



An Roinn Tithíochta,  
Rialtais Áitiúil agus Oidhreachta  
Department of Housing,  
Local Government and Heritage

# ***SCREENING FOR APPROPRIATE ASSESSMENT REPORT***

Application No. FS007161

7<sup>th</sup> of November 2022

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## Statement of Authority

This Screening for Appropriate Assessment Report has been undertaken by Dr [REDACTED], an experienced marine ecologist with a wide range of experience from conservation, developing a quality index tool for Water Framework Directive, habitat mapping, aquaculture to deep water reef ecology. She completed a Ph.D. in the polychaete taxonomy and ecology in NUIG. Following which she undertook Post-Doctoral research on shallow water hydrothermal vent ecosystems at the Institute of Marine Biology of Crete. For the last 11 years she has worked with the National Parks and Wildlife Service as a marine ecologist where she developed the Site Specific Conservation Objectives for all marine Special Areas of Conservation. In this position she also reviewed Appropriate Assessments for Aquaculture Licences and, as part of the statutory process, drafted Departmental responses to these. She has considerable experience in the Habitats Directive, Article 6 Assessments and the case law pertaining to them.

With NPWS she developed and delivered Article 17 monitoring programmes for Annex I habitats and Annex V species. She is on the Natura 2000 Marine Expert Working Group, the OSPAR Benthic Habitats Expert Group and MSFD Integrated Monitoring Programme working group. She has been on a number of research steering groups including the NPWS/EPA co-funded CLEAR project on restoration of coastal lagoons, EcoSystem Services on the VIBES project and the Ecostructure project [<https://www.ecostructureproject.eu>]. She has been Ireland's representative on the Marine and Coastal Biodiversity expert working group for the UN Convention on Biodiversity.

# **1 Introduction**

## **1.1 Project Overview**

Fuinneamh Sceirde Teoranta are progressing the development of the Sceirde Rocks Offshore Wind Farm. They are seeking a Foreshore Licence for a five year period to conduct site investigation activities for the Sceirde Rocks Offshore Wind Farm located approximately 5km off the coast of County Galway. This work will provide a detailed understanding of the existing seabed and sub-seabed conditions. The overall area which is the subject of this application is 141km<sup>2</sup>.

## **1.2 Application documents submitted**

A Foreshore licence application was received from Fuinneamh Sceirde Teoranta on 16<sup>th</sup> of February 2022 along with a cover letter. The following documents were submitted as part of this application:

- i. Application to carry out site investigation activities for the Sceirde Rocks Offshore Wind Farm, Co. Galway 16/02/2022
- ii. Site Layout Map 31/03/2022
- iii. Sceirde Rocks Offshore Wind Farm Foreshore Licence Application “Schedule of Activities” 22/02/2022
- iv. Sceirde Rocks Offshore Wind Farm Foreshore Licence Application “Report to inform AA Screening” 22/02/2022
- v. Sceirde Rocks Offshore Wind Farm Foreshore Licence Application “Environmental Assessment and EIA Screening Report” 22/02/2022

## **1.3 Legislative background and AA process**

Under Article 6.3 of the Habitats Directive (92/43/EEC) Member States are required to consider the potential effects of any project or plan which is not directly connected with, or necessary to, the management of a European site but is likely to have a significant effect on the site before a decision can be made to allow the plan or project to proceed. In order to ascertain if the plan or project, either alone or in-combination with other plans or projects, is likely to have significant effects on a European site an Appropriate Assessment of the implications of the plan or project on the site’s conservation objectives is required. The first step in the process is screening to determine if an Appropriate Assessment is required.

Under the Foreshore Act, as amended, a lease or licence must be obtained from the Minister for Housing, Local Government & Heritage before carrying out activities within the Foreshore area. This area is defined as the HWM to the 12 nautical mile limit. As the Consenting Authority, the Department must carry out a screening for an Appropriate Assessment on any Foreshore application which may have significant effects on the conservation objectives of a European site. To enable the consenting authority to carry out its statutory obligations the applicant provides the Department with sufficient information to allow it to carry out a screening for an appropriate assessment.

This report presents the results of the Screening for Appropriate Assessment of the proposed project. It determines whether the proposed project, either alone or in-combination with other plans or projects, is likely to have significant effects on a European site. It will establish if a stage 2 appropriate assessment is required, thus meeting the Department’s statutory obligations under the European Communities (Birds and Natural Habitats) Regulations 2011

to 2021 (the “Habitats Regulations”), to ensure compliance with the Habitats Directive (92/43/EEC).

#### **1.4 Methodology**

This report has been prepared with reference to the following guidelines and legislation:

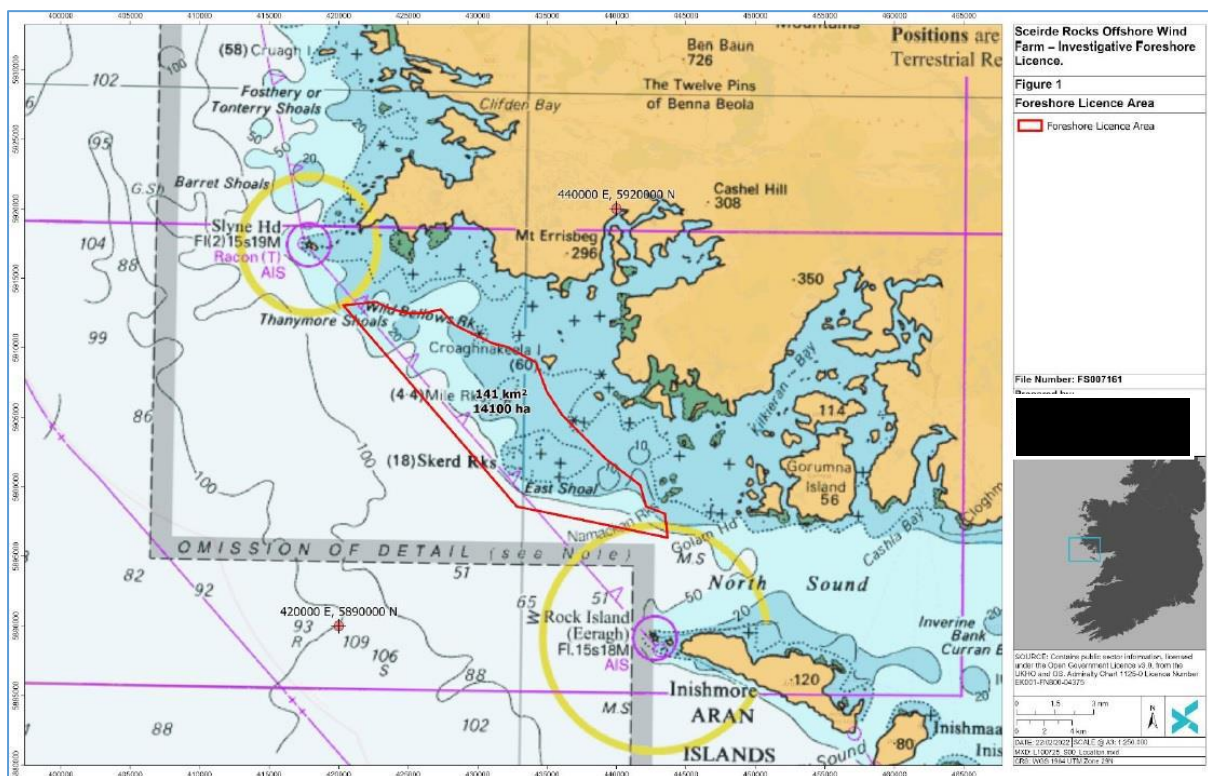
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna. Official Journal of the European Communities.
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version).
- European Communities (Birds and Natural Habitats) Regulations 2011. SI No. 477 of 2011.
- Managing Natura 2000 sites: The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC. European Commission 2019. Office for Official Publications of the European Communities, Luxembourg.
- Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities. DEHLG, 2009. Revision 2010.
- Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters. Department of Arts, Heritage and the Gaeltacht, 2014
- Appropriate Assessment Screening for Development Management OPR Practice Note PN01 March 2021
- Relevant case law

## 2 Project Description

Fuinneamh Sceirde Teoranta (FST) seeks consent to conduct site investigation activities for the Sceirde Rocks Offshore Wind Farm located off the west coast of Ireland. The site investigation activities are in an area corresponding to the proposed array area and will identify the geotechnical, metocean, wind resource and benthic characteristics of the area. The data obtained and its analysis will inform the design of the windfarm and the Environmental Impact Assessment and Natura Impact Assessment necessary for such a windfarm.

### 2.1 Location

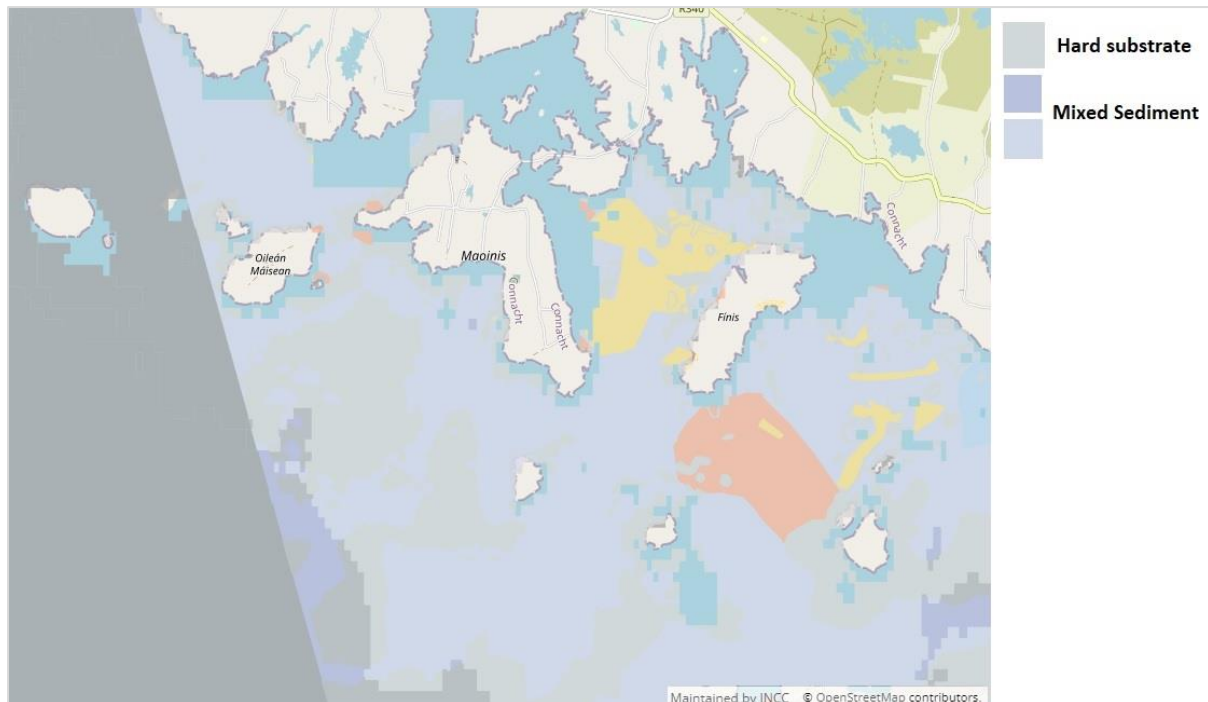
The Foreshore Licence Application Area lies within the 12nm limit and is located approximately 5km off the coast of County Galway. It covers an area of over a 141km<sup>2</sup>, corresponding to the proposed array area (Figure 1).



**Figure 1** The Foreshore Licence Application Area for the array area of the proposed Sceirde Rocks Offshore Wind Farm.

The proposed cable corridor areas extends from the array area making landfall at Tawin in inner Galway Bay and on the Clare coast at Fleagh Point and Killard Point. Site investigation surveys of the proposed cable corridors is the subject of a separate application and will be assessed in a separate screening report.

The sediment in this area is largely that of rock and mixed sediment. Depth ranges from 20m to 40m (Figure 2).



**Figure 2** Sediment type in the vicinity of the Foreshore Licence Application Area.

<https://www.emodnet-seabedhabitats.eu/>

## 2.2 Proposed site investigations

The Applicant has applied for a five year foreshore licence to carry out site investigations works. This will include geotechnical, geophysical, metocean, wind resource and benthic ecological surveys.

## 2.3 Description of the proposed survey works

### 2.3.1 Geotechnical survey

The aim of the geotechnical survey is to give a comprehensive view of the subsurface terrain. The primary geotechnical sampling to comprise of:

- Up to 60 boreholes which may include cable percussive or rotary coring techniques. Borehole depth will not exceed 70m
- Up to 60 seafloor Cone Penetration Tests (CPT)
- Shallow sampling, using Vibrocore techniques at up to 60 locations.

The geotechnical surveys will be performed at various water depths by either a Dynamic Positioning (DP) controlled, heave-compensated drillship, a Jack-up vessel, or by means of seabed drilling equipment.

Vessels will be fully equipped with ultra-short baseline (USBL) system for accurate positioning of boreholes. The survey methodology will comprise a combination of drilling techniques, such as cable percussive drilling, with follow-on rotary coring techniques.

#### 2.3.1.1 Cable percussive drilling

This is a drilling technique to target seabed and sub-seabed sediments which overlie rock. This includes coarse-grained sediments such as sand and gravel, and fine-grained sediments such as clay and silt. Casing will be utilised to stabilise the borehole walls through the superficial sediment. Within coarse-grained sediments, percussive sampling, such as hammer samples, will be undertaken at regular intervals. In-situ standard penetration testing (SPT) will also be



undertaken, generally alternating with percussive sampling. Bulk-disturbed and small-disturbed samples will be taken, where appropriate.

Within fine-grained sediments, hammer or push samples will be taken at regular intervals, alternating with SPT testing. Undisturbed, bulk disturbed and small disturbed samples are anticipated to be taken to enable a range of laboratory tests.

Samples will be appropriately preserved and stored prior to transportation to onshore laboratories for geotechnical testing. An offshore laboratory will also be provided on the vessel to enable classification and index testing to be undertaken, along with preliminary core and sample logging.

#### 2.3.1.2 Rotary coring

Rotary coring is anticipated to comprise double or triple-tubed coring depending on the nature of the rock. The drilling operations typically utilise a drilling fluid to help flush drill cuttings from the bore, cool the drill bit and generally aid drilling performance; drilling fluids are typically certified for offshore use and may comprise biodegradable, miscible guar gum, or similar, and seawater.

The retrieved core is anticipated to be approximately 100mm in diameter but may potentially be reduced to 70mm. The majority of the underlying rocks are anticipated to be high-strength granitoid rocks, with minor zones of limestone around the southern margin.

The extracted rock core will be photographed, logged and sub-sampled offshore. Samples will be appropriately preserved and stored prior to transportation to onshore laboratories for geotechnical testing. Classification and index testing of the rock to be undertaken in the offshore laboratory.

#### 2.3.1.3 Down-hole Testing including Acoustic Imaging

It is anticipated that some level of down-hole testing may be undertaken which could include video imaging, acoustic imaging and dilatometer testing. The purpose of down-hole acoustic imaging is to provide an image of the rock structure to determine the nature, orientation and spacing of any rock discontinuities within the Foreshore Licence Application Area.

The process involves sending an acoustic imaging camera down the borehole which takes a 360° image of the rock face. This can show features such as voids or fractures and can also give an indication of the orientation of discontinuities. The images can also be used to assess zones of core loss and adjust borehole logs accordingly.

Acoustic imaging requires a stable borehole and therefore requires casing through unstable surficial sediments and extension of casing to support deeper unstable zones. Acoustic imaging cannot be undertaken through the cased section of a borehole and therefore the strategy for performing the survey may require modification based on the general nature of the rock encountered.

#### 2.3.1.4 Shallow sampling

A combination of grab samples, vibrocores, and gravity cores may be used to determine the near surface sediment properties. These techniques would range from 0.5m to 6m penetration and would extract a shallow sample for further lab testing and visual description.

#### 2.3.1.5 Cone Penetration Tests (CPT)

Seabed CPTs consist of a self-contained and automated CPT test unit housed within a seabed frame and connected to the DP vessel via a lift wire and data transfer umbilical. The frame is

kept on deck of the DP vessel and deployed over the side using a dedicated Launch Recovery System (LARS) or through a moonpool. Once positioned on the seafloor the cone is pushed at a constant rate into the seabed until either target penetration is achieved or refusal reached. Refusal may be due to maximum thrust reached, excessive load experience on the tip or the sleeve, or excessive cone inclination.

The configuration of the CPT unit used for the preliminary survey will be defined by the target penetration depth. The maximum penetration depth anticipated for this Foreshore Licence Area is circa 50m, however final selection of the CPT unit will be determined on the basis of sediment thicknesses estimated from the geophysical survey data. This preliminary depth places this CPT site investigation within the category of deep seabed CPT testing which would require a 20 to 25 tonne CPT unit. CPT testing at these depths takes a few hours from unit deployment to recovery back on deck. Where the technical requirements are not met at a location the CPT unit may be lifted a small distance from the seabed and repositioned horizontally so that another test can be attempted.

#### 2.3.1.6 USBL Specification and use

Ultra-short baseline (USBL) systems are used to determine the position of subsea survey equipment, towed devices and grab samplers. A USBL system consists of a transducer which is mounted on the vessel and a transponder attached to the deployed equipment. The transducer transmits acoustics through the water and the transponder sends a response which is detected by the transducer. The survey vessel will visit each individual borehole location in turn. Accurate positioning of the boreholes will be achieved using an USBL system. Transponders emit pulses of medium frequency sound. The peak sound pressure level (SPL) was estimated as 207 dB re 1  $\mu$ Pa at 1m for the Kongsberg HiPap 500 (Austin *et al.*, 2012). Transmissions are not continuous but consist of short 'chirps' with a duration that ranges from 3 to 40 milliseconds. Transponders will not emit any sound when on standby. For general positioning and when lowering the seabed frame they will emit one chirp every five seconds. When required for precise positioning they will emit one chirp every second. Use of the USBL and beacon is expected to take from a few minutes to 1.5 hours per station depending on the water depth. Once the seabed frame is on the seabed, stationary and a final fix has been recorded, the USBL will be turned off.

#### 2.3.1.7 Coring fluids and discharges

Borehole coring will be conducted using seawater with no added chemicals wherever possible. If coring fluids are required the most likely fluid to be used is an organic, biodegradable, high performance water-based mud (HPWBM). Bentonite will also be carried on board in case it is needed and this may sometimes be mixed with soda ash. All proposed coring fluid products are rated as PLONOR (posing little or no risk to the environment) and contain only OCNS Gold/Silver, E or D rated chemicals. Final details of the coring fluids to be used will be known upon appointment of the survey contractor.

Only minimal amounts of cuttings will be discharged because 80 - 90% of the core is recovered for analysis. Cuttings that are discharged and will settle close to the seabed and are estimated to amount to <0.25m<sup>3</sup> per borehole.

The proposed geotechnical survey will take place for one to two months over several phases within the five year period.

### 2.3.2 Geophysical survey

Geophysical surveys are required to give a better understanding of water depths, topography and relief structure of the seabed and its subsurface structure. To inform the suitability of a cable corridor area and understanding the top ~5m is crucial.

The proposed geophysical survey programme will use a multibeam echosounder, side scan sonar, magnetometer and sub-bottom profiler. A seismic survey using a slightly higher energy source will be used only if sufficient depth data cannot be obtained using the sub-bottom profiler.

#### 2.3.2.1 Multibeam Echosounder (MBES)

A Multibeam Echosounder system will be used to provide detailed bathymetric mapping throughout the survey area. MBES dual head system will be hull mounted. Operating frequencies for offshore array area are in the region of 200kHz (minimum) and can be up to 700kHz. MBES may be undertaken across the site to a suitable percentage cover.

#### 2.3.2.2 Side Scan Sonar (SSS)

Side Scan Sonar is a sensor which is towed behind the vessel on an armoured tow cable. The SSS system will be used to provide detailed imagery of the seabed throughout the survey area which will aid with seafloor sediment/bedrock and geomorphology mapping as well as for identifying any shallow geohazards. The operating frequency range for the proposed project is between 300 to 900 kHz. SSS survey will be undertaken across the site to a suitable percentage cover.

#### 2.3.2.3 Magnetometer

A magnetometer is a passive device that is towed behind a survey vessel. It is used to detect ferrous objects on the surface or in the subsurface. This work will be carried out alongside the SSS survey work.

#### 2.3.2.4 Sub-bottom Profiler (SBP)

Shallow Sub-Bottom Profiling aims to create a 2-D image of the subsurface up to potential depths of approximately 10-50m below seabed. The SBP system will be used to determine the stratigraphy across the site and quantify the variability in the lateral and vertical extents to a depth of at least 50m below seabed. A typical SBP system is a hull-mounted pinger system with an expected operating frequency range of approximately 2-16kHz and sound pressure levels of 200dB re1μPa at 1 metre range. SBP survey will be undertaken across the site to a suitable percentage cover.

#### 2.3.2.5 Ultra High Resolution Seismic

Higher energy seismic sources (boomer and sparker) may be used to determine the stratigraphy across the site and quantify the variability in the lateral and vertical extents to a depth of at least 50m below the seabed. A typical boomer source would have an expected operating frequency of approximately 2.5kHz with sound pressure levels in the range of 208-215dB re1μPa at 1 metre range. A typical towed sparker system with sound pressure levels in the range of 204-216dB.

Multi-channel acoustic surveys using higher energy sources are used to image the subsurface and categorise sediment strata. These surveys can create ultra-high resolution 2D or 3D images of the subsurface whilst achieving greater depths than sub-bottom profiling systems. The intensity of the source can vary depending on the requirements of the survey. These surveys will only be used if sufficient depth data is not achieved with the use of the SBP

method. This Ultra High Resolution Seismic survey will be undertaken across the site to a suitable percentage cover.

The geophysical surveys will take place for two to three months in several phases over the five year period.

#### 2.3.3 Metocean survey

Metocean site investigations are used to evaluate the wave and current conditions across the Foreshore Licence Application Area. The data will be used to help define the design parameters of the Sceirde Rocks Offshore Wind Farm foundations, as well as the conditions to be expected during the installation and maintenance phases of the project. The site investigations will require the deployment of two wave buoys for a minimum 12 months but possibly up to 24 months.

The wave buoys are designed to follow movement at the water surface and gather the relevant wave data. Each wave buoy is anchored to the sea floor using a length of highly elastic rubber chord and suitably sized anchor structure. The elasticity of this chord allows the buoy to ride and follow the movement of the water surface. A real time data feed with a Global System for Mobile communications (GSM) and satellite communication system transmits the collected data from the buoy to a receiver station onshore. The wave buoy specifications include: an LED light for detection, an integrated datalogger, GPS position, a solar powered battery and an internal backup battery pack.

#### 2.3.4 Wind Resource survey

Wind resource measurements are required to accurately estimate the wind conditions across the Sceirde Rocks Offshore Wind Farm site. The data collected will be used to assess the energy production from the wind farm, including daily and seasonal patterns. The wind data is also used as one of the inputs for the engineering design of the wind turbine, turbine layout and foundation structures.

The wind resource survey, using a floating LiDAR (FLS), will last a minimum of 12 months but could last more than 24 months. It is expected that there will be up to two wind measurement locations within the Foreshore Licence Application Area. Two FLS buoys will be deployed in this area in order to improve the accuracy of the wind resource estimates, as well as provide additional contingency.

Each FLS is usually a small, 2m to 3m diameter, buoy moored using a gravity anchor. It houses a LiDAR (Light Detection And Ranging) device which uses laser to measure wind speed and direction at a range of heights, up to 100m to 200m above the device. The buoy also houses the necessary processing equipment, power supply systems (solar panels, small scale wind turbine generators, and batteries), additional measurement systems required for the data monitoring (such as key metocean and atmospheric characteristics), as well as auxiliary systems for marine navigation safety. The data is stored on the device and is also uploaded to a remote storage via a GSM or satellite link.

There are several FLS providers and the final design used for the measurement survey at Sceirde Rocks Offshore Wind Farm will be known following appointment of the survey contractor. The FLS would be deployed, serviced, and decommissioned using an installation vessel.

#### 2.3.5 Benthic Ecological surveys

The purpose of the benthic ecological surveys is to identify the extent and distribution of marine benthic communities and habitats within the Foreshore Licence Application Area. The

sample locations will be selected to ensure that samples are collected from different habitats to generate a representative overview of the benthos in the Foreshore Licence Application Area.

A drop down camera/Remotely Operated Vehicle (ROV), water column sampling and grab sampling will be used to characterise the benthic communities. This will include intertidal and subtidal sediment and reef communities. For subtidal reef drop down camera or ROV and possibly supplemented diver survey will be used to characterise the community.

It is proposed that up to 40 grab sample stations (using day grab or van Veen grab) will be taken across the site. A stratified random sampling regime across the Foreshore Licence Application Area has been adopted to determine the baseline environment. Some of the proposed benthic grab stations will coincide with the proposed geotechnical borehole locations. The remainder will be spread across the area to include the range of depths and exposures present.

The benthic sampling will include up to four replicate grabs at each station. Three replicates will be used for macrofaunal analysis and the fourth will be sub-sampled for Particle size analysis (PSA) and organic carbon content. The replication of samples is proposed to provide a statistically robust macrofaunal data set to inform the environmental baseline and future monitoring.

A total of up to 160 grabs are expected to be taken each disturbing an area of 0.1m<sup>2</sup>. Therefore the total area of seabed that would be directly affected by the grab sampling regime will be 16m<sup>2</sup>. Where benthic sampling is not possible drop down video/camera analysis will be used to establish the benthic community present.

#### 2.3.6 Survey Vessels

A range of vessels will be used to carry out the various surveys to be undertaken in the Foreshore Licence Application Area. Given the nature of the surveys the vessel will be slow moving.

The survey contractor vessels will comply with international and national statute as appropriate including but not limited to:

- European Communities (Birds and Natural Habitats) Regulations 2011;
- Sea Pollution Act 1991 and International Convention for the Prevention of Marine Pollution from Ships (MARPOL 73/78);
- Sea Pollution (Amendment) Act 1999 and International Convention on Oil Pollution Preparedness, Response and Co-operation 1990;
- S.I No. 372/2012 Sea Pollution (Prevention of Pollution by Garbage from Ships) Regulations 2012;
- S.I. No. 492/2012 Sea Pollution (Prevention of Pollution by Sewage from Ships) (Amendment) Regulations 2012; and
- SI. No. 507/2012 Merchant Shipping (Collision Regulations) (Ships and Water-Craft on the Water) Order 2012

#### 2.3.7 Noise from survey works

Underwater noise generated as a result of the survey activities is given in table 1. Noise emissions associated with the survey vessels are continuous in nature. Use of a Dynamic Positioning (DP) system constitutes the greatest noise source for this type of vessel. Hartkin *et al.* (2011) found that source pressure levels reached a maximum of 170 dB within 1m of the trustors whilst the vessel was on DP.

The source noise levels for rotary coring is 165dB re 1µpa @1m and source noise levels for percussive drilling is 185dB re 1µpa @1m (Subacoustech Environmental Ltd, 2018).

Ultra-short baseline SBL system will be used to determine the position of equipment when it is deployed. It will be used on Remotely Operated Vehicles (ROVs), towed devices, grab samplers, etc. This involves the emission of sound from a vessel-mounted transducer to a subsea transponder. Transponders will not emit any sound when on standby. The USBL systems can be used either continuously or intermittently through the operation they are supporting. Transmissions are not continuous but consist of short 'chirps' with a duration that ranges from 3 to 40 milliseconds. For general positioning and when lowering the seabed frame, they will emit one chirp every five seconds. When required for precise positioning they will emit one chirp every second. Use of the USBL and beacon is expected to take from a few minutes to 1.5 hours per station depending on the water depth. Once the seabed frame is on the seabed, stationary and a final fix has been recorded, the USBL will be turned off.

**Table 1** Summary of noise sources from Survey works from the Screening for Appropriate Assessment Report (Xodus 2022)

Noise Source	Typical Frequency	Typical Sound Pressure Level (dB re 1µPa @ 1m)
USBL	19.5 – 33.5 kHz	207
Geotechnical Drilling	2Hz – 50kHz	160 - 185
Shipping Noise	<1 kHz	160 - 185
Multi-beam echo sounder	200 – 700kHz	200 - 228
Side Scan Sonar	300 – 900kHz	228
SBP (Pinger, Chirp, Parametric)	2 – 16kHz	200 - 226
UHSR (Sparker/Boomer)	2.5kHz	204-216/208-215

### **3 Screening for Appropriate Assessment**

#### **3.1 Management of Natura 2000 site/s**

Plans or projects that are directly connected with or necessary to the management of a Natura 2000 site do not require AA. The proposed project is not directly connected with or necessary for the management of a Natura 2000 site. Therefore this project is subject to screening for Appropriate Assessment to determine if it alone, or in-combination with other plans or projects, is likely to cause significant effects to a European site.

#### **3.2 Identification of possible effects**

A European site is only at risk of likely significant effects where the Source-Pathway-Receptor link exists between the proposed development and the European site (OPR 2021).

##### **3.2.1. Annex I habitats**

The potential environmental impacts on Annex I Habitats as a result of the site investigation surveys is physical disturbance and habitat loss.

Equipment used to sample sediments may lead to an increase in suspended sediment concentrations (SSC). Such increases can lead to the clogging of feeding apparatus of filter feeders, smothering of sessile species, increase in scouring and rendering hard surfaces unsuitable for epibenthic settlement. There is therefore the potential for both is physical disturbance and habitat loss on Annex I habitat Reefs. Habitat loss is the result of direct removal of the substrate from the habitat.

##### **3.2.2 Annex II species**

###### Marine mammals

In Ireland Annex II marine mammal species include the European otter, grey seal, harbour seal, harbour porpoise and bottlenose dolphin. Marine mammals may be impacted by visual disturbance, above water noise disturbance, injury due to collision with survey vessels and from the effects of underwater noise.

For otters there is potential for behavioural effects due to increased noise levels and visual stimuli from the proposed activities in the intertidal and shallow subtidal. Effects may include reduced foraging opportunities, reduced resting and breeding locations, and unfavourable commuting routes.

Vessel strikes are a known cause of mortality in marine mammals (Laist et al., 2001; Wilson et al., 2020). Injuries as a result of collision may also result in individuals becoming vulnerable to secondary infections. Slower vessels following a consistent trajectory allow animals the opportunity to avoid collisions. The risk of fatality is also reduced if vessels are moving slowly. The introduction of underwater noise through geotechnical and geophysical surveys has the potential to disturb and/or injure marine mammals if the frequency/frequencies of the sound emitted fall within their hearing range. Marine mammals rely on sound to navigate, to communicate with one another and to sense and interpret their surroundings. This is of particular concern for cetacean species which are confined to the marine environment. Currently three groups of cetaceans are recognised depending on their known auditory ability and functional frequencies (Table 2). Seals have differing auditory ability depending on if they are in air or in water. They are therefore, from a functional point of view, divided into two groups, in water and in air.



Cetaceans			Pinnipeds	
Low frequency 7 Hz-35 kHz	Mid-frequency 150 Hz-160 kHz	High frequency 200 Hz-180 kHz	in water 5 Hz-86 kHz	in air 75 Hz-30 kHz
Baleen whales	Most toothed whales, dolphins	Certain toothed whales, porpoise	All species	All species
Species- Ireland	Species- Ireland	Species- Ireland	Species- Ireland	Species- Ireland
Humpback whale	Sperm whale	Pygmy sperm	Grey seal	Grey seal
Blue whale	Killer whale	whale *Harbour	Harbour seal	Harbour seal
Fin whale	Long-finned pilot	porpoise		
Sei whale	whale			
Minke whale	Beaked whale			
	species			
	*Dolphin species			

**Table 2** Known auditory ability and functional frequencies cetacean species and seals (from Southall *et al.*, 2007). \*Southall *et al.*, 2019 updated the marine mammal hearing groups, adding a Very High-frequency cetacean group which includes Harbour porpoise and now including Bottlenose dolphin in the High frequency group.

Southall *et al.* (2007) identified thresholds of peak sound pressure (SPL) and sound exposure (SEL) from discrete sound events (single or multiple, within a 24-hr period) that would be expected to elicit Temporary Threshold Shift (TTS) and/or Permanent Threshold Shift (PTS) in receiving marine mammals. Southall *et al.*, (2019) revised noise exposure criteria to predict the onset of auditory effects in marine mammals (Table 3).

Marine Mammal hearing group	TTS onset: SEL weighted	TTS onset: Peak SPL unweighted	PTS onset: SEL weighted	PTS onset: Peak SPL unweighted
Low frequency Cetaceans	168	213	183	219
High frequency Cetaceans	170	224	185	230
Very High frequency Cetaceans	140	196	155	202
Seals in water	188	226	203	218
Seals on land	146	161	161	144

**Table 3** TTS- and PTS- onset thresholds for marine mammals exposed to impulsive noise SEL thresholds in dB re1 $\mu$ Pa<sup>2</sup>s under water and dB re20 $\mu$ Pa<sup>2</sup>s in air (for seals only) from Southall *et al.*, 2019.

### Migratory fish

Many fish which possess swim bladders do not have anatomical connections with the ear and therefore do not have a high degree of hearing sensitivity compared to those with such connections. Atlantic Salmon have poor hearing sensitivity and are only capable of detecting low frequency tones (below 380Hz) and particle motion rather than sound pressure (NOAA, 2016). However, all fish have the capability to hear low-frequency sounds (< 500 Hz) and, consequently, can be disturbed by noisy human activities (Popper *et al.* 2003, 2014).

### 3.2.3. Birds

Different seabird species exhibit varying sensitivities to noise. Some species, such as herring gull, lesser black-backed gull and to a lesser extent kittiwake, display habituated responses to additional anthropogenic noise. Other species groups, such as divers, are sensitive to



anthropogenic disturbance (Furness *et al.*, 2012, Black *et al.*, 2015, Dierschke *et al.*, 2017, Fleissbach *et al.*, 2019).

Underwater noise is likely to cause disturbance to some species of diving seabird. It may affect prey acquisition, cause displacement from habitat or evoking an escape flight response (Black *loc.cit*, Dierschke *loc.cit*). Seabirds whose predominant method of foraging is shallow diving, dip diving or surface feeding are unlikely to be impacted by underwater noise due to the brevity of exposure time and sensitivity to disturbance (Furness *loc.cit*, Fleissbach *loc.cit*).

Breeding seabirds nesting on shorelines or structures in proximity to human activities can be disturbed from their nests. Similarly other seabird aggregations or individual birds may be disturbed by presence of a vessel or on its approach (Althouse *et al.*, 2019, Furness *loc.cit*, Dierschke *loc.cit*, Fleissbach *loc.cit*).

Disturbance and displacement of species may have consequences at individual and population levels (Joint SNCB note 2017). The survey works may also have effects on the prey species of these birds, reducing their availability which may then adversely affect survival and productivity.

#### 3.2.4 Accidental spillage

This is a busy navigation area in which a lot of fishing, commercial and recreational vessels operate. Given that the surveys would amount to a single extra vessel in this area the likelihood of a collision resulting in a pollution event is considered insignificant. As vessels are required by law to adhere to regulations governing accidental leakages and spillages similarly the likelihood of such an occurrence is considered very unlikely.

### 3.3 Identification of the relevant European site/s

Special Area of Conservations (SAC) were screened on the potential for connectivity between the proposed project and their qualifying interests. Potential connectivity was considered if there was overlap with the Foreshore Licence Application Area and an SAC (direct effects) or if the SAC was within range of the effects of the proposed activity (indirect effects).

#### 3.3.1 Annex I habitats

As these works are being undertaken in the marine environment, using the Source-Pathway-Receptor model (OPR 2021), only the marine and coastal Annex I habitats were considered in this screening process.

While the Foreshore Licence Application Area does not directly overlap with any SACs it is adjacent to Kilkieran Bay and Islands SAC. This SAC is designated for the Annex I habitat Reefs and increases in suspended sediment concentrations may have significant effects of this habitat depending on the amount and the distance of the activity from the habitat. Therefore Kilkieran Bay and Islands SAC is considered to be with the Zone of Influence of the proposed project.

#### 3.3.2 Annex II species

##### Migratory fish

Once they leave freshwater salmon migrate to their feeding grounds in the northern Atlantic. Recent studies have found that salmon populations migrate towards oceanographic fronts for feeding (Rikardsen *et al.*, 2021). Salmon from northwest Spain and southeast Ireland appear to move out to the shelf edge before crossing the Atlantic towards Greenland. Therefore only SACs along the western seaboard and in the vicinity of the Foreshore Licence Application Area were considered to be in the Zone of Influence of the proposed project.

The Freshwater Pearl Mussel utilises Atlantic salmon at a certain stage in its life cycle, Sea lamprey is a predator of salmon (OSPAR 2009). Therefore it is considered that if the salmon is significantly impacted by an activity there is a possibility that these species may also be negatively affected. The Zone of Influence for these species was considered the same as that for Atlantic salmon.

Using this criteria four SACs were identified to be considered further in the screening process. These are:

- Connemara Bog Complex SAC
- Lough Corrib SAC
- Maumturk Mountains SAC
- The Twelve Bens/Garraun Complex SAC

#### Marine mammals

After breeding most grey seals disperse away from their haul-out sites therefore their usage of a particular SAC is very time and location specific. On this basis and considering available data on grey seal movements (e.g. Cronin *et al.*, 2011; SMRU Ltd, 2011; Russell and McConnell, 2014) there is potential for interactions between grey seals and projects 200km distant from the SAC for which they are designated. This is considered the Zone of Influence for this species.

In Ireland the foraging range for harbour seal ranges between 20km and 40km (Cronin, 2010), using the precautionary principle that latter value was considered in the screening process and is taken as the Zone of Influence for this species.

Otters are a semi-aquatic species who use the marine environment for foraging. Otters that forage on the coast have flexible foraging times linked to the tides. The Zone of Influence for this species is 20km along the shore.

In Ireland there are a number of SACs designated for the cetaceans, harbour porpoise and common bottlenose dolphin. As these Annex II species are highly mobile species specific Management Units (MU) are used to assess the effect of an activity on them. The Zone of Influence of a project which has the potential to impact on a species is considered to be the MU for that species which overlaps with the project. With respect to the proposed project the overlapping MU for harbour porpoise is the Celtic and Irish Seas; for the bottlenose dolphin it is the West Coast of Ireland (IAMMWG, 2015).

Using this criteria seventeen Irish, sixteen French, and four British sites were identified to be within the Zone of Influence of the proposed project. These are:

- Kilkieran Bay and Islands SAC
- Inishbofin and Inishshark SAC
- Duvillaun Islands SAC
- Inishkea Islands SAC
- Blasket Islands SAC
- Slieve Tooley/Tormore Island/Loughros Beg Bay SAC
- Roaringwater Bay and Islands SAC
- Slyne Head Islands SAC
- Slyne Head Peninsula SAC
- West Connacht Coast SAC
- Connemara Bog Complex SAC

- Lough Corrib SAC
- Maumturk Mountains SAC
- The Twelve Bens/Garraun Complex SAC
- Blasket Islands SAC
- Roaringwater Bay and Islands SAC
- Rockabill to Dalkey SAC
- Récifs et landes de la Hague
- Anse de Vauville
- Banc et récifs de Surtainville
- Chausey
- Baie du Mont Saint-Michel
- Estuaire de la Rance
- Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard
- Cap d'Erquy-Cap Fréhel
- Baie de Saint-Brieuc – Est
- Tregor Goëlo Est
- Côte de Granit rose-Sept-Iles
- Nord Bretagne DH
- Baie de Morlaix
- Abers - Côte des legends
- Ouessant-Molène
- Côtes de Crozon
- North Anglesey Marine / Gogledd Môn Forol
- West Wales Marine / Gorllewin Cymru Forol
- North Channel
- Bristol Channel Approaches / Dynesfeydd Môr Hafren

### 3.3.3 Birds

A Special Protection Area (SPA) is considered to have connectivity if it either overlaps with the Foreshore Licence Application Area or is within 15km of this area. It is acknowledged that seabirds generally have large foraging ranges (Woodward *et al.* 2019) and may occasionally occur in the Foreshore Licence Application Area from more distant SPAs. If the survey area represents the outer extent of the foraging range of species, such as Manx Shearwater which have very large ranges, then the connectivity between it and SPAs for which the species is an SCI is considered to be insignificant.

Using the above criteria the following SPAs were considered to be within the Zone of Influence of the proposed project:

- Slyne Head To Ardmore Point Islands SPA [IE004159]
- Inishmore SPA [IE004152]
- Connemara Bog Complex SPA [IE004181]

### 3.4 Assessment of Likely Significant Effects

The SACs and SPAs which were considered to be within the Zone of Influence of the proposed project and their qualifying interests are present in tables 4 and 5, respectively.

#### 3.4.1 Annex I Habitats

The Emodnet habitat data shows the Foreshore Licence Application Area to be largely that of mixed sediment and hard substrate (figure 1). This reflects an area of strong hydrodynamics with low levels of fine material. In such areas increases in Suspended Sediment Concentrations will be slight, confined to a small area around the sampling station and be temporary in nature. Therefore the possibility of likely significant effects on the Annex I habitat Reefs in the adjacent SAC as a result of the proposed project **can be excluded**.

#### 3.4.2 Annex II species

As the nature of seabed at this site is mixed sediment and hard substrate the levels of suspended sediment from benthic and geotechnical sampling where it occurs will be localised and temporary. As such likely significant effects will not occur. Although there is increasing knowledge on noise impacts on individual fish species (Popper 2012, 2016) the extent to which this could affect an animal's fitness is still unknown, making it difficult to define the maximum level of underwater noise that is consistent with a favourable conservation status at the population level. Using the precautionary principle the possibility of likely significant effects as a result of underwater noise from the proposed project on migratory fish species **cannot be excluded**.

While there is potential for Otter to be present in the proposed Foreshore Licence Application Area, the presence of a single additional vessel in this busy maritime area is unlikely to have a significant impact on this species. The possibility of likely significant effects on Otter within the Zone of Influence of the proposed project **can be excluded**.

For the proposed site investigations the expected frequency range of noise emissions from the USBL operations overlap with the hearing range of all cetacean hearing groups (table 3). The SPL from this equipment is within the range to cause Permanent Threshold Shift (PTS) in very high frequency cetaceans hearing group, this group includes Harbour porpoise. It is also at a level that can produce Temporary Threshold Shift (TTS) in seals in water. Therefore the possibility of likely significant effects as a result of the proposed project on these marine mammals within the Zone of Influence of the proposed project **cannot be excluded**.

**Table 4** Special Area of Conservation (SAC) and their qualifying interests to be considered further in the screening process.

The QIs in red are screened in for Stage 2 Appropriate Assessment.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
Kilkieran Bay and Islands SAC [Site code IE002111]	adjacent	Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</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] Najas flexilis (Slender Naiad) [1833] Reefs [1170] Lutra lutra (Otter) [1355]	Out	No source-link-pathway to terrestrial habitats. No overlap of marine or coastal habitats with the survey area. SSC levels will be very low and localised.
		<i>Phoca vitulina</i> (Harbour Seal) [1365]	In	Disturbance from underwater noise.
Slyne Head Islands SAC [Site code IE000328]	3km	Reefs [1170]	Out	No overlap with the survey area. SSC levels will be very low and localised.
		<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349] <i>Halichoerus grypus</i> (Grey Seal) [1364]	In	Disturbance from underwater noise.
Slyne Head Peninsula SAC [Site code IE002074]	3km	Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170]	Out	No source-link-pathway to terrestrial habitats.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
		Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</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] Machairs (* in Ireland) [21A0] Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> ) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130] Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] European dry heaths [4030] <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites) [6210] <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> ) [6410] 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]		No overlap of marine or coastal habitats with the survey area. SSC levels will be very low and localised.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
Connemara Bog Complex SAC [Site code IE002034]	3km	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349]	In	Disturbance from underwater noise.
		Coastal lagoons [1150] Reefs [1170] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Natural dystrophic lakes and ponds [3160] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260] Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Depressions on peat substrates of the Rhynchosporion [7150] Alkaline fens [7230] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Euphydryas aurinia (Marsh Fritillary) [1065] Najas flexilis (Slender Naiad) [183] Lutra lutra (Otter) [1355]	Out	No disturbance from underwater noise.
		<i>Salmo salar</i> (Salmon) [1106]	In	Disturbance from underwater noise.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
West Connacht Coast SAC [Site code IE002998]	9km	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349]	In	Disturbance from underwater noise.
Twelve Bens/Garraun Complex SAC [Site code IE002031]	21km	<p>Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]  Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130]  Alpine and Boreal heaths [4060]  Blanket bogs (* if active bog) [7130]  Depressions on peat substrates of the Rhynchosporion [7150]  Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110]  Calcareous rocky slopes with chasmophytic vegetation [8210]  Siliceous rocky slopes with chasmophytic vegetation [8220]  Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]  Lutra lutra (Otter) [1355]  Najas flexilis (Slender Naiad) [1833]</p>	Out	No source-link-pathway to habitats. SSC levels will be very low and localised.
		<i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029] <i>Salmo salar</i> (Salmon) [1106]	In	Direct and indirect disturbance from underwater noise.
Inishbofin and Inishshark SAC [Site code IE000278]	27km	<p>Coastal lagoons [1150]  Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110]  Northern Atlantic wet heaths with Erica tetralix [4010]  European dry heaths [4030]</p>	Out	No Source-Pathway-Receptor link to habitats
		<i>Halichoerus grypus</i> (Grey Seal) [1364]	In	Disturbance from underwater noise.



Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
Maumturk Mountains SAC [Site code IE002008]	36km	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Northern Atlantic wet heaths with Erica tetralix [4010] Alpine and Boreal heaths [4060] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the Rhynchosporion [7150] Siliceous rocky slopes with chasmophytic vegetation [8220] Najas flexilis (Slender Naiad) [1833]	Out	No Source-Pathway-Receptor link to habitats. SSC levels will be very low and localised.
		Salmo salar (Salmon) [1106]	In	Disturbance from underwater noise.
Lough Corrib SAC [Site code IE000297]	54km	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Out	No Source-Pathway-Receptor link to habitats.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
		Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210] Petrifying springs with tufa formation ( <i>Cratoneurion</i> ) [7220] Alkaline fens [7230] Limestone pavements [8240] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] Bog woodland [91D0] <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029] <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092] <i>Lampetra planeri</i> (Brook Lamprey) [1096] <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] <i>Lutra lutra</i> (Otter) [1355] <i>Najas flexilis</i> (Slender Naiad) [1833] <i>Hamatocaulis vernicosus</i> (Slender Green Feather-moss) [6216]		
Duvillaun Islands SAC [Site code IE000495]	80km	<i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Salmo salar</i> (Salmon) [1106] <i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349] <i>Halichoerus grypus</i> (Grey Seal) [1364]	In	Disturbance from underwater noise.
Inishkea Islands SAC [Site code IE000507]	81km	Machairs (* in Ireland) [21A0] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]	Out	No Source-Pathway-Receptor link
		<i>Halichoerus grypus</i> (Grey Seal) [1364]	In	Disturbance from underwater noise.
Blasket Islands SAC [Site code IE002172]	125km	Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330]	Out	No Source-Pathway-Receptor link

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
Slieve Tooley/Tormore Island/Loughros Beg Bay SAC [Site code IE 000190]	114km	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351] <i>Halichoerus grypus</i> (Grey Seal) [1364]	In	Disturbance from underwater noise.
		Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Atlantic salt meadows ( <i>Glauco-Puccinellietalia 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] 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] Dunes with <i>Salix repens</i> ssp. <i>argentea</i> ( <i>Salicion arenariae</i> ) [2170] Humid dune slacks [2190] Alpine and Boreal heaths [4060] Blanket bogs (* if active bog) [7130] Vertigo angustior (Narrow-mouthed Whorl Snail) [1014] Lutra lutra (Otter) [1355]	Out	No Source-Pathway-Receptor link
		<i>Halichoerus grypus</i> (Grey Seal) [1364]	In	Disturbance from underwater noise.
Roaringwater Bay and Islands SAC [Site code IE000101]	228km	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] Lutra lutra (Otter) [1355] <i>Halichoerus grypus</i> (Grey Seal) [1364]	Out	No pathway to habitats.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
		<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise
Rockabill to Dalkey SAC [IE003000]	Within MU for Harbour Porpoise	Reefs [1170]	Out	No pathway to habitats.
		<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise
North Anglesey Marine / Gogledd Môn Forol [UK 0030398]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Bristol Channel Approaches / Dynesfeydd Môr Hafren [UK0030396]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
North Channel [UK 0030399]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
West Wales Marine / Gorllewin Cymru Forol [UK 0030397]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Récifs et landes de la Hague [FR2500084]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Anse de Vauville [FR2502019]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Banc et récifs de Surtainville [FR2502018]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Chausey [FR2500079]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Baie du Mont Saint-Michel [FR2500077]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Estuaire de la Rance [FR5300061]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard [FR5300012]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Cap d'Erquy-Cap Fréhel [FR5300011]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Baie de Saint-Brieuc – Est [FR5300066]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Tregor Goëlo Est [FR5300010]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Côte de Granit rose-Sept-Iles [FR5300009]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Nord Bretagne DH [FR2502022]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Baie de Morlaix [FR5300015]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Abers - Côte des legends [FR5300017]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Ouessant-Molène [FR5300018]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Côtes de Crozon [FR5302006]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
West Wales Marine / Gorllewin Cymru Forol UK0030397	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
North Channel UK0030399	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.
Bristol Channel Approaches / Dynesfeydd Môr Hafren UK003039	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
North Anglesey Marine / Gogledd Môn Forol [UK0030398]	Within MU for Harbour Porpoise	<i>Phocoena phocoena</i> (Harbour Porpoise) [1351]	In	Disturbance from underwater noise.

### 3.4.2 Birds

While it is acknowledged that species which use the area for feeding, loafing and breeding may be disturbed by the activities of the survey vessel, any visual or above water noise disturbance from an additional vessel in this busy maritime area is unlikely to be felt against background levels. Given the short duration of the proposed site investigations the significance of effects on birds in the offshore environment from the proposed site investigations, including due to visual or overwater noise disturbance, will be temporary and has been assessed as imperceptible. Similarly the effects on prey species of SCIs as a result of the proposed works given the total available foraging area is limited, both spatially and temporally.

Information on the underwater hearing abilities of diving birds and evidence of the effects of underwater anthropogenic noise on them is very limited. Studies suggest that mortality occurs when in close proximity to the event (Danil & St Leger 2011). Seabird responses to approaching vessels are highly variable (e.g. Fliessbach *et al.* 2019) and in a busy maritime area flushing disturbance may be reduced. Therefore using the precautionary principle the possibility of likely significant effects as a result of the proposed project on bird species within the Zone of Influence of the proposed project **cannot be excluded**.

**Table 5** Special Protection Areas (SPA) and their qualifying interests to be considered further in the screening process.

Site and Code	Distance from Survey Area	Qualifying Interests	Screened In/Out	Potential source of impact
Slyne Head To Ardmore Point Islands SPA [IE004159]	0km	Barnacle Goose [A045] Sandwich Tern ( [A191] Arctic Tern [A194] Little Tern [A195]	Out	No disturbance from an additional vessel in busy maritime area.
Inishmore SPA [IE004152]	4km	Kittiwake [A188] Arctic Tern [A194] Little Tern [A195]	Out	No disturbance from an additional vessel in busy maritime area.
		Guillemot [A199]	In	Disturbance from underwater noise
		Cormorant [A017]	In	Disturbance from underwater noise
Connemara Bog Complex SPA [IE004181]	8km	Golden Plover [A140] Common Gull [A182] Merlin [A098]	Out	No disturbance from an additional vessel in busy maritime area. No connectivity between the principle supporting habitat of Merlin and the proposed project.

### 3.4.3 In-combination effects

In a search of the Department's Foreshore applications web site and the Galway County Council web site on the 7<sup>th</sup> of November 2022. A number of Foreshore applications were

identified which may have potential to have in-combination effects with the proposed project (table 6).

Of identified projects only those which have a temporal overlap with the proposed project are likely to have in-combination effects. Such effects, depending on the project, are likely to include all or some of the following effects - above water noise disturbance, under water noise disturbance and visual disturbance. However it should be noted that many of the projects are at a more advance stage in the application process and are likely to have taken place prior to the proposed project.

Based on insufficient clarity on when the survey/works will be carried out and using the precautionary principle the following projects are considered to have in-combination effects with the proposed project:

- FS007543 Fuinneamh Sceirde Teoranta
- FS007063 Aigean Renewables Ltd.
- FS006886 Clarus Offshore Wind Farm Ltd.
- FS007375 Mainstream Renewable Power Ltd.
- FS007246 Farice ehf.
- FS007085 Irish Water



**Table 6** Propose projects considered for in-combination effects.

	Location	Application Stage	Effects
FS007461 UCD Research Experiments	Deployment of research equipment Inishmaan, Co. Galway	Consultation August 2022	No effects
FS007543 Fuinneamh Sceirde Teoranta	Site Investigations Export Cable Corridor landfall Counties Galway and Clare	Applied May 2022	Possible effects if surveys are taking place at the same time.
FS007063 Aigean Renewables Ltd.	Site Investigations Counties Clare and Kerry	Applied January 2022	Possible effects if surveys are taking place at the same time.
FS006886 Clarus Offshore Wind Farm	Site Investigations off Counties Kerry and Clare into Shannon Estuary	Applied November 2021	Possible effects if surveys are taking place at the same time.
FS007375 Mainstream Renewable Power Ltd	Site Investigations off Counties Kerry and Clare to Money Point	Applied June 2021	Possible effects if surveys are taking place at the same time.
FS006566 Marine Institute	Development of a one quarter scale Renewable energy test site Spiddal Co. Galway	Applied April 2016	No effects
FS007246 Farice ehf	Sub-sea fibre optic cable system with landfall at Ballyloughane Strand, Co. Galway	Determined June 2022	Possible effects if surveys are taking place at the same time.
FS007083 Cross Shannon electricity cable	Moneypoint, Co. Clare to Kilpaddoge, Co. Kerry	Awaiting Determination.	No effects
FS007181 DesignPro	Testing of tidal power generating devices Cahiracon Townland, Clare	Application withdrawn	No effects
FS007036 Shannon Airport Authority	Refurbishment of existing flood defence embankments	Application withdrawn	No effects
FS007085 Irish Water	Site Investigations for Sewerage Scheme, Roundstone Bay, Galway	March 2020	Possible effects if surveys are taking place at the same time.
FS006975 Shannon Foynes Port Company	Maintenance Dredging Foynes Port to be carried out every two to three years	July 2019	No effects

## 4. Conclusion

### 4.1 Appropriate Assessment Screening Conclusion

The qualifying interests of European sites which may experience likely significant effects as a result of the proposed project were identified using the Source-Pathway-Receptor approach.

Disturbance from underwater noise causing likely significant effects could not be discounted for the following European sites:

- Kilkieran Bay and Islands SAC
- Inishbofin and Inishshark SAC
- Duvillaun Islands SAC
- Inishkea Islands SAC
- Blasket Islands SAC
- Connemara Bog Complex SAC
- Twelve Bens/Garraun Complex SAC
- Maumturk Mountains SAC
- Connemara Bog Complex SPA
- Slieve Tooey/Tormore Island/Loughros Beg Bay SAC
- Roaringwater Bay and Islands SAC
- Rockabill to Dalkey SAC
- Slyne Head Islands SAC
- Slyne Head Peninsula SAC
- West Connacht Coast SAC
- Roaringwater Bay and Islands SAC
- Rockabill to Dalkey SAC
- Récifs et landes de la Hague SAC
- Anse de Vauville SAC
- Banc et récifs de Surtainville SAC
- Chausey SAC
- Baie du Mont Saint-Michel SAC
- Estuaire de la Rance SAC
- Baie de Lancier, Baie de l'Arguenon, Archipel de Saint Malo et Dinard SAC
- Cap d'Erquy-Cap Fréhel SAC
- Baie de Saint-Brieuc – Est SAC
- Tregor Goëlo Est SAC
- Côte de Granit rose-Sept-Iles SAC
- Nord Bretagne DH SAC
- Baie de Morlaix SAC
- Abers - Côte des legends SAC
- Ouessant-Molène SAC
- Côtes de Crozon SAC
- North Anglesey Marine / Gogledd Môn Forol SAC
- West Wales Marine / Gorllewin Cymru Forol SAC
- North Channel SAC
- Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC

It is concluded that likely significant effects as a result of this project, alone or in-combination with other plans and projects, on the conservation objectives of European sites cannot be excluded and therefore an Appropriate Assessment is required.

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## 6. Site Specific Conservation Objectives

The site specific conservation objectives for SACs were Version 1 and the four SPA had generic objectives on NPWS's website at the time of writing. Site specific conservation objectives were not available for Cardigan Bay/ Bae Ceredigion [UK 0012712], Bristol Channel Approaches / Dynesfeydd Môr Hafren UK0030396 or any of the French sites at time of writing.

Kilkieran Bay and Islands IE002111

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO002111.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002111.pdf)

Slyne Head Islands SAC IE000328

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO000328.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000328.pdf)

Slyne Head Peninsula SAC IE002074

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO002074.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002074.pdf)

Connemara Bog Complex SAC IE002034

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO002034.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002034.pdf)

Lough Corrib SAC IE000297

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO000297.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000297.pdf)

Maumturk Mountains SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO002008.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002008.pdf)

The Twelve Bens/Garraun Complex SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO002031.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002031.pdf)

West Connacht Coast SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO002998.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002998.pdf)

Inishbofin and Inishshark SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO000278.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000278.pdf)

Duvillaun Islands SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO000495.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000495.pdf)

Inishkea Islands SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO000507.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000507.pdf)

Blasket Islands SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO002172.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002172.pdf)

Slieve Tooley/Tormore Island/Loughros Beg Bay SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO000190.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000190.pdf)

Roaringwater Bay and Islands SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO000101.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000101.pdf)

Rockabill to Dalkey SAC

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO003000.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO003000.pdf)

North Anglesey Marine / Gogledd Môn Forol

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North Channel

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West Wales Marine / Gorllewin Cymru Forol

<https://data.jncc.gov.uk/data/029e40f3-5f67-4168-b10d-8730f2c40e0a/WWM-conservation-advice.pdf>