website (Moneypoint Offshore Wind, 2021) indicated that in January 2021 ESB submitted an Investigative Foreshore Licence application; although as of November 2021 this is not publicly available.

Note: Equinor announced in November 2021 that they have withdrawn from the project. ESB has put the project on hold, however, do intend to continue with the development once another investor has agreed to continue the development (Buljan, 2021).

WestWave Energy Test Site – ESB

The proposed WestWave energy test site is located off Killard, Co. Clare. It is a 5MW pre-commercial project to build the first full-scale, operational wave farm off the west coast of Ireland. The proposed development will include near-shore and offshore wave energy converter devices. As of November 2021, there were no Foreshore Licence Applications relating to this project published on the DHLGH website.

Ilen Floating Wind Farm– Simply Blue Energy

COWF are aware that the Ilen project is a proposed co-developed floating offshore wind and wave energy installation to be located approximately 35km off the west coast of Co. Clare. This project is in conjunction with Project Saoirse and both projects will be installed in two separate phases, with installation of the Ilen Project intended for 2028 (CORPOWER, 2021). The floating wind farm element has a proposed capacity of 1.1 GW while the wave energy element has a proposed capacity of 30 MW, with the first pre-FEED and geophysical reconnaissance surveys planned to be undertaken sometime in 2021. An Investigative Foreshore Licence application was intended to be submitted in December 2020, although as of November 2021 this is not publicly available. Currently the status of the project is at concept/early planning stage (4C Offshore, 2020). As such, there is potential for these surveys to overlap spatially and temporally with the proposed site investigations.

Project Saoirse Wave Energy, Simply Blue Energy

Simply Blue Energy is developing Project Saoirse approximately 4-6 km off the west coast of County Clare, which will consist of a 5MW wave energy conversion array of approximately 15-16 WEC units. The installation for this project is planned to be in 2026 (CORPOWER, 2021). The proposed development will overlap within the FLAA. Publicly available information (Skopljak, 2021; Offshore, 2021) suggests that an Investigative Foreshore Licence application for the project was submitted in December 2020; although as of November 2021 this is not publicly available.

Mainstream Renewable Power

COWF are aware that Mainstream Renewable Power is preparing to apply for an Investigative Foreshore Licence to conduct site investigation works to assess a potential wind farm off counties Clare and Kerry. At present the application is not available on the DHLGH foreshore applications website. However, the Mainstream Power website indicates that public consultations are ongoing for multiple sites (Mainstream Renewable Power, 2021). While no publicly available information is available on this development, it is thought it could potentially overlap the FLAA for the Clarus Offshore Wind Farm.

Loop Head Wave Power Station

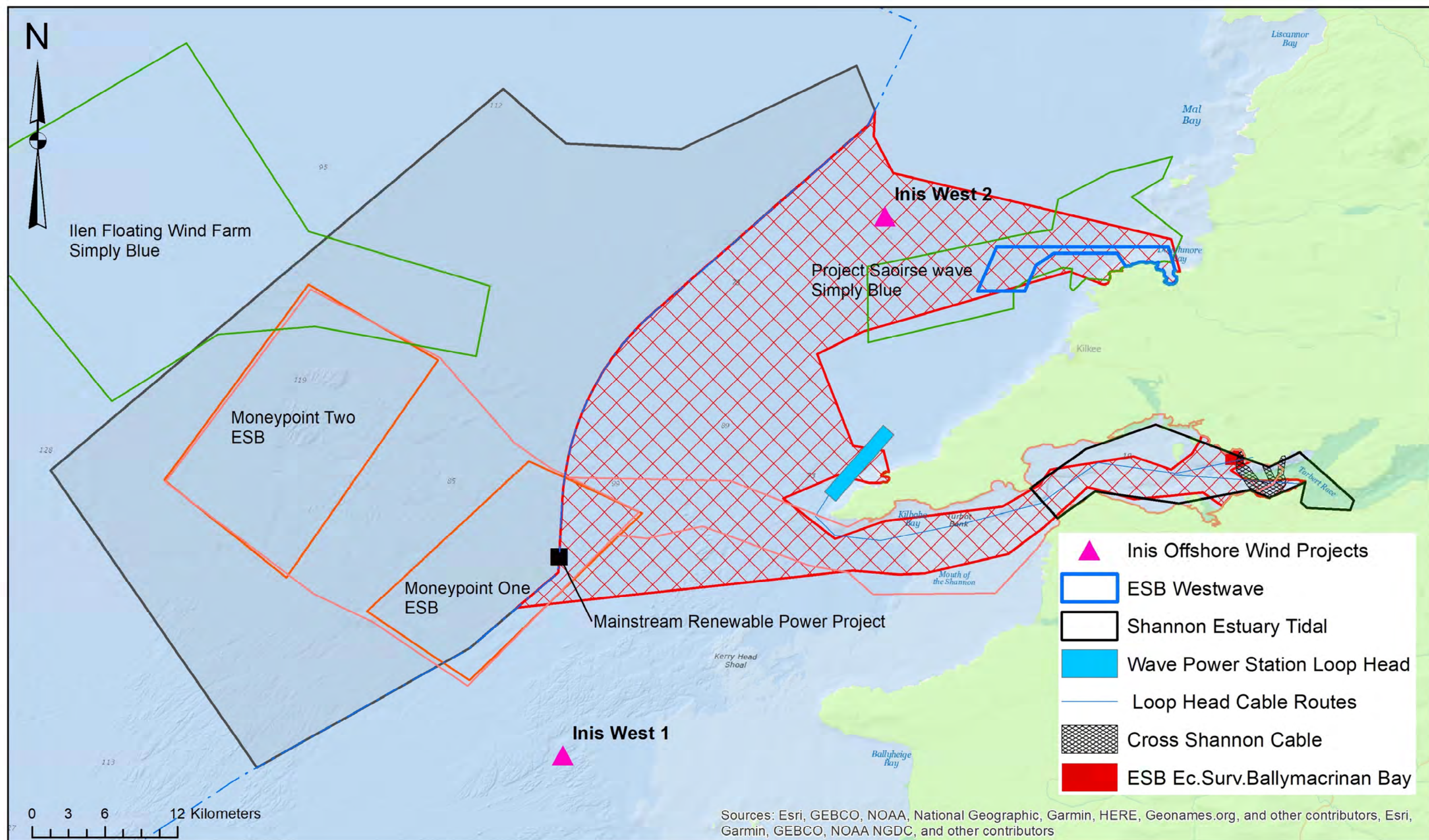
There is limited publicly available information on this project. A presentation by Marine Renewable Energy Ireland and University College Cork (October 2018) suggests that the proposed project could have an initial capacity of 300MW. The wave energy converters could be installed over the period 2022 to 2032 with an export power cable to the Moneypoint Power Station. At present (November 2021) there are no associated Investigative Foreshore Licence Applications available on the DHLGH foreshore applications website.

Shannon Estuary Tidal

There is limited publicly available information on this project. However, in 2020 DesignPro Limited, submitted an Investigative Foreshore Licence application (F5007081) to deploy and test a 60KW hydrokinetic turbine in the Shannon Estuary as part of a European Funded Horizon 2020 project. The deployment location is off the pier at Inishmurry (Cahiracon, Co. Clare). This site is outside of the FLAA, further east in the River Shannon estuary, approximately 17km away. At present (November 2021) there are no associated Investigative Foreshore Licence Applications available on the DHLGH foreshore applications website.

Inis West One and Two

COWF are aware of two further proposed developments by Inis West Offshore Wind in collaboration with Warwick Energy off the Coast of Co. Clare; Inis 1 and Inis 2. Both projects have an estimated capacity of 1000MW (2000 MW in total). Information available from Wind Energy Ireland suggest that Inis 2 overlaps with FLAA. 4C Offshore (2021) reports that as of 10 October 2021 an Investigative Foreshore Licence Application has been submitted; but as November 2021 this was not publicly available.



Clarus Offshore Wind Farm

Map 3

Other Projects in the Area

Legend

- Foreshore Licence Application Area
- Contiguous Project Area
- ▨ Cable Investigation Area
- Irish Territorial Sea 12 nm Limit

Notes: Project locations and boundaries indicative only based on current information available.
Data source: DCCAE, DHLGH, EIRGRID, MRJA, WEI, Inis Website

Ver	Date	Drawn by	Checked	Approved
V1	03/11/2021	AM	EW	SDP
Map prepared by: Agnieszka Matysik, MEngSc in Environmental Engineering, PGD in Sustainable Energy, HDGGIS				
Filename: *C0031E_FIG_OtherProjects_V3.0_20211103				Size A3
Scale: 1:400,000		Printed @ A3		
Coordinate System: IRENET95 Irish Transverse Mercator Projection: Transverse Mercator				



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4.3 Screening of European Sites

A Geographic Information System (GIS) was used to map the boundaries of SACs and SPAs in relation to the FLAA. All SACs and SPAs which are within the defined search areas for identified receptors have been listed along with their QIs / SCIs in Tables 4-3 and 4-4 below. A total of 28 sites were screened in this assessment. These sites are detailed in Figure 3-1, Map 3, above.

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

- Yes: A pathway between the proposed survey and the QIs / SCIs can be identified that is likely to result in an effect; or
- No: Either a pathway between the proposed survey and the QIs / SCIs cannot be identified or a pathway exists but there is no physical overlap of the activity and the conservation feature.

For all QIs / SCIs where it is determined there is a pathway, the likely significance of the effect has been assessed in light of the conservation objectives for the site in Section 4.4.

For all QIs / SCIs where it is determined that there is no pathway, the QIs / SCIs has been screened out from further assessment. Screening has been undertaken without consideration of any project specific mitigation measures.

Table 4-3 Screening assessment – SACs

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
Lower River Shannon SAC (IE002165)	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160]	0.0	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	No - The area affected by the proposed site investigations is limited in extent, with the estimated borehole footprint across the entire FLAA being only approximately 71.88m². This will not alter the nature of the seabed and following sampling, the seabed will return to pre-impact conditions.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
			Siltation rate changes (including smothering)	No – Sediment from boreholes will only be dispersed up to 1.8m² from the hole itself. In addition, the strong estuarine tides within the SAC will ensure any dispersed sediment is removed within one tidal cycle.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
	Reefs [1170] Atlantic salt meadows [1330] Mediterranean salt meadows [1410]		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Yes - Borehole Drilling - Given the wide-ranging extent of reef habitat and the smaller localised areas of salt meadow found in the Lower River Shannon SAC (NPWS, 2012a), there exists the potential for reef and salt meadow habitat to be subject to penetration/disturbance should boreholes be drilled within the habitats.	Yes - The proposed site investigation could potentially overlap with proposed site investigations for the other offshore wind farm developments in the area.	SCREENED IN
				No – Grab samples, Cone Penetration Tests (CPT) and Vibrocores – Due to the hard-underlying substrate, it will not be technically feasible to collect samples from the reef habitat utilising these methods.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
			Siltation rate changes (including smothering)	No – Sediment from boreholes will only be dispersed up to 1.8m² from the hole itself. In addition, the strong estuarine	No – There is no potential for in-combination effect from siltation rate changes (including smothering) as any	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
				tides within the SAC will ensure any dispersed sediment is removed within one tidal cycle.	spatial or temporal overlap with other projects in the area will be negligible.	
	Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0] <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029]		None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349]		Underwater noise changes	Yes - Underwater noise from the site investigation equipment and vessels could affect common bottlenose dolphin from the site if they are in the FLAA.	Yes – The proposed site investigations could potentially overlap with site investigations for the other projects in the area.	SCREENED IN
			Changes to supporting habitat and prey availability	No – Any impact to habitats within the SAC as a result of proposed site investigations will be negligible in extent with it being estimated that borehole drilling will occupy a seabed footprint of approximately 71.88m ² , with the grab samples removing approximately 19.5m ³	No – There is no potential for in-combination effect from changes to supporting habitat and prey availability.	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
				of sediment across the entire FLAA. As such, there will be no changes to the supporting habitat or prey availability.		
	<i>Lutra lutra</i> (Otter) [1355]		Visual disturbance Underwater noise changes	Yes – Otters within the site may be disturbed by the presence of vessels during the proposed site investigations and sound produced by the proposed site investigations.	Yes – The proposed site investigation could potentially overlap with site investigations for the other offshore wind farm developments in the area.	SCREENED IN
	<i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Lampetra planeri</i> (Brook Lamprey) [1096] <i>Lampetra fluviatilis</i> (River Lamprey) [1099] <i>Salmo salar</i> (Salmon) [1106]		Underwater noise changes	No – These species are not sensitive to underwater noise changes (Popper <i>et al.</i> 2014). As such they will not be affected by noise generated by proposed site investigations.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
Kilkee Reefs SAC (IE002264)	Large shallow inlets and bays [1160]	0.0	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	No - The area affected by the proposed site investigations is limited in extent, with the estimated borehole footprint across the entire FLAA being approximately 71.88m ² . This will not alter the nature of the seabed and following sampling the seabed will return to pre-impact conditions.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
			Siltation rate changes (including smothering)	No – Due to the minimal volume of sediment dispersed by borehole drilling (1.8m ²) and the exposed nature of the coastline to the Atlantic Ocean, any disturbed sediment will be quickly dispersed.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
	Submerged or partially submerged sea caves [8330]		None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
	Reefs [1170]		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Yes- Borehole Drilling - Given the wide-ranging extent of reef habitat found in the Kilkee Reefs SAC (NPWS, 2014), there exists the potential for intertidal reef habitat to be subject to penetration/disturbance should boreholes be drilled within the habitat.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
				No – Grab samples, Cone Penetration Tests (CPT) and Vibrocores – Due to the hard-underlying substrate, it will not be technically feasible to collect samples from the reef habitat utilising these methods.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
			Siltation rate changes (including smothering)	No – Due to the minimal volume of sediment dispersed by borehole drilling (1.8m ²) and the exposed nature of the coastline to the Atlantic Ocean, any disturbed sediment will be quickly dispersed.	No – There is no potential for in-combination effect from siltation rate changes (including smothering) as any spatial or temporal overlap with other projects in the area will be negligible.	SCREENED OUT
Carrowmore Point to Spanish Point and Islands SAC (IE001021)	Coastal lagoons [1150] Perennial vegetation of stony banks [1220] Petrifying springs with tufa formation (Cratoneurion) [7220]	1.0	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
	Reefs [1170]		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	No – No pressure receptor pathway Identified.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
			Siltation rate changes (including smothering)	No – Due to the minimal volume of sediment dispersed by borehole drilling (1.8m ²) and the exposed nature of the coastline to the Atlantic Ocean, any disturbed sediment will be quickly dispersed.	No – There is no potential for in-combination effect from siltation rate changes (including smothering) as any spatial or temporal overlap with other projects in the area will be negligible.	SCREENED OUT
Carrowmore Dunes SAC (IE002250)	Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014]	0.0	None	No – No pressure receptor pathway identified.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
	Reefs [1170]		Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Yes – Borehole Drilling - Given the wide-ranging extent of reef habitat found in the Carrowmore Dunes SAC, there exists the potential for intertidal reef habitat to be subject to penetration/disturbance should boreholes be drilled within the intertidal habitat.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
				No – Grab samples, Cone Penetration Tests (CPT) and Vibrocores – Due to the hard-underlying substrate, it will not be technically feasible to collect samples from the reef habitat utilising these methods.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
			Siltation rate changes (including smothering)	No – Due to the minimal volume of sediment dispersed by borehole drilling (1.8m ²) and the exposed nature of the coastline to the Atlantic Ocean, any	No – There is no potential for in-combination effect from siltation rate changes (including smothering) as any spatial or temporal overlap with other projects in the area will be negligible.	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
				disturbed sediment will be quickly dispersed.		
Kerry Head Shoal SAC (IE002263)	Reefs [1170]	1.5	Siltation rate changes (including smothering)	No – The footprint of the intrusive survey works will be limited to the FLAA and will not overlap with the SAC. Consideration has been given to whether suspended sediments e.g. from geotechnical boreholes, could be deposited over the habitats. However, given the small volume of risings it was concluded that levels of suspended sediment generated by the works would not be noticeable against the normal level of background fluctuations.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT
Castlemaine Harbour SAC (IE000343)	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]	40	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pathway for effect with the proposed site investigations.	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with <i>Salix repens ssp. argentea</i> (<i>Salicion arenariae</i>) [2170] Humid dune slacks [2190] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0] <i>Lutra lutra</i> (Otter) [1355] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]					
	<i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Lampetra fluviatilis</i> (River Lamprey) [1099] <i>Salmo salar</i> (Salmon) [1106]		Underwater noise changes	No - These species are not sensitive to underwater noise changes (Popper et al., 2014). As such they will not be affected by noise generated by proposed site investigations.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Basket Islands SAC (IE002172)	Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330]	39	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351] <i>Halichoerus grypus</i> (Grey Seal) [1364]		Underwater noise changes	Yes - Underwater noise from the site investigation survey equipment and vessels could affect common bottlenose dolphin from the site if they are in the FLAA.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
Kilkieran Bay and Islands SAC (IE002111)	Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Machairs (* in Ireland) [21A0] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130] Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>) [6510] <i>Lutra lutra</i> (Otter) [1355] <i>Najas flexilis</i> (Slender Naiad) [1833]	41	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
	<i>Phoca vitulina</i> (Harbour Seal) [1365]		Underwater noise changes	Yes - Underwater noise from the site investigation survey equipment and vessels could affect common bottlenose dolphin from the site if they are in the FLAA.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
Slyne Head Peninsula SAC (IE002074)	Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Annual vegetation of drift lines [1210]	63	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
	<p>Perennial vegetation of stony banks [1220]</p> <p>Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</p> <p>Embryonic shifting dunes [2110]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Machairs (* in Ireland) [21A0]</p> <p>Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110]</p> <p>Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130]</p> <p>Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140]</p> <p>European dry heaths [4030]</p> <p><i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130]</p> <p>Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210]</p> <p>Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410]</p>					

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
	Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>) [6510] Alkaline fens [7230] <i>Petalophyllum ralfsii</i> (Petalwort) [1395] <i>Najas flexilis</i> (Slender Naiad) [1833]					
	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349]		Underwater noise changes	Yes - Underwater noise from the site investigation survey equipment and vessels could affect common bottlenose dolphin from the site if they are in the FLAA.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
Slyne Head Islands SAC (IE000328)	Reefs [1170]	63	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349] <i>Halichoerus grypus</i> (Grey Seal) [1364]		Underwater noise changes	Yes - Underwater noise from the site investigation survey equipment and vessels could affect common bottlenose dolphin from the site if they are in the FLAA..	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
West Connacht Coast SAC (IE002998)	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349]	70	Underwater noise changes	Yes - Underwater noise from the site investigation survey equipment and vessels could affect common bottlenose dolphin from the site if they are in the FLAA.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
Inishbofin and Inishshark SAC (IE000278)	<i>Halichoerus grypus</i> (Grey Seal) [1364]	86	Underwater noise changes	No – Due to the distance of this site from the FLAA, the likelihood of any interaction between individuals from the site with the proposed site investigations is very low. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
	Coastal lagoons [1150] Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] European dry heaths [4030]		None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Duvillaun Islands SAC (IE000495)	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349]	140	Underwater noise changes	Yes - Underwater noise from the site investigation survey equipment and vessels could affect common bottlenose dolphin from the site if they are in the FLAA.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
	<i>Halichoerus grypus</i> (Grey Seal) [1364]		Underwater noise changes	No – Due to the distance of this site from the FLAA, the likelihood of any interaction between individuals from this site with the proposed site investigations is very low. Therefore, the proposed site investigations are not deemed capable of undermining the site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Inishkea Islands SAC (IE000507)	<i>Halichoerus grypus</i> (Grey Seal) [1364]	145	Underwater noise changes	No – Due to the distance of this site from the FLAA, the likelihood of any interaction between individuals from the site with the proposed site investigations is very low. Therefore, the proposed site investigations are not deemed capable of undermining the site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
	Machairs (* in Ireland) [21A0] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]		None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
Roaringwater Bay and Islands SAC (IE000101)	Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330] Otter [1355]	155 Around the coast (ATC)	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
	Harbour Porpoise (<i>Phocena phocena</i>) [1351]		Underwater noise changes	No – The max distance harbour porpoise travel each day is 100km (BEIS, 2019). Due to the distance of this site from the FLAA, the likelihood of any interaction between individuals from the site with the proposed site investigations is very low. Therefore, the proposed site investigations are deemed not capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
	<i>Halichoerus grypus</i> (Grey Seal) [1364]		Underwater noise changes	No – Due to the distance of this site from the FLAA, the likelihood of any interaction between individuals from the site with the proposed site investigations is very low. Therefore, the proposed site investigations are deemed not capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Slieve Toomey/Tormore Island/Loughros	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Embryonic shifting dunes [2110]	265	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
Beg Bay SAC (IE000190)	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Decalcified fixed dunes with <i>Empetrum nigrum</i> [2140] Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>) [2150] Alpine and Boreal heaths [4060] Blanket bogs (* if active bog) [7130] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] <i>Lutra lutra</i> (Otter) [1355]					
	<i>Halichoerus grypus</i> (Grey Seal) [1364]		Underwater noise changes	No – Due to the distance of this site from the FLAA, the likelihood of any interaction between individuals from the site with the proposed site investigations is very low. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Horn Head and Rinclevan SAC (IE000147)	Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	335	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>) [2170] Humid dune slacks [2190] Machairs (* in Ireland) [21A0] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130] <i>Vertigo geyeri</i> (Geyer's Whorl Snail) [1013] <i>Petalophyllum ralfsii</i> (Petalwort) [1395] <i>Najas flexilis</i> (Slender Naiad) [1833]					
	<i>Halichoerus grypus</i> (Grey Seal) [1364]		Underwater noise changes	No – Due to the distance of this site from the FLAA, the likelihood of any interaction between individuals from this site with the proposed site investigations is very low. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Saltee Islands SAC (IE000707)	Mudflats and sandflats not covered by seawater at low tide [1140] Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Submerged or partially submerged sea caves [8330]	380	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
	<i>Halichoerus grypus</i> (Grey Seal) [1364]		Underwater noise changes	No – Due to the distance of this site from the FLAA, the likelihood of any interaction between individuals from this site with the proposed site investigations is very low. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
West Wales Marine / Gorllewin Cymru Forol SAC (UK0030397)	<i>Phocoena phocoena</i> (Harbour porpoise) [1351]	430 Around the Coast (ATC)	Underwater noise changes	No – The likelihood of individuals from this site being found within the FLAA is very low given the large distance between the site and FLAA. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC (UK0030396)	<i>Phocoena phocoena</i> (Harbour porpoise) [1351]	455 ATC	Underwater noise changes	No – The likelihood of individuals from this site being found within the FLAA is very low given the large distance between the site and FLAA. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Cardigan Bay/ Bae Ceredigion SAC (UK0012712)	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349]	485 ATC	Underwater noise changes	No – The likelihood of individuals from this site being found within the FLAA is very low given the large distance between the site and FLAA. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Rockabill to Dalkey Island SAC (IE003000)	Reefs [1170]	520 ATC	None	No - No pressure receptor pathway identified.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Qualifying Interests	Distance to FLAA (km)*	Potential Pressures	Potential pressure receptor pathway?	Potential for In-combination effects	Conclusion
	Harbour Porpoise (<i>Phocena phocena</i>) [1351]		Underwater noise changes	No – The likelihood of individuals from this site being found within the FLAA is very low given the large distance between the site and FLAA. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
North Anglesey Marine / Gogledd Môn Forol SAC (UK0030398)	<i>Phocoena phocoena</i> (Harbour porpoise) [1351]	545 ATC	Underwater noise changes	No – The likelihood of individuals from this site being found within the FLAA is very low given the large distance between the site and FLAA. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
North Channel SAC (UK0030399)	<i>Phocoena phocoena</i> (Harbour porpoise) [1351]	625 ATC	Underwater noise changes	No – The likelihood of individuals from this site being found within the FLAA is very low given the large distance between the site and FLAA. Therefore, the proposed site investigations are not deemed capable of undermining this site's conservation objectives.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Table 4-4 Screening Assessments: SPAs

Site Name and Code	Special Conservation Interests	Distance to FLAA (km)	Potential Pressures	Likelihood of interaction between survey works and designating feature(s)	Potential for In-combination effects	Conclusion
Kerry Head SPA (IE004189)	Breeding Northern fulmar (<i>Fulmarus glacialis</i>) [A009] Chough (<i>Pyrrhocorax pyrrhocorax</i>) [A346]	6	Visual disturbance	Yes – Breeding northern fulmar and chough from this site may be disturbed by the proposed site investigations.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN

Site Name and Code	Special Conservation Interests	Distance to FLAA (km)	Potential Pressures	Likelihood of interaction between survey works and designating feature(s)	Potential for In-combination effects	Conclusion
Illaunonearaun SPA (IE004114)	Overwintering Barnacle goose (<i>Branta leucopsis</i>) [A045]	8	Visual disturbance	No – As the proposed site investigations will be conducted outside of the over wintering period (October-April), the proposed site investigations will avoid the main period when barnacle goose will be present.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Mid-Clare Coast SPA (IE004182)	Breeding Great cormorant (<i>Phalacrocorax carbo</i>) [A017]	0	Visual disturbance	Yes – Breeding cormorant from this site may be disturbed by the proposed site investigations.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
	Overwintering Barnacle Goose (<i>Branta leucopsis</i>) [A045] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Sanderling (<i>Calidris alba</i>) [A144] Purple Sandpiper (<i>Calidris maritima</i>) [A148] Dunlin (<i>Calidris alpina</i>) [A149] Turnstone (<i>Arenaria interpres</i>) [A169] Wetland and Waterbirds [A999]		Visual disturbance	No – As the proposed site investigations will be conducted outside of the over wintering period (October-April), the proposed site investigations will avoid the main period when the SCIs are present.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
River Shannon and River Fergus Estuaries SPA (IE004077)	Breeding Great cormorant (<i>Phalacrocorax carbo</i>) [A017]	0	Visual disturbance	Yes – Breeding great cormorant from this site may be disturbed by the proposed site investigations.	Yes – The ESB Moneypoint Ecological Survey at Ballymacrinan Bay, should it again take place in 2022 based in its bi-annual schedule, could coincide with the proposed site investigations. The proposed site investigations could also potentially overlap with other proposed offshore site investigations	SCREENED IN

Site Name and Code	Special Conservation Interests	Distance to FLAA (km)	Potential Pressures	Likelihood of interaction between survey works and designating feature(s)	Potential for In-combination effects	Conclusion
	Overwintering Whooper Swan (<i>Cygnus cygnus</i>) [A038] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Wigeon (<i>Anas penelope</i>) [A050] Teal (<i>Anas crecca</i>) [A052] Pintail (<i>Anas acuta</i>) [A054] Shoveler (<i>Anas clypeata</i>) [A056] Scaup (<i>Aythya marila</i>) [A062] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Curlew (<i>Numenius arquata</i>) [A160] Redshank (<i>Tringa totanus</i>) [A162] Greenshank (<i>Tringa nebularia</i>) [A164] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Wetland and Waterbirds [A999]		Visual disturbance	No – As the proposed site investigations will be conducted outside of the overwintering period (October to April), the proposed site investigations will avoid the main period when the SCIs are present.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Special Conservation Interests	Distance to FLAA (km)	Potential Pressures	Likelihood of interaction between survey works and designating feature(s)	Potential for In-combination effects	Conclusion
Loop Head SPA (IE004119)	Breeding Black-legged kittiwake (<i>Rissa tridactyla</i>) [A188] Common guillemot (<i>Uria aalge</i>) [A199]	0.1	Visual disturbance	Yes – Breeding black-legged kittiwake and common guillemot from this site may be disturbed by the proposed site investigations.	Yes – The proposed site investigations could potentially overlap with site investigations for other projects in the area.	SCREENED IN
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (IE004161)	Breeding Hen Harrier (<i>Circus cyaneus</i>) [A082]	7	Visual disturbance	No – Hen harrier is a terrestrial species and does not forage in the marine environment. As such there is no pathway for interaction between the species and the proposed site investigations.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT
Tralee Bay Complex SPA (IE004188)	Breeding Black-headed gull (<i>Chroicocephalus ridibundus</i>) [A179] Common gull (<i>Larus canus</i>) [A182]	15	Visual disturbance	No – Birds identified as being sensitive to the proposed site investigations are nesting birds and individuals within 2km of the FLAA. It is recognised that black-headed gull and common gull from this site could be foraging in the zone of influence (15km from the FLAA). 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 deemed capable of undermining this site's conservation objectives.	No – There is no potential for in-combination effects from visual disturbance as there will be no spatial or temporal overlap with other projects in the area.	SCREENED OUT
	Overwintering Whooper swan (<i>Cygnus cygnus</i>) [A038] Light-bellied brent goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Wigeon (<i>Anas penelope</i>) [A050] Teal (<i>Anas crecca</i>) [A052]		None	No – As the proposed site investigations will be conducted outside of the overwintering period (October to April), the proposed site investigations will avoid the main period when the SCIs are present.	No potential for in-combination effect as there is no pressure receptor pathway	SCREENED OUT

Site Name and Code	Special Conservation Interests	Distance to FLAA (km)	Potential Pressures	Likelihood of interaction between survey works and designating feature(s)	Potential for In-combination effects	Conclusion
	Mallard (<i>Anas platyrhynchos</i>) [A053] Pintail (<i>Anas acuta</i>) [A054] Scaup (<i>Aythya marila</i>) [A062] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed plover (<i>Charadrius hiaticula</i>) [A137] Golden plover (<i>Pluvialis apricaria</i>) [A140] Grey plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed godwit (<i>Limosa limosa</i>) [A156] Bar-tailed godwit (<i>Limosa lapponica</i>) [A157] Curlew (<i>Numenius arquata</i>) [A160] Redshank (<i>Tringa totanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Wetland and waterbirds [A999]					

*ATC – indicated distances measured Along the Coast rather than the shortest distance, as the crow flies.

4.4 Assessment of Likely Significant Effect (LSE)

An initial screening of European Sites identified 31 European Sites within the defined search areas listed in Tables 4-3 and 4-4. Tables 4-3 and 4-4 identified that a pressure-receptor pathway exists for 13 of the sites. For the remaining 18 sites, there is no spatial or temporal overlap between the proposed site investigations and Special Conservation Interests/Qualifying Interests of the site.

Tables 4-3 and 4-4 identified that there are three pressures from the proposed site investigations that could affect the Qualifying Interests of European Sites. These are:

- Visual disturbance;
- Underwater sound changes; and
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.

This section describes the possible pressures and potential effects and assesses the likely significant effect (LSE) of the proposed survey on the conservation objectives of the European Sites.

4.4.1 Visual Disturbance

Table 4-3 and 4-4 identified a pressure-receptor pathway between the proposed survey and the Qualifying Interest features of the Lower River Shannon SAC, Kerry Head SPA, Mid-Clare Coast SPA, River Shannon and Fergus Estuaries SPA and Loop Head SPA for the pressure Visual Disturbance.

Two sources of disturbance have been identified:

- Disturbance from survey vessel movements; and
- Disturbance from geotechnical borehole drilling.

The most vulnerable birds to disturbance would be nesting birds and breeding birds within the breeding season (February to October) within 2km of the proposed site investigations. There is the potential that breeding and nesting birds may be disturbed by the presence of survey vessels and equipment. Both visual and noise disturbance may result from the presence of the vessels and equipment whilst noise disturbance is likely to be the most significant cause of disturbance during borehole operations.

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.

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 (Showler *et al.*, 2010). 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 likely significant effects.

There is also potential for European otters to be disturbed by the presence of vessels, should the proposed site investigations occur in locations frequently used by the species for foraging or if the site investigations overlap with areas of open water that otter's transit.

4.4.1.1 Lower River Shannon SAC

Qualifying Interests assessed for LSE

- Otter

Conservation objectives

To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

- Distribution – No significant decline
- Extent of terrestrial habitat – No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along riverbanks/ around ponds.
- Extent of marine habitat – No significant decline. Area mapped and calculated as 4,461.6ha.
- Extent of freshwater (river) habitat - No significant decline. Length mapped and calculated as 500.1km.
- Extent of freshwater (lake/lagoon) habitat - No significant decline. Area mapped and calculated as 125.6ha.
- Couching sites and holts – No significant decline
- Fish biomass available – No significant decline
- Barriers to connectivity – No significant increase

Assessment against conservation objectives

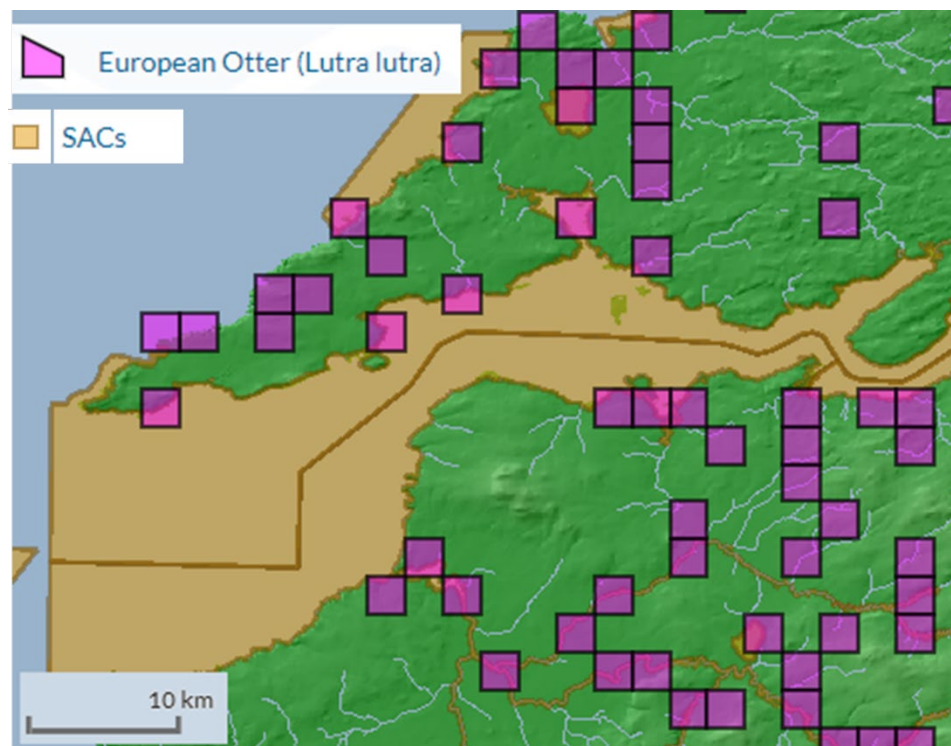
Otter, an Annex II species under the Habitats Directive, is commonly found within the Lower River Shannon SAC. While the exact population within the SAC has not been determined, 1,644 individuals were estimated to be present within the Shannon River Basin District during the previous National Otter Survey of Ireland conducted between 2010-2012 (Reid *et al.*, 2013). Figure 4-3 below displays approximate sighting locations of otter within the Lower River Shannon SAC.

The eastern most edge of the FLAA for this project extends approximately 42km into the Lower River Shannon SAC. If this region is chosen for survey it is possible that temporary visual and noise disturbance from survey works (presence of survey vessels and drilling of boreholes) could disturb otter within the European Site.

While otters will typically feed within 80m of the shoreline, they regularly commute over stretches of open water, up to 500m. This may consist of transiting between the mainland and an island, between two islands or across an estuary (NPWS, 2012a). Within the FLAA, at its narrowest point the Shannon Estuary reaches a width of approximately 2.3km. As such, otters are unlikely to be transiting across the estuary during the proposed site investigations. While otters may be disturbed by the presence of vessels should they operate close to shore, given the temporary nature of the proposed site investigations and slow-moving or stationary nature of the vessels (3.6km/h to 7km/h), any disturbance would be brief and not significant. In relation to the conservation objectives for the species, the proposed site investigations will not lead to an increase in barriers to connectivity within the site and will not lead to a decline in the extent of habitat available, distribution of the species within the site or availability of prey. The proposed site investigations are not deemed capable of undermining the site's conservation objectives, therefore there will be no likely significant effects on this site.

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

Figure 4-3 Otter sightings within the Lower River Shannon SAC (Source: Biodiversity Maps Ireland)



4.4.1.2 Kerry Head SPA

Qualifying Interests assessed for Likely Significant Effects

- Northern fulmar
- Chough

Conservation objectives

To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.

Assessment against conservation objectives

Kerry Head SPA supports an internationally important population of breeding chough, an Annex I species listed under the EU Birds Directive, with 30 breeding pairs being recorded in a 2002/03 survey. In addition to the 30 recorded pairs, a flock of 20 individuals was recorded along the northern coastline of the site, suggesting the recorded number of pairs may be an underestimate. Chough typically breed from April - July, with female chough incubating alone for 17-21 days and their young flying at 6-7 weeks of age (RSPB, 2020). The site is also home to a nationally important population of northern fulmar, with 421 pairs being recorded in the Seabird 2000 survey. The northern fulmar breeding season typically occurs between the months of April – October (Dewey, 2009), with peak numbers in Ireland occurring in June (Cummins, Lauder and Tierney, 2019).

The Zone of Influence of disturbance on nesting birds is considered by the Joint SNCB Interim Displacement Advice Note (2017) assessment to be up to 2km from the survey vessels². Kerry Head

² At the time of writing there is no Irish equivalent to this guidance note.

SPA is located approximately 7km from the FLAA. Due to the distance from the nesting habitat to the FLAA it is deemed that there will be no disturbance of nesting cormorant and northern fulmar.

Although there is the potential that breeding Northern fulmar could be foraging in the FLAA which provides a pathway for disturbance effects, Northern fulmar is classed as having a low habitat specialisation and low disturbance susceptibility (score of 1 out of 5) (JNCC, 2017). Survey vessels will be slow moving, only between approximately 3.6km/h to 7km/h which is slower or the same as walking speed, and at times stationary. At such slow speeds, the vessels are effectively stationary in terms of bird displacement. Studies have shown that slow moving vessels cause little disturbance to birds and birds may habituate to frequent and relatively benign events and noises (Natural England and Suffolk Coast and Heaths, 2012). As such, any disturbance from survey vessels on northern fulmar will be negligible.

The noise from drilling geotechnical boreholes is not sufficient to cause a complete startle flight reaction, but maybe sufficient to cause disturbance within 100m. However, given the short duration of the borehole survey and the low susceptibility of northern fulmar to disturbance, any disturbance to northern fulmar will be negligible.

There exists the potential for other project's site investigations to occur in the region simultaneously with the proposed site investigations, which could lead to a cumulative effect of visual disturbance. However, given the distance of the FLAA from the SPA and the low sensitivity of northern fulmar to visual disturbance, the presence of other survey vessels will not have a significant cumulative effect on the SCIs of Kerry Head SPA.

Therefore, it has been concluded that the proposed worksite investigations, either alone or in combination with other projects will not adversely affect the breeding northern fulmar or cormorant population or cause a decline in population, productivity rate or distribution.

Screening Conclusion: No likely significant effects on northern fulmar or cormorant / AA is not required

4.4.1.3 Mid-Clare Coast SPA

Qualifying Interests assessed for Likely Significant Effects

- Great cormorant

Conservation objectives

To maintain the favourable conservation condition of Cormorant in the Mid-Clare Coast SPA, which is defined by the following list of attributes and targets:

- Breeding population and abundance – no significant decline
- Productivity rate – no significant decline
- Distribution of breeding colonies - no significant decline
- Prey biomass available – no significant decline
- Barriers to connectivity – no significant increase
- Disturbance at the breeding site - Human activities should occur at levels that do not adversely affect the breeding cormorant population

Assessment against conservation objectives

Mid-Clare Coast SPA supports a nationally important breeding colony of great cormorant. The species nests on Mattle Island, with 60 nests being recorded in the most recent survey in May 1990 (NPWS, 2015). Great cormorant breed between the months of February – September, with eggs hatching after a month. Young fledge two months after hatching but are dependent on their parents for food for a further three months.

Mid-Clare Coast SPA is located partially within the FLAA, extending into the northern-most edge of the FLAA that adjoins the Irish coastline. Mattle Island, while not being located within the FLAA itself, is approximately 2.5km from the FLAA. The Zone of Influence of disturbance on nesting birds is considered to be up to 2km (NE and JNCC 2012). Therefore, nesting birds will not be disturbed by the proposed site investigations given the distance to Mattle Island. However, there still remains the potential that breeding cormorant could be disturbed if they were to forage in the FLAA.

In the Joint SNCB Interim Displacement Advice Note (2017), cormorant is classed as having a moderate habitat specialisation (score of 3 out of 5) and high susceptibility to disturbance (score of 4 out of 5). In relation to the conservation objectives, the proposed site investigations will not reduce the natural range of great cormorant, nor will it have a significant effect on the habitat that the species require to maintain the population.

Survey vessels will be slow moving, only between approximately 3.6km/h to 7km/h which is slower or the same as walking speed, and at times stationary. At such slow speeds, the vessels are effectively stationary in terms of bird displacement. Studies have shown that slow moving vessels cause little disturbance to birds and birds may habituate to frequent and relatively benign events and noises (Natural England and Suffolk Coast and Heaths, 2012). Additionally, any such disturbance will take place in the context of existing sources of disturbance such as commercial shipping, recreational boating etc. Cormorant have a relatively wide mean-max foraging range of 25.6km (Woodward et al. 2019) suggesting that they will be able to temporarily relocate to adjacent waters whilst the survey passes through. As such, any disturbance from survey vessels on cormorant will be negligible.

The noise from drilling geotechnical boreholes is not sufficient to cause a complete startle flight reaction in birds but maybe sufficient to cause disturbance within 100m. However, given the short duration of the borehole survey and the relatively wide foraging range of the species any disturbance from borehole drilling on cormorant will be temporary and negligible.

Screening Conclusion: No Likely Significant Effects on cormorant / AA is not required

4.4.1.4 River Shannon and Fergus Estuaries SPA

Qualifying Interests assessed for Likely Significant Effects

- Great cormorant

Conservation objectives

To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

- Breeding population and abundance – no significant decline
- Productivity rate – no significant decline
- Distribution of breeding colonies - no significant decline
- Prey biomass available – no significant decline
- Barriers to connectivity – no significant increase
- Disturbance at the breeding site - Human activities should occur at levels that do not adversely affect the breeding cormorant population
- Population trend - Long term population trend stable or increasing

Assessment against conservation objectives

River Shannon and Fergus Estuaries SPA supports a nationally important population of great cormorant, with 93 pairs being recorded within the site in 2010. River Shannon and Fergus Estuaries SPA is located within the FLAA, extending into the eastern-most edge of the FLAA. If this region is

chosen for survey it is possible that temporary visual and noise disturbance from the proposed site investigations (presence of survey vessels and drilling of boreholes) could disturb nesting cormorant.

In the Joint SNCB Interim Displacement Advice Note (2017), cormorant is classed as having a moderate habitat specialisation (score of 3 out of 5) and high susceptibility to disturbance (score of 4 out of 5). In relation to the conservation objectives, the proposed survey will not reduce other than temporarily the natural range of great cormorant, nor will it have a significant effect on the habitat that the species require to maintain the population. While it is possible that the seabed within River Shannon and Fergus Estuaries SPA may not be selected for survey, following the precautionary principle it is assumed that geotechnical borehole locations will be undertaken within the site.

Peak numbers of great cormorant within the SAC have been recorded at Glin Castle to Colmanstown, with 575 individuals being recorded at this site on two survey occasions on 24/11/10 and 07/01/11 (NPWS, 2012c). This number of individuals represents a number of all-Ireland importance and represents the majority of individuals within the site. This site is located approximately 4.6km from the FLAA, outside of the range where nesting individuals may be disturbed. As such, while individual foraging birds could potentially be briefly disturbed by the presence of vessels, the proposed site investigations will not disturb nesting birds. In addition, due to the high shipping-traffic nature of the Shannon Estuary, great cormorant is likely habituated to the presence of vessels, so survey vessels will be within the baseline fluctuations for the estuary. Foraging birds will therefore not be disturbed other than negligibly.

As great cormorant within the River Shannon and Fergus Estuaries SPA is not located within Ballymacrinan Bay, there is no spatial pathway for effect between this project and any future ecological surveys conducted in Ballymacrinan Bay for ESB Moneypoint and the EirGrid cable installation. The exact details of other renewable project site investigation surveys is not known and it is possible that one or more may also survey within the River Shannon Estuary. Given there are approximately 1800 vessel movements within the estuary annually, the temporary addition of vessel activity for the proposed site investigations will not significantly increase the overall level of vessel traffic. Multiple projects will increase vessel activity within the estuary, but as the projects are all temporary with different schedules there will be no cumulative impact.

Therefore, it has been concluded that the proposed site investigations, both alone or in-combination with another plan/project, will not adversely affect the breeding great cormorant population or cause a decline in population, productivity rate or distribution.

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

4.4.1.5 Loop Head SPA

Qualifying Interests assessed for Likely Significant Effects

- Common guillemot
- Black-legged kittiwake

Conservation objectives

To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.

Assessment against conservation objectives

Loop Head SPA supports nationally important populations of common guillemot and black-legged kittiwake, with a survey in 2000 recording 3,350 pairs and 260 pairs of each species, respectively. The common guillemot breeding season typically occurs between March and July, with the black-legged kittiwake breeding season typically occurring between February and August.

Loop Head SPA is located at the eastern most edge of Co. Clare. While the FLAA does not fall within the SPA itself, the boundary of the FLAA is drawn tightly around the SPA's boundary. If this region is chosen for survey it is possible that temporary visual and noise disturbance from the proposed site investigations (presence of survey vessels and drilling of boreholes) could disturb nesting common guillemot and black-legged kittiwake.

In the Joint SNCB Interim Displacement Advice Note (2017), common guillemot is classed as having a moderate habitat specialisation and susceptibility to disturbance with a score of 3 out of 5. Black-legged kittiwake is classed as having a low habitat specialisation and susceptibility to disturbance with a score of 2 out of 5. As such, of the two species, common guillemot is more likely to be disturbed by the proposed site investigations.

Unlike other Auk species that typically feed offshore, common guillemot typically feed close to their breeding grounds and rarely travel long distances from such locations. Due to their tendency to feed close to their breeding grounds, common guillemot has been found to be vulnerable to disturbance from transiting vessels, with a 2002 study recommending that a set-back distance of 600m from any foraging seabirds, at a speed of 25km/h, would reduce flushing probability to 10% the majority of the time (Ronconi and Clair, 2002). As survey vessels will be travelling at speeds significantly lower than this, at speeds of 3.6km/h – 7km/h, it is unlikely that nesting common guillemot will be significantly disturbed by passing vessels. While it is possible that the seabed within Loop Head SPA may not be selected for survey, following the precautionary principle it is assumed that geotechnical borehole locations will be undertaken within the site.

There exists the potential for site investigations for other projects to occur in the region simultaneously with the proposed site investigations, which could lead to a cumulative effect of visual disturbance. However, given the high shipping densities found in the region, individuals from Loop Head SPA will be habituated to the presence of other vessels. As such, the presence of another survey vessel from another project will not lead to a significant cumulative effect.

While common guillemot and black-legged kittiwake may be disturbed by drilling activities, due to their low-moderate susceptibility to disturbance any disturbance events will be brief with both species recovering quickly. Therefore, it has been concluded that the proposed site investigations, both alone or in-combination with another plan/project, will not adversely affect the breeding common guillemot and black-legged kittiwake or cause a decline in population, productivity rate or distribution. The conservation condition of both populations within Loop Head SPA will be maintained.

Screening Conclusion: No likely significant effects on common guillemot or black-legged kittiwake / AA is not required.

4.4.2 Underwater sound changes – Marine mammals

Table 4-3 identified a pressure-receptor pathway for the pressure underwater sound changes between the proposed survey and seven European Sites for which the QIs are Annex II cetacean or pinniped species.

The geophysical survey includes the use of multi-beam echo-sounders, side scan sonars and sub bottom profilers, and geotechnical survey produces underwater noise during vibrocore and borehole drilling. One of the most important environmental concerns related to the proposed site investigations is the potential effects of underwater sound on marine mammals. Both cetaceans and 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 marine mammals. 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.

The AA screening has used the Risk Assessment for Annex IV Species (Document reference: P2399_R5461) submitted in support of this Investigative Foreshore Licence Application to inform the conclusions. The main conclusions relevant to the AA screening were as follows:

- There is no evidence that the noise produced by site investigation survey equipment will lead to injurious effects.
- Harbour porpoise, common, bottlenose dolphin, grey and harbour seal could be exposed to sound levels that are sufficient to cause disturbance within 5km of the geophysical sound source.

4.4.2.1 Lower River Shannon SAC

Qualifying Interests assessed for Likely Significant Effects

- Common bottlenose dolphin
- Otter

Conservation objectives

To maintain the favourable conservation condition of common bottlenose dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

- Access to suitable habitat - Species range within the site should not be restricted by artificial barriers to site use.
- Habitat use: critical areas - Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition.
- Disturbance - Human activities should occur at levels that do not adversely affect the common bottlenose dolphin population at the site.

To restore the favourable conservation condition of otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

- Distribution – No significant decline
- Extent of terrestrial habitat – No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along riverbanks/ around ponds.
- Extent of marine habitat – No significant decline. Area mapped and calculated as 4,461.6ha.
- Extent of freshwater (river) habitat - No significant decline. Length mapped and calculated as 500.1km.
- Extent of freshwater (lake/lagoon) habitat - No significant decline. Area mapped and calculated as 125.6ha.
- Couching sites and holts – No significant decline
- Fish biomass available – No significant decline
- Barriers to connectivity – No significant increase

Assessment against conservation objectives

The Lower River Shannon SAC is home to a population of common bottlenose dolphin, with a recent study in 2018 estimating a population of 139 dolphins in the estuary (Rogan *et al.*, 2018). Population abundances do typically vary across the year however, with a smaller number using the estuary in the winter months (Englund, Ingram and Rogan, 2008). There are two critical habitat areas in the Shannon Estuary that were first identified in 2002 (See Figure 4-5). They are defined as critical areas of habitat as they are preferentially utilised by the resident common bottlenose dolphin population over other

areas in the estuary. In subsequent years, the data has consistently shown that these areas are important to dolphins year-round (Rogan *et al.*, 2018).

The FLAA for the proposed site investigations overlaps with the critical habitat for common bottlenose dolphin. The Risk Assessment for Annex IV Species submitted in support of this Investigative Foreshore Licence Application concludes that there is no evidence that the site investigation survey equipment will lead to injurious effects. However, temporary disturbance may occur within 5km of the survey activity. Given the importance of the Lower River Shannon SAC for the species, the timing of the activities overlapping with the dolphins presence and the overlap of the FLAA with areas of critical habitat, it cannot be ruled out that the conservative objectives of the European site will not be undermined by the proposed survey. In addition, should site investigations for other projects occur simultaneously with the proposed site investigations, the cumulative effect of both surveys may increase the area within which individuals may be disturbed.

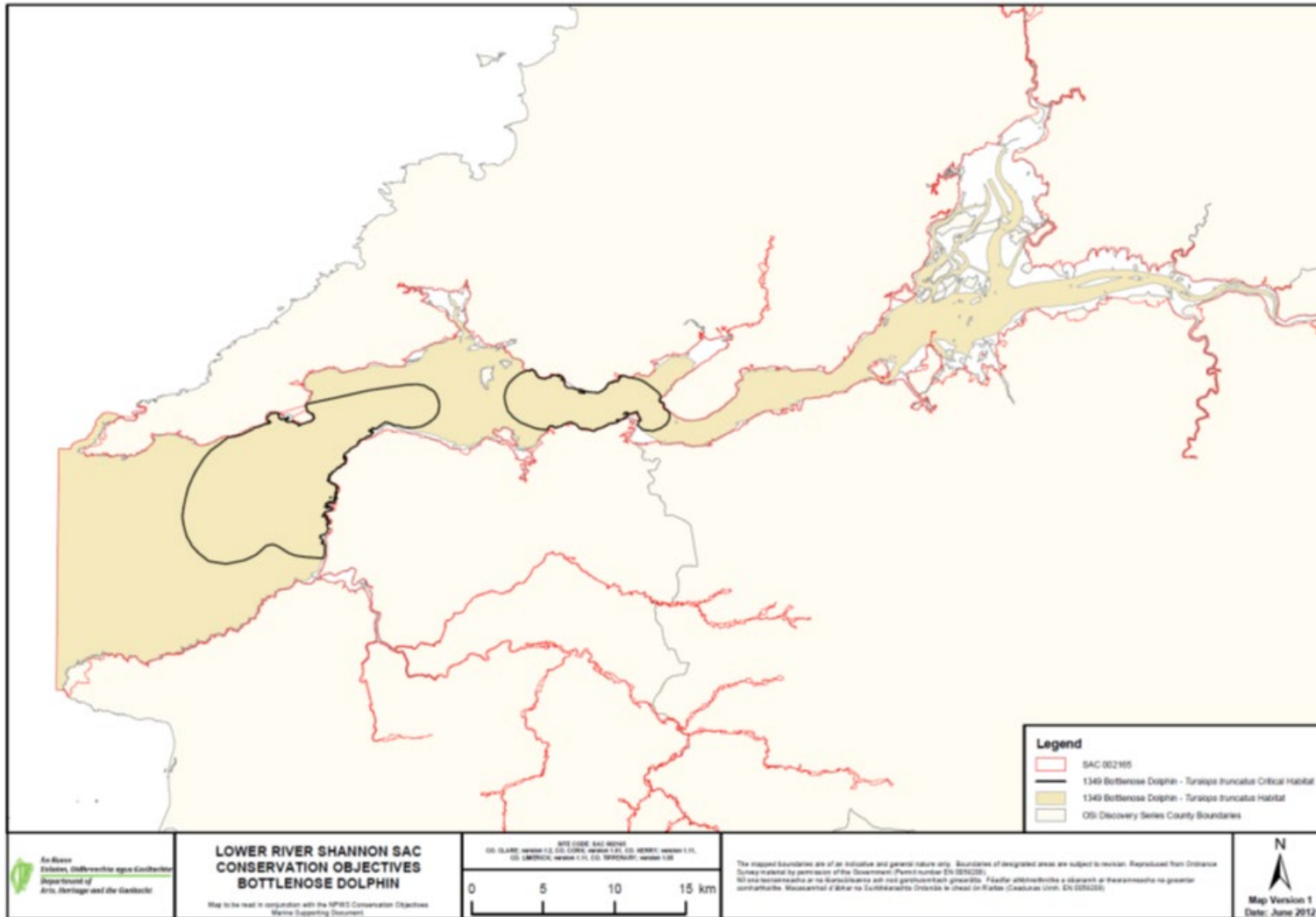
Otters are found throughout the Lower River Shannon Estuary SAC, with a 250m commuting buffer for the species in place around the entire coastline of the site (NPWS, 2012a). The otter population has declined in the area in recent decades, with the conservation objectives for the species aimed at restoring the favourable condition of the species within the site.

Otter typically forage within 80m of the shoreline, and so are unlikely to be found out in the open waters of the Shannon Estuary where the surveys will primarily take place, reducing the potential for noise generated by the activities to injure or disturb individuals. It has previously been found that otters, due to their similarity in auditory characteristics, have a similar impact criteria to high frequency cetaceans (Southall *et al.* 2019). The Risk Assessment for Annex IV Species submitted in support of this Investigative Foreshore Licence Application concluded that injury to otters from the surveys will not occur. The distribution within the SAC will not be affected and there will be no significant increase in the barriers to connectivity between their habitats. In relation to the conservation objectives for the species, the proposed site investigations will not lead to a decline in the extent of habitat available, distribution of the species within the site or availability of prey.

Screening Conclusion: No Likely Significant Effects on otter / AA is not required.

Screening Conclusion: Potential for Likely Significant Effects on common bottlenose dolphin / AA is required.

Figure 4-4 Location of common bottlenose dolphin critical habitat within Lower River Shannon SAC (Source: NPWS, 2012).



4.4.2.2 Blasket Islands SAC

Qualifying Interests assessed for Likely Significant Effects

- Harbour porpoise
- Grey seal

Conservation objectives

To maintain the favourable conservation condition of harbour porpoise in Blasket Islands SAC, which is defined by the following list of attributes and targets:

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

To maintain the favourable conservation condition of grey seal in Blasket Islands SAC, which is defined by the following list of attributes and targets:

- Access to suitable habitat - Species range within the site should not be restricted by artificial barriers to site use.
- Breeding behaviour - Conserve the breeding sites in a natural condition.
- Moulting behaviour - Conserve the moult haul-out sites in a natural condition.
- Resting behaviour - Maintain the resting haul-out sites in a natural condition.
- Disturbance - Human activities should occur at levels that do not adversely affect the grey seal population at the site.

Assessment against conservation objectives

It is possible that harbour porpoise from Blasket Islands SAC may be present within the FLAA during the proposed site investigations given that the FLAA is located in the same management unit as this SAC (Celtic and Irish Sea MU). However, given that the SAC is 40km from the FLAA, that the species has a low average density within the FLAA (Marine Institute, 2020b), and that the Zone of Influence of disturbance is small (5km), the probability of individuals being present within the Zone of Influence is low. In addition, the proposed site investigations will be transient and sound levels generated will not act as an artificial barrier within the European Site. The proposed site investigations will not restrict access to suitable harbour porpoise habitat within the surrounding area.

Based on the high density of grey seal present on the west coast of Ireland (Marine Institute, 2020b), they could be present within the 5km zone of influence for disturbance during the survey, during the earlier months of the proposed survey window (May to August). From August through to December, animals are likely to be hauled up on beaches for pupping, reducing the number of individuals that may be present within the ZOI for disturbance. In addition, the proposed site investigations will be transient and sound levels generated will not act as an artificial barrier within the European Site. Therefore, the proposed site investigations will not restrict access to suitable grey seal habitat within the European Site and in the surrounding area.

The document entitled 'Risk Assessment for Annex IV Species' submitted in support of this Investigative Foreshore Licence Application concluded there is no evidence that the geophysical or geotechnical survey activities proposed will result in injurious effects. While any individuals present within the protected site may be disturbed by the survey activities, this disturbance effect will be temporary.

Taking into account the discussion above it has been concluded that the proposed site investigations are not capable of undermining the site's conservation objectives, therefore there will be no likely significant effects on this site.

Screening Conclusion: No likely significant effects to harbour porpoise or grey seal / AA is not required.

4.4.2.3 Kilkieran Bay and Islands SAC

Qualifying Interests assessed for Likely Significant Effects

- Harbour seal

Conservation objectives

To maintain the favourable conservation condition of harbour seal in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets:

- Access to suitable habitat - Species range within the site should not be restricted by artificial barriers to site use.
- Breeding behaviour - Conserve the breeding sites in a natural condition.
- Moulting behaviour - Conserve the moult haul-out sites in a natural condition.
- Resting behaviour - Maintain the resting haul-out sites in a natural condition.
- Disturbance - Human activities should occur at levels that do not adversely affect the harbour seal population at the site.

Assessment against conservation objectives

Kilkieran Bay and Islands SAC lies 40km from the FLAA and therefore based on harbour seals maximum foraging range of 50km it is possible that seals from this SAC will be present in the waters within the 5km Zone of Influence for disturbance during the survey. While harbour seal can travel up to 50km from their haul-out site to forage, the majority of individuals forage within 25km of their haul-out site (Cunningham *et al.*, 2009). As such it is unlikely that a significant number of individuals from Kilkieran Bay and Islands SAC would be found foraging within the FLAA.

Additionally, the survey will be transient and sound levels generated will not act as an artificial barrier. Therefore, the proposed site investigations will not restrict access to suitable harbour seal habitat at the site and the surrounding area.

The document entitled 'Risk Assessment for Annex IV Species' submitted in support of this Investigative Foreshore Licence Application concluded that there is no evidence that the site investigation survey equipment and vessel activities proposed will result in injurious effects. While any individuals present within the site may be disturbed by the survey activities, this disturbance effect will be temporary.

Taking into account the discussion above it has been concluded that the surveys are not capable of undermining the site's conservation objectives, therefore there will be no likely significant effects on this site.

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

4.4.2.4 Slyne Head Peninsula SAC

Qualifying Interests assessed for Likely Significant Effects

- Common bottlenose dolphin

Conservation objectives

To maintain the favourable conservation condition of common bottlenose dolphin in Slyne Head Peninsula SAC, which is defined by the following list of attributes and targets:

- Access to suitable habitat - Species range within the site should not be restricted by artificial barriers to site use.
- Disturbance - Human activities should occur at levels that do not adversely affect the common bottlenose dolphin population at the site.

Assessment against conservation objectives

It is possible that common bottlenose dolphin from this site maybe observed in the area given that the FLAA is in the same management unit as the Slyne Head Peninsula SAC (i.e. the West Coast of Ireland MU). The document entitled 'Risk Assessment for Annex IV Species' submitted in support of this Investigative Foreshore Licence Application concluded that there is no evidence that the site investigation survey equipment and vessel activities proposed will result in injurious effects. Given the ZOI for disturbance (5km) and the distance to Slyne Head Peninsula SAC (62km), survey operations will not affect the long-term population viability nor the natural range of common bottlenose dolphin from this site. Furthermore, the proposed site investigations will not affect the structure or the function of common bottlenose dolphin habitat.

Screening Conclusion: No likely significant effects to common bottlenose dolphin / AA is not required.

4.4.2.5 Slyne Head Islands SAC

Qualifying Interests assessed for Likely Significant Effects

- Common bottlenose dolphin
- Grey seal

Conservation objectives

To maintain the favourable conservation condition of common bottlenose dolphin in Slyne Head Islands SAC, which is defined by the following list of attributes and targets:

- Access to suitable habitat - Species range within the site should not be restricted by artificial barriers to site use.
- Disturbance - Human activities should occur at levels that do not adversely affect the common bottlenose dolphin population at the site.

Assessment against conservation objectives

It is possible that common bottlenose dolphin from this site maybe observed in the area given that the FLAA is in the same management unit as the Slyne Head Islands SAC (i.e. the West Coast of Ireland MU). The document entitled 'Risk Assessment for Annex IV Species' submitted in support of this Investigative Foreshore Licence Application concluded that there is no evidence that the site investigation survey equipment and vessel activities proposed will result in injurious effects. Given the Zone of Influence for disturbance (5km) and the distance to Slyne Head Islands SAC (63km), the proposed site investigations will not affect the long-term population viability nor the natural range of common bottlenose dolphin from this site. Furthermore, the proposed site investigations will not affect the structure or the function of common bottlenose dolphin habitat.

Based on the high density of grey seal present on the west coast of Ireland (Marine Institute, 2020b), they could be present within the 5km Zone of Influence for disturbance during the survey, during the earlier months of the proposed survey window (May to August). From August through to December animals are likely to be hauled up on beaches for pupping, reducing the number of individuals that

may be present within the Zone of Influence for disturbance. In addition, the proposed site investigations will be transient and sound levels generated will not act as an artificial barrier. Therefore, the proposed site investigations will not restrict access to suitable grey seal habitat at the site and the surrounding area.

Screening Conclusion: No likely significant effects to common bottlenose dolphin or grey seal / AA is not required.

4.4.2.6 West Connacht Coast SAC

Qualifying Interests assessed for Likely Significant Effects

- Common bottlenose dolphin

Conservation objectives

To maintain the favourable conservation condition of common bottlenose dolphin in West Connacht Coast SAC, which is defined by the following list of attributes and targets:

- Access to suitable habitat - Species range within the site should not be restricted by artificial barriers to site use.
- Disturbance - Human activities should occur at levels that do not adversely affect the common bottlenose dolphin population at the site.

Assessment against conservation objectives

It is possible that common bottlenose dolphin from this site maybe observed in the area given that the FLAA is in the same management unit as the West Connacht Coast SAC (i.e. the West Coast of Ireland MU). The document entitled 'Risk Assessment for Annex IV Species' submitted in support of this Investigative Foreshore Licence Application concluded that there is no evidence that the site investigation survey equipment and vessel activities proposed will result in injurious effects. Given the Zone of Influence for disturbance (5km) and the distance to West Connacht Coast SAC (80km), the proposed site investigations will not affect the long-term population viability nor the natural range of common bottlenose dolphin from this site. Furthermore, the proposed site investigations will not affect the structure or the function of common bottlenose dolphin habitat.

Screening Conclusion: No likely significant effects to common bottlenose dolphin / AA is not required.

4.4.2.7 Duvillaun Islands SAC

Qualifying Interests assessed for Likely Significant Effects

- Common bottlenose dolphin

Conservation objectives

To maintain the favourable conservation condition of common bottlenose dolphin in Duvillaun Islands SAC, which is defined by the following list of attributes and targets:

- Access to suitable habitat - Species range within the site should not be restricted by artificial barriers to site use.
- Disturbance - Human activities should occur at levels that do not adversely affect the common bottlenose dolphin population at the site.

Assessment against conservation objectives

It is possible that common bottlenose dolphin from this site maybe observed in the area given that the FLAA is in the same management unit as the Duvillaun Islands SAC (i.e. the West Coast of Ireland MU). The document entitled 'Risk Assessment for Annex IV Species' submitted in support of this

Investigative Foreshore Licence Application concluded that there is no evidence that there is no evidence that the site investigation survey equipment and vessel activities proposed will result in injurious effects. Given the Zone of Influence for disturbance (5km) and the distance to Duvillaun Islands SAC (138km), the proposed site investigations will not affect the long-term population viability nor the natural range of common bottlenose dolphin from this site. Furthermore, the proposed site investigations will not affect the structure or the function of common bottlenose dolphin habitat.

Screening Conclusion: No likely significant effects to common bottlenose dolphin / AA is not required.

4.4.3 Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion

4.4.3.1 Lower River Shannon SAC

Qualifying Interests assessed for Likely Significant Effects

- Reefs
- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- Mediterranean salt meadows (*Juncetalia maritimi*)

Conservation objectives

Reefs

To maintain the favourable conservation condition of reefs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

- Habitat distribution - The distribution of reefs is stable, subject to natural processes.
- Habitat area - The permanent habitat area is stable, subject to natural processes.
- Community distribution - Conserve the following reef community types in a natural condition: Fucoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone- dominated subtidal reef community; and *Laminaria*- dominated community complex

Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)

To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

- Habitat area - Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 6.774ha; Barrigone, Aughinish- 10.288ha; Beagh- 0.517ha; Bunratty- 26.939ha; Shepperton, Fergus Estuary- 37.925ha; Inishdea, Owenshere- 18.127ha; Killadysert, Inishcorker- 2.604ha; Knock- 0.576ha; Querin- 3.726ha; Rinevilla Bay- 11.883ha.
- Habitat distribution - No decline or change in habitat distribution, subject to natural processes.
- Physical structure: sediment supply - Maintain natural circulation of sediments and organic matter, without any physical obstructions.
- Physical structure: creeks and pans - Maintain creek and pan structure, subject to natural processes, including erosion and succession
- Physical structure: flooding regime - Maintain natural tidal regime.

- Vegetation structure: zonation – Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
- Vegetation structure: vegetation height – Maintain structural variation within sward
- Vegetation structure: vegetation cover – Maintain more than 90% of the saltmarsh area vegetated
- Vegetation composition: typical species and sub-communities – Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)
- Vegetation structure: negative indicator species – *Spartina anglica* - No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%

Mediterranean salt meadows (*Juncetalia maritimi*)

To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

- Habitat area - Area increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 4.193ha; Barrigone, Aughinish- 2.407ha; Bunratty- 0.865ha; Inishdea, Owenshere- 11.609ha; Killadysert, Inishcorker- 0.705ha; Knock- 0.143ha, Querin- 0.008ha; Rinevilla Bay- 2.449ha.
- Habitat distribution - No decline or change in habitat distribution, subject to natural processes.
- Physical structure: sediment supply - Maintain natural circulation of sediments and organic matter, without any physical obstructions.
- Physical structure: creeks and pans – Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession
- Physical structure: flooding regime - Maintain natural tidal regime.
- Vegetation structure: zonation – Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
- Vegetation structure: vegetation height – Maintain structural variation within sward
- Vegetation structure: vegetation cover – Maintain more than 90% of areas outside creeks vegetated.
- Vegetation composition: typical species and sub-communities – Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)
- Vegetation structure: negative indicator species – *Spartina anglica* - No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.

Assessment against conservation objectives

Reef

The Lower River Shannon SAC supports a wide range of reef habitat, as illustrated in Figure 4-6 below. Where the community occurs in the outer more exposed shores, north of Kerry Head and south of Loop Head, the substrate is predominantly bedrock. Elsewhere the substrate is that of cobbles or boulders or a combination of these. The exposure regime is that of exposed to moderately exposed reef. The biota of this community is dominated by the furoid algae *Fucus vesiculosus*, *F. spiralis* and *F. serratus*. The associated flora includes *Ulva* sp., *Porphyra umbilicalis*, *Ralfsia* sp., *Corallina officinalis* and encrusting red algae. The associated fauna includes the gastropods *Patella* sp., *Littorina saxatilis*, *Melarhaphe neritoides* and *Nucella* sp., the polychaetes *Pomatoceros* sp. and *Spirorbis* spp. and barnacles including *Elminius modestus*, *Chthamalus montagui* and *C. stellatus* (NPWS, 2012a).

Within the FLAA, the drilling of up to approximately 6 boreholes within the intertidal/subtidal area is proposed. Across the entire FLAA, it is estimated that borehole drilling will occupy a seabed footprint of 71.88m². While this figure is small in the context of the large area of the SAC (683km²), any removal of reef habitat is a significant change to the SAC. Due to the presence of furoid dominated intertidal reef community complex along most of the intertidal zone in the Lower River Shannon SAC, it cannot be ruled out that borehole drilling would not result in a decrease in habitat area within the SAC. Due to the uncertainty regarding the scope and location of other project's site investigations in the region, it cannot be excluded that there will not be a potential cumulative effect on reef habitat.

Screening Conclusion: Potential for Likely Significant Effects on reefs / AA is required.

Atlantic salt meadows and Mediterranean salt meadows

The Lower River Shannon SAC supports areas of the habitats Atlantic salt meadows and Mediterranean salt meadows. The extent of these habitats within the Lower River Shannon SAC and Carrigafoyle sub-site is detailed in Figure 4-7 below. The FLAA does not intersect any of the saltmarsh habitat identified within the SAC.

Screening Conclusion: No Likely Significant Effects / AA is not required.

Figure 4-5 Location of intertidal and subtidal community complexes within Lower River Shannon SAC (Source: NPWS, 2012).

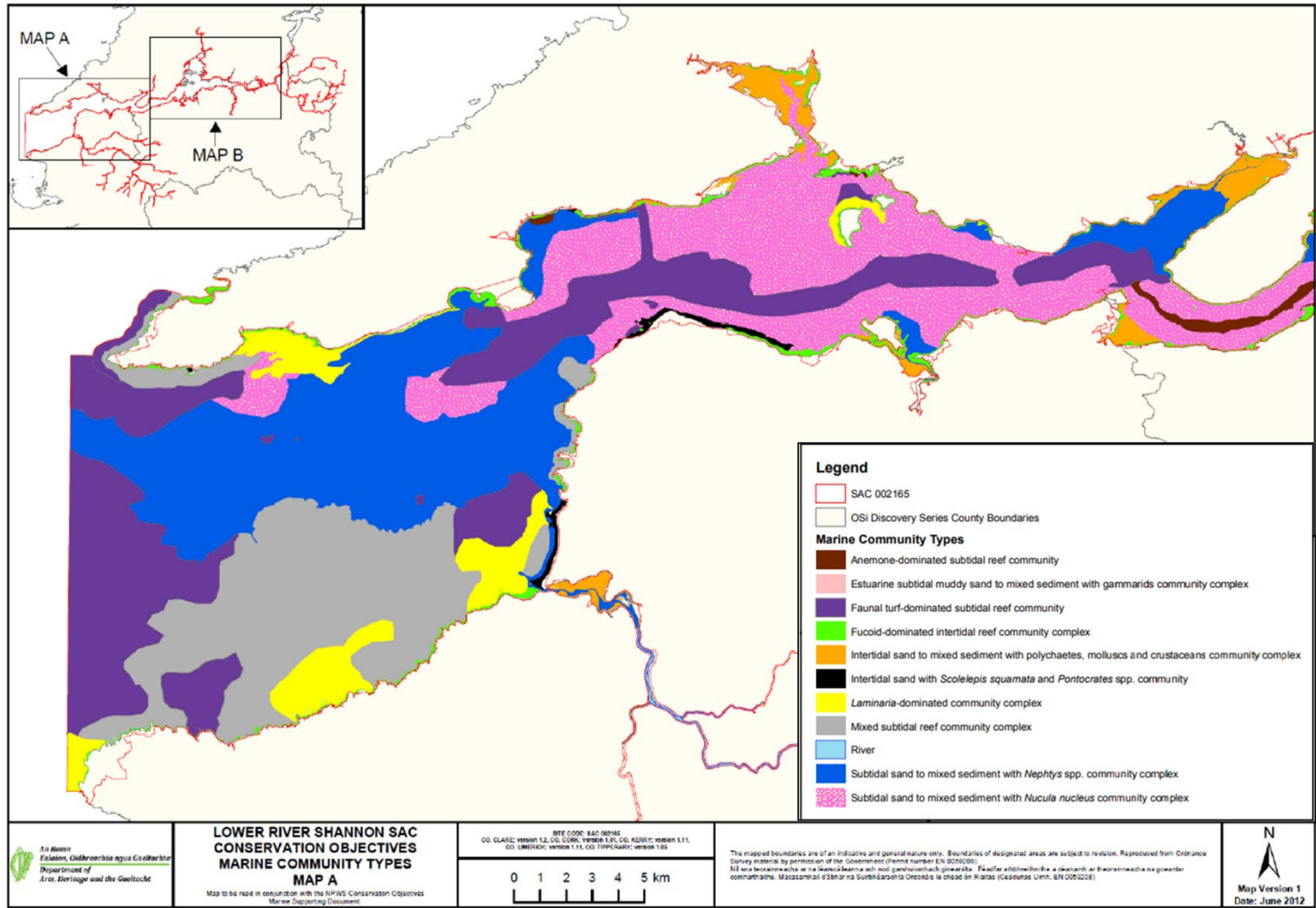
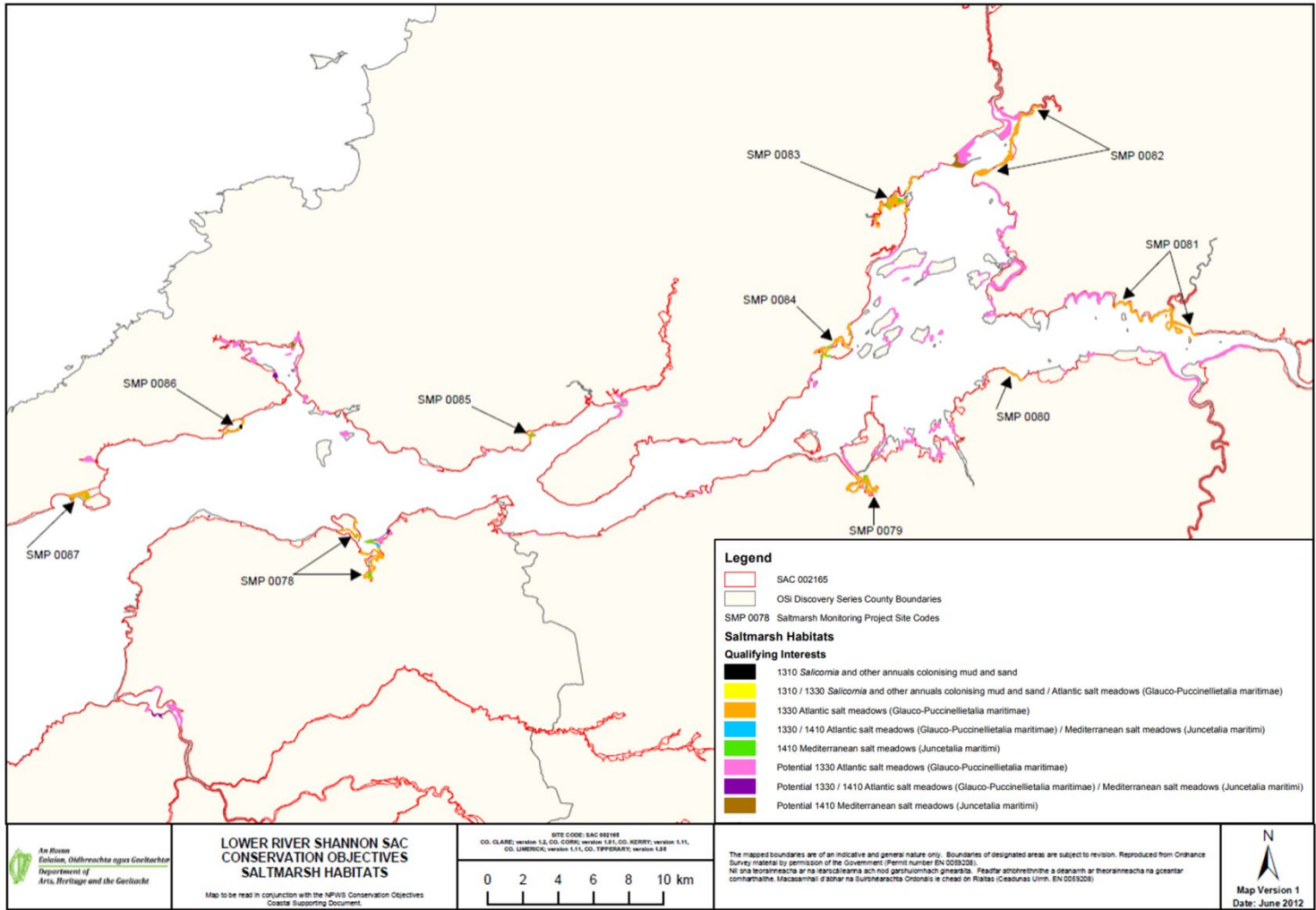


Figure 4-6 Location of salt meadow habitats within Lower River Shannon SAC (Source: NPWS, 2012).



4.4.3.2 Kilkee Reefs SAC

Qualifying Interests assessed for Likely Significant Effects

- Reefs

Conservation objectives

To maintain the favourable conservation condition of Reefs in Kilkee Reefs SAC, which is defined by the following list of attributes and targets:

- Habitat distribution - The distribution of reefs is stable, subject to natural processes.
- Habitat area - The permanent habitat area is stable, subject to natural processes.
- Community structure - Conserve the following community types in a natural condition: Exposed intertidal reef community complex; Exposed subtidal reef community complex.

Assessment against conservation objectives

Almost the entirety of the Kilkee Reefs SAC is covered by subtidal reef habitat. The exposed nature of the site provides ideal conditions for extensive, dense blue mussel (*Mytilus edulis*) beds in the lower mid-shore (NPWS, 2014). Moving seaward, the shallow sublittoral reefs are steeply sloping and extremely or moderately exposed to wave action. These reef communities may be very species rich, with many algal, kelp and sponge species present, along with sea fans and sea slugs as the depth increases. At depths below 25 m the reefs have animal-dominated communities with sparse algae.

Within the FLAA the drilling of up to approximately 6 boreholes within the intertidal/subtidal area is proposed. Across the entire FLAA, it is estimated that borehole drilling will occupy a seabed footprint of 71.88m². While this figure is small in the context of the large area of the SAC (28.77km²), any permanent removal of reef habitat would be considered under the Habitats Directive a significant change to the SAC. Due to the presence of exposed intertidal reef community complex along most of the intertidal zone in the Kilkee Reefs SAC, it cannot be ruled out that borehole drilling would not result in a decrease in habitat area within the SAC. Due to the uncertainty regarding the scope and location of other project's site investigations in the region, it cannot be excluded that there will not be a potential cumulative effect on reef habitat.

Screening Conclusion: Potential for Likely Significant Effects on reefs / AA is required.

4.4.3.3 Carrowmore Dunes SAC

Qualifying Interests assessed for Likely Significant Effects

- Reefs

Conservation objectives

To maintain the favourable conservation condition of Reefs in Carrowmore Dunes SAC, which is defined by the following list of attributes and targets:

- Habitat distribution - The distribution of reefs is stable, subject to natural processes.
- Habitat area - The permanent habitat area is stable, subject to natural processes.
- Community structure - Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated community complex.

Assessment against conservation objectives

Within Carrowmore Dunes SAC there are two reef communities, intertidal reef complex and *Laminaria*-dominated community complex which are largely located to the north and southwest of the site. There is also a mobile sand community complex which is a supporting habitat of the Mid Clare Coast SPA.

Within the FLAA the drilling of up to approximately 6 boreholes within the intertidal/subtidal area is proposed. Across the entire FLAA, it is estimated that borehole drilling will occupy a seabed footprint of 71.88m². While this figure is small in the context of the large area of the SAC (4.51km²), any permanent removal of reef habitat would be considered under the Habitats Directive a significant change to the SAC. Due to the presence of reef community complex along most of the intertidal/nearshore zone in the Carrowmore Dunes SAC, it cannot be ruled out that borehole drilling would not result in a decrease in habitat area within the SAC. Due to the uncertainty regarding the scope and location of other project's site investigations in the region, it cannot be excluded that there will not be a potential cumulative effect on reef habitat.

Screening Conclusion: Potential for Likely Significant Effects on reefs / AA is required.

4.5 Screening Statement and Conclusions

To determine whether the proposed survey is likely to have a significant effect on any European Sites, either individually or in-combination with other plans or projects, AA screening was carried out.

The screening assessed 31 European Sites that were either within the direct zone of influence of the proposed survey or contain mobile Qualifying Interest features which could potentially travel into the FLAA.

It was identified that the proposed survey could induce the following pressures on Qualifying Interests which required assessment for Likely Significant Effects:

- Visual disturbance;
- Underwater sound changes; and
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.

Other projects and plans in the area were identified and assessed to determine if they could interact with the proposed site investigations to have an in-combination effect. It was determined that there exists a potential spatial and temporal pathway between the proposed site investigations and any other projects in the area.

Initial screening of the 31 European Sites identified a pressure-receptor pathway between the proposed survey and the Qualifying Interests of 13 European Sites (Table 4-3 and 4-4). Of these 13 sites, assessment for likely significant effects (Section 4.4) concluded that for three sites it cannot be ruled out that the proposed site investigations either alone or in-combination with other plans and projects will not have a likely significant effect and that Stage 2 Appropriate Assessment is required.

Table 4-5 summarises the conclusions of the assessment of likely significant effects.

Screening has concluded that Appropriate Assessment is required for:

- Lower River Shannon SAC (IE002165)
- Kilkee Reefs SAC (IE002264)
- Carrowmore Dunes SAC (IE002250)

Table 4-5 Summary – Potential for likely significant effects

Site Code & Name	Qualifying Interest Screened In for LSE	Potential pressure	Potential in-combination effect	Conclusion
Lower River Shannon SAC (IE002165)	Common bottlenose dolphin	Underwater sound changes	Yes	LSE cannot be ruled out / AA is required
	Otter	Underwater sound changes	Yes	No LSE
	Atlantic salt meadows Mediterranean salt meadows	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	No	No LSE
	Reefs		Yes	LSE cannot be ruled out / AA is required
Kilkee Reefs SAC (IE002264)	Reefs	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Yes	LSE cannot be ruled out / AA is required
Carrowmore Dunes SAC (IE002250)	Reefs	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	Yes	LSE cannot be ruled out / AA is required
Blasket Islands SAC (IE002172)	Harbour porpoise Grey seal	Underwater sound changes	Yes	No LSE
Kilkieran Bay and Islands SAC (IE002111)	Harbour seal	Underwater sound changes	Yes	No LSE
Slyne Head Peninsula SAC (IE002074)	Common bottlenose dolphin	Underwater sound changes	Yes	No LSE
Slyne Head Islands SAC (IE000328)	Common bottlenose dolphin	Underwater sound changes	Yes	No LSE
West Connacht Coast SAC (IE002998)	Common bottlenose dolphin	Underwater sound changes	Yes	No LSE
Duvillaun Islands SAC (IE000495)	Common bottlenose dolphin	Underwater sound changes	Yes	No LSE
Kerry Head SPA (IE004189)	Breeding northern fulmar Breeding cormorant	Visual disturbance	Yes	No LSE
Mid-Clare Coast SPA (IE004182)	Overwintering assemblage	Visual disturbance	No	No LSE
	Breeding great cormorant	Visual disturbance	Yes	No LSE
River Shannon and River Fergus Estuaries SPA (IE004077)	Overwintering assemblage	Visual disturbance	No	No LSE
	Breeding great cormorant	Visual disturbance	Yes	No LSE
Loop Head SPA (IE004119)	Breeding black-legged kittiwake and common guillemot	Visual disturbance	Yes	No LSE

5. STAGE 2 – NATURA IMPACT STATEMENT

5.1 Introduction

The Stage 1 screening provided in Section 4 concluded that there is the potential for likely significant effects on the following sites and that an AA is required:

- Lower River Shannon SAC (IE002165)
- Kilkee Reefs SAC (IE002264)
- Carrowmore Dunes SAC (IE002250)

The AA is a focused and detailed impact assessment of the implications of the plan or project (alone and in combination with other plans and projects), on the integrity of a European Site. The assessment considers the conservation objectives of the European Site. It is undertaken by the competent authority, which for Foreshore Licence applications is the Department of Housing, Local Government and Heritage. To inform the AA, the proponent of the plan (i.e. Clarus Offshore Wind Farm Limited) must provide a Natura Impact Statement (NIS) which provides data and information on proposed site investigations and an analysis of potential effects on the European Site.

NPWS guidance (2012) on the content of the NIS states:

“The more detailed ecological assessment of proposed activities requires that two key questions be addressed: ‘What are the likely impacts of the proposed activity?’ and ‘How quickly could the qualifying interest recover from the impact, if at all?’”.

The guidance identifies specific questions which should be considered when providing information to support the AA. The questions relevant to Annex II species and habitats have been used to guide the assessment presented below.

This Stage 2 - Natura Impact Statement draws on information provided in Section 4 – Stage 1 AA Screening above; Table 5-1 provides cross-references for where specific information on the three European Sites can be found. This NIS focuses on the three European Sites for which the potential for a likely significant effect has been identified and provides assessment on their site integrity as a result of the proposed site investigations. Where appropriate, it proposes mitigation measures which will be taken by Clarus Offshore Wind Farm Limited to reduce the significance of effects.

Table 5-1 Cross-reference to other supporting information

Relevant information	Lower River Shannon SAC	Kilkee Reefs SAC	Carrowmore Dunes SAC
Description of works	Section 2	Section 2	Section 2
Conservation objectives of the European Site	4.4.2.1 & 4.4.3.1	4.4.3.2	4.4.3.3
Assessment of aspects of the proposed project which could negatively affect the conservation objectives of the European Site	4.4.2.1 & 4.4.3.1	4.4.3.2	4.4.3.3

5.2 Lower River Shannon SAC

5.2.1 Screening conclusion

Lower River Shannon SAC is designated, amongst other screened out Qualifying Interests, for common bottlenose dolphin and reef. The conservation objectives for the relevant Qualifying Interests are detailed below.

5.2.1.1 Common bottlenose dolphin

The conservation objectives for common bottlenose dolphin are to maintain the favourable conservation condition of common bottlenose dolphin in the site, which is defined by the following list of attributes and targets:

- Access to suitable habitat - Species range within the site should not be restricted by artificial barriers to site use.
- Habitat use: critical areas - Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition.
- Disturbance - Human activities should occur at levels that do not adversely affect the common bottlenose dolphin population at the site.

The AA screening concluded that, while injury to common bottlenose dolphin will not occur as a result of proposed site investigations, given the potential range of disturbance (5km) of such activities and the presence of critical habitat for the species within the FLAA, it cannot be ruled out that the proposed site investigations would not disturb the population within the SAC.

5.2.1.2 Reefs

To maintain the favourable conservation condition of reefs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

- Habitat distribution - The distribution of reefs is stable, subject to natural processes.
- Habitat area - The permanent habitat area is stable, subject to natural processes.
- Community distribution - Conserve the following reef community types in a natural condition: Fucoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone- dominated subtidal reef community; and *Laminaria*- dominated community complex

The AA screening concluded that, due to the presence of fucoid dominated intertidal reef community complex along the majority of the intertidal zone in the Lower River Shannon SAC, it cannot be ruled out that borehole drilling would not result in a decrease in habitat area within the SAC.

5.2.2 Assessment of effects

Given the potential for likely significant effects on common bottlenose dolphin from underwater noise changes (i.e. from geophysical and geotechnical surveys and other equipment associated with the survey vessels) and on reefs from the pressure penetration/disturbance, further assessment is required in order to firstly understand the nature and extent of these effects and to then identify suitable mitigation measures to avoid or reduce effects, such that adverse effects on the integrity of the SAC will not arise.

Table 5-2 and Table 5-3 outline the specific questions detailed in the NPWS (2012) guidance on Marine Natura Impact Statements that need to be considered by the assessment for common bottlenose dolphin and reefs respectively.

Table 5-2 Assessment of potential effects on common bottlenose dolphin

Questions	Response
Will the proposed operation or activity result in death, injury or disturbance of individuals?	Yes – As detailed in Section 4.4.3.1, while death/injury to common bottlenose dolphin will not occur as a result of the proposed site investigations, disturbance to individuals may occur up to 5km from the sound source. While it is not currently known exactly where the proposed site investigations will occur within the FLAA, disturbance to individuals is possible should it occur within the SPA or proximity.
Is it possible to estimate the number of individuals that are likely to be affected	No - It is not currently known where in the FLAA the proposed site investigations will be undertaken. As the FLAA is located within an area where the estuary narrows to less than 5km, given the 5km radial disturbance ZOI of the survey activities there is the potential that the whole population may be disturbed. Such a disturbance would be transient and temporary.
Will individuals be disturbed at a sensitive time or location during their life cycle	Yes – The proposed site investigations could overlap with the time when common bottlenose dolphin numbers are at their peak within the site.
Are the impacts likely to focus on a particular section of the population, e.g., adults vs. juveniles, males vs. females	No – Any disturbance resulting from underwater noise produced by the proposed site investigations will affect any individuals present nearby regardless of age or gender.
Will the operation/activity cause displacement from key functional areas	Potentially – Critical habitat areas for common bottlenose dolphin are located with the FLAA. While it is not yet known where the proposed site investigations will be conducted, should they be conducted within these critical habitat areas individuals may be briefly displaced from these key functional areas.
Is the habitat of the species likely to deteriorate causing disturbance to individuals or populations	No – The marine survey and borehole works will not affect the habitat of common bottlenose dolphin. The change in underwater sound will be a temporary effect and will not lead to a permanent deterioration to the water column and therefore habitat for the species.
How quickly is the affected population in the SPA likely to recover once the operation/activity has ceased	Evidence suggests that avoidance behaviour will be temporary, with individuals returning to the area affected once the sound has ceased (Bowles <i>et al.</i> , 1994; Morton and Symonds, 2002; Stone and Tasker, 2006; Gailey, Würsig and McDonald, 2007; Stone <i>et al.</i> , 2017). It is important to note that, the proposed site investigations are temporary, being undertaken intermittently over the years following grating of the Foreshore Licence, therefore any individuals that are disturbed will be able to return to the FLAA as soon as the survey activity has ceased.
In the absence of mitigation, are the effects of the proposed operation/activity on Annex II species likely to have a significant effect on the favourable conservation condition of the Annex II species at the site	In the absence of mitigation, it is uncertain as to whether temporary disturbance of common bottlenose dolphin would lead to a significant effect on the favourable conservation objective of the Annex II species at the site. Conducting works within the defined critical habitat for dolphin or conducting the surveys simultaneously with site investigations proposed for other projects would lead to disturbance of over 20% of individuals within the SAC on a particular day ³ . This would result in a temporary but potentially significant disturbance effect on the species in the absence of mitigation.
What measures can be implemented to mitigate the significance of the likely adverse impact into insignificance?	The contractor for the proposed site investigations will follow the Department of Arts, Heritage and the Gaeltacht (DAHG) 'Guidance to Manage the Risk to Marine Mammals from Man-made sound sources in Irish Waters' (DAHG 2014); in particular Section 4.3.4 Geophysical Acoustic Surveys and Section 4.3.2 Drilling. This will include: <ul style="list-style-type: none"> ▪ The commensal of survey activity at the innermost part of the estuary and working outwards to ensure animals are not driven into or artificially confined within the estuary; ▪ Use of Marine Mammal Observers (MMO); ▪ Pre-start monitoring for 30 minutes of 500m radial distance; ▪ If output source exceeds 170dB re 1uPA@1mm, and equipment technically allows, then a ramp up procedure will be used; ▪ Breaks in sound output; and

³ In light of the absence of specific guidelines, the JNCC definition for disturbance within a harbour porpoise SAC has been used as a guide to significance level effects (JNCC, 2020).

Questions	Response
	<ul style="list-style-type: none"> Reporting. <p>Clarus Offshore Wind Farm Limited will co-ordinate with any developers that are granted a Foreshore Licence within the region on the timing of site investigations to minimise cumulative impacts.</p>

Table 5-3 Assessment of potential effects on reefs

Questions	Response
Is there likely to be an adverse impact to physical or chemical parameters, or principal biological communities of the Annex I habitat?	Yes – Should borehole drilling occur within an area of reef community within the SAC, the underlying habitat within the footprint of the borehole would be removed and thus be adversely impacted.
How does that impact arise in relation to the proposed development?	This impact would arise from the drilling of boreholes within an area of Qualifying Interest habitat. A borehole is a method of drilling into the seabed to recover samples and enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string. The drill string is then rotated to commence boring. Tools are lowered into the drill string to recover samples or conduct in-situ soil and rock testing.
How are the existing physical, chemical and/or biological aspects of the qualifying interest likely to be impacted?	Habitat within the footprint of any borehole drilled within the reef would be taken as a sample, removing the area of existing habitat from the site. In addition, Qualifying Interest habitat within the footprint of the jack-up barge will be temporarily compacted by the pressure of the equipment on the seabed.
What is the likely duration of the impact?	The impact of the borehole core extraction, although extremely localised, restricted to a total footprint of approximately 71.88m ² , would be permanent. Substrate compressed by the weight of the jack-up barge will not be permanently lost, with habitat recovery in the short-term.
Where applicable, how quickly are the biological communities likely to recover once the operation/activity has ceased?	Due to the limited footprint of each borehole drilled (approximately 71.88m ² across the entire FLAA), recovery time for the surrounding community would be quick. There would be a short-term effect (1-7 years) to the drilled areas however, with the surrounding reef eventually re-colonising the areas.
In the absence of mitigation, are the physical, chemical or biological impacts of the proposed operation/activity likely to have a significant effect on the favourable conservation condition or relevant conservation targets (where available) of the Annex I habitat at the site?	Any permanent removal of reef habitat would be considered under the Habitats Directive a significant change to the SAC. However, while there would be a loss of habitat it is an extremely minor area in relation to the overall site itself. As the affected areas would be able to recover over time, the reef would be stable subject to natural processes and in the long-term the integrity of the site would not be affected.
What measures can be implemented to mitigate the significance of the likely adverse impact into insignificance?	Geophysical data and the existing biotope maps for the area will be used to identify potential reef and position geotechnical and environmental stations to avoid intrusive sampling in these areas. If geophysical interpretation is inconclusive, drop down camera will be used to visualise the seabed prior to sampling.

5.2.3 Mitigation

Mitigation measures in this section are proposed to inform the appropriate assessment.

5.2.3.1 Common bottle dolphin mitigation measures

- The contractor for the proposed site investigations will follow the Department of Arts, Heritage and the Gaeltacht (DAHG) 'Guidance to Manage the Risk to Marine Mammals from Man-made sound sources in Irish Waters' (DAHG 2014); in particular Section 4.3.4 Geophysical Acoustic Surveys and Section 4.3.2 Drilling. This will include the following measures:
 - The commensal of survey activity at the innermost part of the estuary and working outwards to ensure animals are not driven into or artificially confined within the estuary;

- Use of Marine Mammal Observers (MMO);
- Pre-start monitoring for 30 minutes of 500m radial distance;
- If output source exceeds 170dB re 1uPA@1mm, and equipment technically allows then a ramp up procedure will be used;
- Breaks in sound output; and
- Reporting.
- Clarus Offshore Wind Farm Limited will co-ordinate with any developers that are granted a Foreshore Licence within the region on the timing of site investigations to minimise cumulative impacts.

5.2.3.2 Reef mitigation measures

- Geophysical data and the existing biotope maps for the area will be used to identify potential reef and to position geotechnical and environmental stations to avoid intrusive sampling in these areas. If geophysical interpretation is inconclusive, drop down camera will be used to visualise the seabed prior to sampling.

5.2.4 Conclusion

Disturbance from underwater sound changes caused by the proposed site investigations could temporarily disturb common bottlenose dolphin within the Lower River Shannon SAC and could therefore result in a brief to temporary effect to the existing population.

In addition, penetration/disturbance of reef habitat from borehole drilling could remove a small area of Qualifying Interest habitat from the SAC. Although this area of removed habitat will be able to be re-colonised in the short-term (1-7 years) as the boreholes backfill, there will be a small loss of habitat in the short term and mitigation has been proposed to reduce impacts.

Mitigation measures have been proposed to ensure that common bottlenose dolphin will not be significantly disturbed and that reef habitat within the SAC will not be significantly reduced in extent, so that the conservation objectives of the SAC will not be adversely affected.

As highlighted in Table 4-3, there is potential temporal and spatial overlap with surveys and any other projects in the area. However, provided that the mitigation measures in Section 5.3.3 are implemented, there will be **no adverse effect on the integrity of the site, either alone or in combination with other plans or projects.**

5.3 Kilkee Reefs SAC

5.3.1 Screening conclusion

Kilkee Reefs SAC is designated, amongst other screened out QIs, for reefs. The conservation objectives for reefs is “To maintain the favourable conservation condition of Reefs in Kilkee Reefs SAC, defined by the following list of attributes and targets:

- Habitat distribution - The distribution of reefs is stable, subject to natural processes.
- Habitat area - The permanent habitat area is stable, subject to natural processes.
- Community structure - Conserve the following community types in a natural condition: Exposed intertidal reef community complex; Exposed subtidal reef community complex.”

The AA screening concluded that, due to the presence of exposed intertidal reef community complex along the majority of the intertidal zone in the Kilkee Reefs SAC, it cannot be ruled out that borehole drilling would not result in a decrease in habitat area within the SAC.

5.3.2 Assessment of effects

Given the potential for significant effects on reefs from the pressure penetration/disturbance, further assessment is required in order to firstly understand the nature and extent of these effects and to then identify suitable mitigation measures to avoid or reduce effects, such that adverse effects on the integrity of the SAC will not arise.

Table 5-4 outlines the specific questions detailed in the NPWS (2012) guidance on Marine Natura Impact Statements that need to be considered by the assessment for reefs.

Table 5-4 Assessment of potential effects on reefs

Questions	Response
Is there likely to be an adverse impact to physical or chemical parameters, or principal biological communities of the Annex I habitat?	Yes – Should borehole drilling occur within an area of intertidal reef within the SAC, underlying reef habitat within the footprint of the borehole would be removed and thus be adversely impacted.
How does that impact arise in relation to the proposed development?	This impact would arise from the drilling of boreholes within an area of intertidal reef. A borehole is a method of drilling into the seabed to recover samples and enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string. The drill string is then rotated to commence boring. Tools are lowered into the drill string to recover samples or conduct in-situ soil testing.
How are the existing physical, chemical and/or biological aspects of the qualifying interest likely to be impacted?	Reef habitat within the footprint of any borehole drilled within the reef would be taken as a sample, removing the area of existing habitat from the site.
What is the likely duration of the impact?	This impact although extremely localised, restricted to a total footprint of approximately 71.88m ² , would be permanent.
Where applicable, how quickly are the biological communities likely to recover once the operation/activity has ceased?	Due to the limited footprint of each borehole drilled (approximately 71.88m ² across the entire FLAA), recovery time for the surrounding community would be quick. There would be a short-term effect (1-7 years) to the drilled areas however, with the surrounding reef eventually re-colonising the areas as the boreholes backfill.
In the absence of mitigation, are the physical, chemical or biological impacts of the proposed operation/activity likely to have a significant effect on the favourable conservation condition or relevant conservation targets (where available) of the Annex I habitat at the site?	Any permanent removal of reef habitat would be considered under the Habitats Directive a significant change to the SAC. However, while there would be a loss of habitat it is an extremely minor area in relation to the overall site itself. As the impacted areas would be able to recover over time, the reef would be stable subject to natural processes and in the long-term the integrity of the site would not be affected.
What measures can be implemented to mitigate the significance of the likely adverse impact into insignificance?	Geophysical data and the existing biotope maps for the area will be used to identify potential reef and position geotechnical and environmental stations to avoid intrusive sampling in these areas. If geophysical interpretation is inconclusive, drop down camera will be used to visualise the seabed prior to sampling.

5.3.3 Mitigation

Mitigation measures in this section are proposed to inform the appropriate assessment.

- Geophysical data and the existing biotope maps for the area will be used to identify potential reef and position geotechnical and environmental stations to avoid intrusive sampling in these areas. If geophysical interpretation is inconclusive, drop down camera will be used to visualise the seabed prior to sampling.

5.3.4 Conclusion

Penetration/disturbance of intertidal reef habitat from borehole drilling would remove an area of reef from the SAC. Although this area of removed habitat will be able to be re-colonised in the short-term

(1-7 years) as the boreholes backfill, there will be a small loss of habitat in the short term and mitigation has been proposed to reduce impacts.

Implementation of mitigation measures will ensure that intertidal reef within the SAC will not be significantly reduced in extent and that the conservation objectives of the SAC will not be adversely affected. This mitigation removes the potential for cumulative effects.

Providing that the mitigation measures in Section 5.4.3 are implemented, there will be **no adverse effect on the integrity of the site, either alone or in combination with other plans or projects.**

5.4 Carrowmore Dunes SAC

5.4.1 Screening conclusion

Carrowmore Dunes SAC is designated, amongst other amongst other screened out QIs, for reefs. The conservation objectives for reefs are "To maintain the favourable conservation condition of Reefs in Carrowmore Dunes SAC, which is defined by the following list of attributes and targets:

- Habitat distribution - The distribution of reefs is stable, subject to natural processes.
- Habitat area - The permanent habitat area is stable, subject to natural processes.
- Community structure - Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated community complex."

The AA screening concluded that, due to the presence of intertidal reef community complex along the majority of the intertidal zone in the Carrowmore Dunes SAC, it cannot be ruled out that borehole drilling would not result in a decrease in habitat area within the SAC.

5.4.2 Assessment of effects

Given the potential for significant effects on reefs from the pressure penetration/disturbance, further assessment is required in order to firstly understand the nature and extent of these effects and to then identify suitable mitigation measures to avoid or reduce effects, such that adverse effects on the integrity of the SAC will not arise.

Table 5-5 outlines the specific questions detailed in the NPWS (2012) guidance on Marine Natura Impact Statements that need to be considered by the assessment for reefs.

Table 5-5 Assessment of potential effects on reefs

Questions	Response
Is there likely to be an adverse impact to physical or chemical parameters, or principal biological communities of the Annex I habitat?	Yes – Should borehole drilling occur within an area of intertidal reef within the SAC, underlying reef habitat within the footprint of the borehole would be removed and thus be adversely impacted.
How does that impact arise in relation to the proposed development?	This impact would arise from the drilling of boreholes within an area of intertidal reef. A borehole is a method of drilling into the seabed to recover samples and enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string. The drill string is then rotated to commence boring. Tools are lowered into the drill string to recover samples or conduct in-situ soil testing.
How are the existing physical, chemical and/or biological aspects of the qualifying interest likely to be impacted?	Reef habitat within the footprint of any borehole drilled within the reef would be taken as a sample, removing the area of existing habitat from the site.
What is the likely duration of the impact?	This impact although extremely localised, restricted to a total footprint of 71.88m ² , would be permanent.

Questions	Response
Where applicable, how quickly are the biological communities likely to recover once the operation/activity has ceased?	Due to the limited footprint of each borehole drilled (approximately 71.88m ² across the entire FLAA), recovery time for the surrounding community would be quick. There would be a short-term effect (1-7 years) to the drilled areas however, with the surrounding reef eventually re-colonising the areas.
In the absence of mitigation, are the physical, chemical or biological impacts of the proposed operation/activity likely to have a significant effect on the favourable conservation condition or relevant conservation targets (where available) of the Annex I habitat at the site?	No – Any permanent removal of reef habitat would be considered under the Habitats Directive a significant change to the SAC. However, while there would be a loss of habitat it is an extremely minor area in relation to the overall site itself. As the impacted areas would be able to recover over time, the reef would be stable subject to natural processes and in the long-term the integrity of the site would not be affected.
What measures can be implemented to mitigate the significance of the likely adverse impact into insignificance?	Geophysical data and the existing biotope maps for the area will be used to identify potential reef and position geotechnical and environmental stations to avoid intrusive sampling in these areas. If geophysical interpretation is inconclusive, drop down camera will be used to visualise the seabed prior to sampling.

5.4.3 Mitigation

Mitigation measures in this section are proposed to inform the appropriate assessment.

- Geophysical data and the existing biotope maps for the area will be used to identify potential reef and position geotechnical and environmental stations to avoid intrusive sampling in these areas. If geophysical interpretation is inconclusive, drop down camera will be used to visualise the seabed prior to sampling.

5.4.4 Conclusion

Penetration/disturbance of intertidal reef habitat from borehole drilling would remove an area of reef from the SAC. Although this area of removed habitat will be able to be re-colonised in the short-term (1-7 years) as the boreholes backfill, there will be a small loss of habitat in the short term and mitigation has been proposed to reduce impacts.

Implementation of mitigation measures have been proposed to ensure that intertidal reef within the SAC will not be significantly reduced in extent and that the conservation objectives of the SAC will not be adversely affected. This mitigation removes the potential for cumulative effects.

Providing that the mitigation measures in Section 5.5.3 are implemented, there will be **no adverse effect on the integrity of the site, either alone or in combination with other plans or projects.**

6. SUMMARY

The proposed site investigation works have been subject to the AA process due to the location with respect to nine European Sites.

A detailed screening assessment has been conducted which concluded that likely significant effects cannot be ruled out on the Qualifying Interests and conservation objectives of three European Sites:

- Lower River Shannon SAC (IE002165, common bottlenose dolphin, reefs)
- Kilkee Reefs SAC (IE002264, reefs)
- Carrowmore Dunes SAC (IE002250, reefs)

The assessment concluded that there exists the potential for cumulative effects between the proposed site investigation works and any other projects in the area.

Further to screening, a Natura Impact Statement has been provided to inform the Appropriate Assessment and concludes:

- Effects on the Lower River Shannon SAC QIs common bottlenose dolphin from geophysical survey activities will be avoided through ensuring the survey contractor implements the 'Guidance to Manage the Risk to Marine Mammals from Man-made sound sources in Irish Waters' and liaison with other developers in the region to minimise cumulative impacts.
- Effects on the QIs reef within the Lower River Shannon SAC, Kilkee Reefs SAC and Carrowmore Dunes SAC from borehole drilling will be avoided as existing biotope maps for the area will be used to identify potential reef and position geotechnical and environmental stations to avoid intrusive sampling in these areas. If geophysical interpretation is inconclusive, drop down camera will be used to visualise the seabed prior to sampling.
- It is the view of the authors of this Natura Impact Statement (Intertek Energy & Water Consultancy Services) that, following the implementation of the mitigation measures prescribed in the NIS, the proposed site investigations will not, by itself or in combination with other plans or projects, have an adverse effect on the integrity of any European Sites and there is no reasonable scientific doubt as to that conclusion.

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