Gas Networks Ireland

Strategic Gas Emergency Reserve – Marine Site Investigation (SI) Works

Risk Assessment for Annex IV Species

RSK General Notes

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1 Introduction

1.1 Overview

Following a review carried out by The Department of the Environment, Climate and Communications (DECC) of the Security of Energy Supply of Ireland's Electricity and Gas Systems, there is need to improve the resilience of Ireland's natural gas supplies and infrastructure in the event of a disruption to the country's natural gas supplies for the short to medium term.

Energy Security in Ireland (ESI) to 2030 outlines a comprehensive strategy aimed at ensuring energy security throughout the current decade while facilitating a sustainable transition towards a carbon-neutral energy system by 2050.

Action 17 of ESI proposes the implementation of a "Strategic Gas Emergency Reserve to protect Ireland in the event of a gas supply disruption as Ireland makes a secure transition to a majority renewable energy".

In January 2025, the Government of Ireland issued the "Programme for Government 2025 – Securing Ireland's Future" which included the commitment that the government will "Take all necessary action to ensure and protect Ireland's energy security".

In March 2025, the Government of Ireland gave approval to proceed with the development of a State-led strategic gas emergency reserve. The delivery of a temporary gas reserve is deemed critical to Ireland's energy security as we continue to transition to indigenous, clean renewable energy.

Based on the above decision, Gas Networks Ireland (GNI) propose to construct a receiving terminal and jetty to accommodate a Floating Storage and Regasification Unit (FSRU), which will allow for the importation of and storage of Liquified Natural Gas (LNG) within Ireland's jurisdictional waters. The FSRU will be connected to the national grid network for injection in case of a supply emergency.

GNI intends to apply to the Maritime Area Regulatory Authority (MARA) for a Maritime Usage Licence (MUL) to conduct marine Site Investigations (SI) and environmental surveys within two areas of the Shannon Estuary adjacent to the townlands of Shannakea Beg, Cahiracon, Foynes Island, Leahys and Corgrig.

This report has been prepared as part of the MUL application process. The proposed works are designed to provide high quality baseline data that will contribute to site selection and any subsequent design, EIAR, and Appropriate Assessment, undertaken for the Strategic Gas Emergency Reserve (SGER) Project; in the event that a site is taken forward to the planning/consenting stage.

1.2 Purpose of this report

Cetaceans, marine turtles, and otters are afforded protections under Annex IV of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna). The EC (Birds and Natural Habitats) Regulations 2011 (as amended) (hereafter referred to as "the Regulations") transpose the Habitats Directive (92/43/EEC) into Irish law.

Regulation 51 of the Regulations sets out the system of strict protection for animals; under this

regulation it is an offence to:

- Deliberately capture or kill any specimen of these species in the wild
- Deliberately disturb these species particularly during the period of breeding, rearing, hibernation and migration
- Deliberately take or destroy eggs of these species in the wild
- Damage or destroy a breeding or resting place of such animal, or
- Keep, transport, sell, exchange, offer for sale or offer for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive.

It is therefore an offence to capture, kill or disturb deliberately a single cetacean, marine turtle or otter in Irish waters, or to damage/destroy an otter or marine turtle's breeding or resting place in Ireland, without a derogation licence first obtained from the Minister in accordance with Regulation 54 of the Regulations.

This document has been prepared by RSK Environment Ltd. on behalf of GNI in support of the Maritime Usage Licence Application to the MARA. This report contains an assessment of the likely effects for the proposed SI works on Annex IV species in accordance with Regulation 54.

1.3 Statement of Authority

This report has been prepared by RSK on behalf of GNI. The technical competence of the authors is outlined below:

[redacted] s Technical Director within the International Projects Group Marine Team in RSK. He has over 20 years of experience in marine environmental surveying and consulting. He holds an honours degree in Marine Biology and Oceanography and a Masters in Marine Resource Development and Protection. He has particular experience in marine ecology surveys, and the subsequent analysis and reporting of marine survey data for EIA projects, including Appropriate Assessment and Annex IV species reports.

[redacted] is a Senior Marine Consultant within the International Projects Group Marine Team in RSK. She has over 10 years of experience in the marine ecology field. She holds an honours degree in Marine Science and a Masters in Biology. She has contributed to numerous marine environmental projects including Appropriate Assessments, Natura Impact Statements and EIAR chapters.

2 Project Description

2.1 Site Locations

The proposed MUL Area covers an area of 11.19km^2 and extends from the townland of Shannakea Beg along the Clare coast to Cahiracon (Ed Killadysert), across the Shannon Estuary to Shannon Foynes Island and along the Limerick coast to the townland of Leahys and Corgrig (Figure 2.1). The works described in this application relates solely to the SI / sampling works within the proposed MUL Area (Figure 2.2 and Figure 2.3). Marine SI is required to inform preliminary design and facilitate environmental assessment in advance of Planning for the SGER project. Site investigations are to be completed over two phases, with Phase 1 being used to determining the optimum location of the SGER and Phase 2 being used at a later date to coordinate with the detailed design stage.

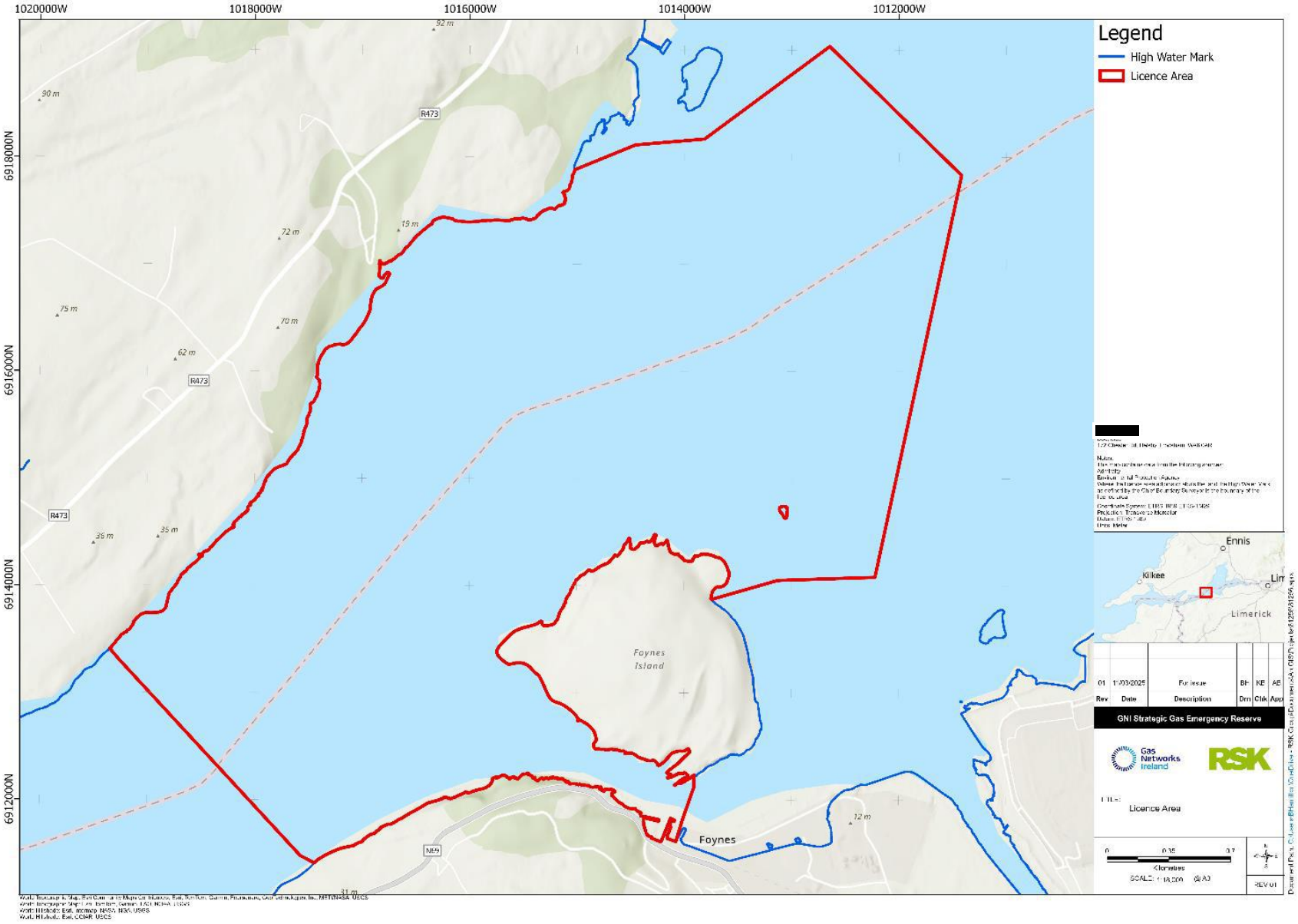

Figure 2.1
Proposed MUL Area

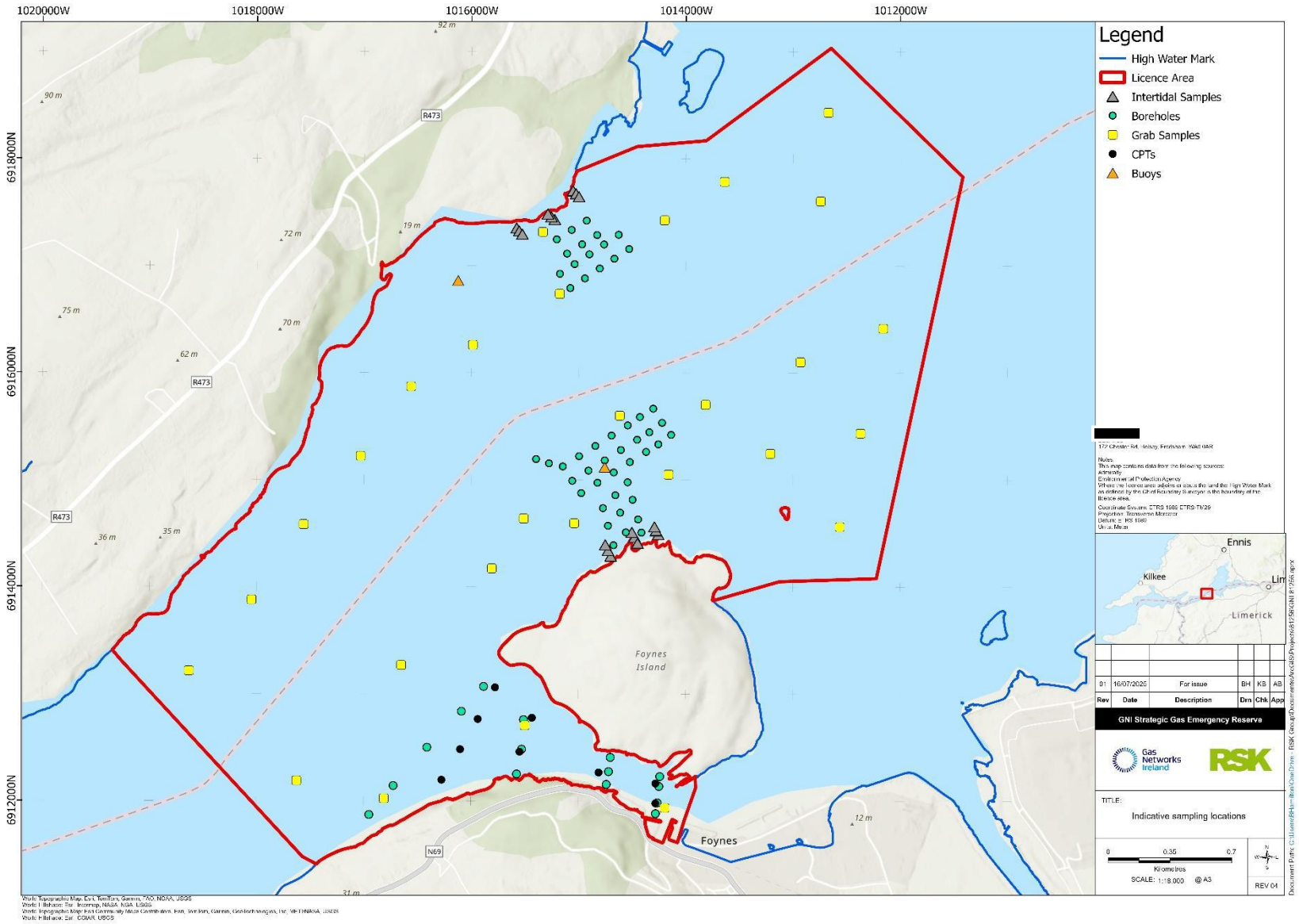

Figure 2.2
Indicative sampling locations

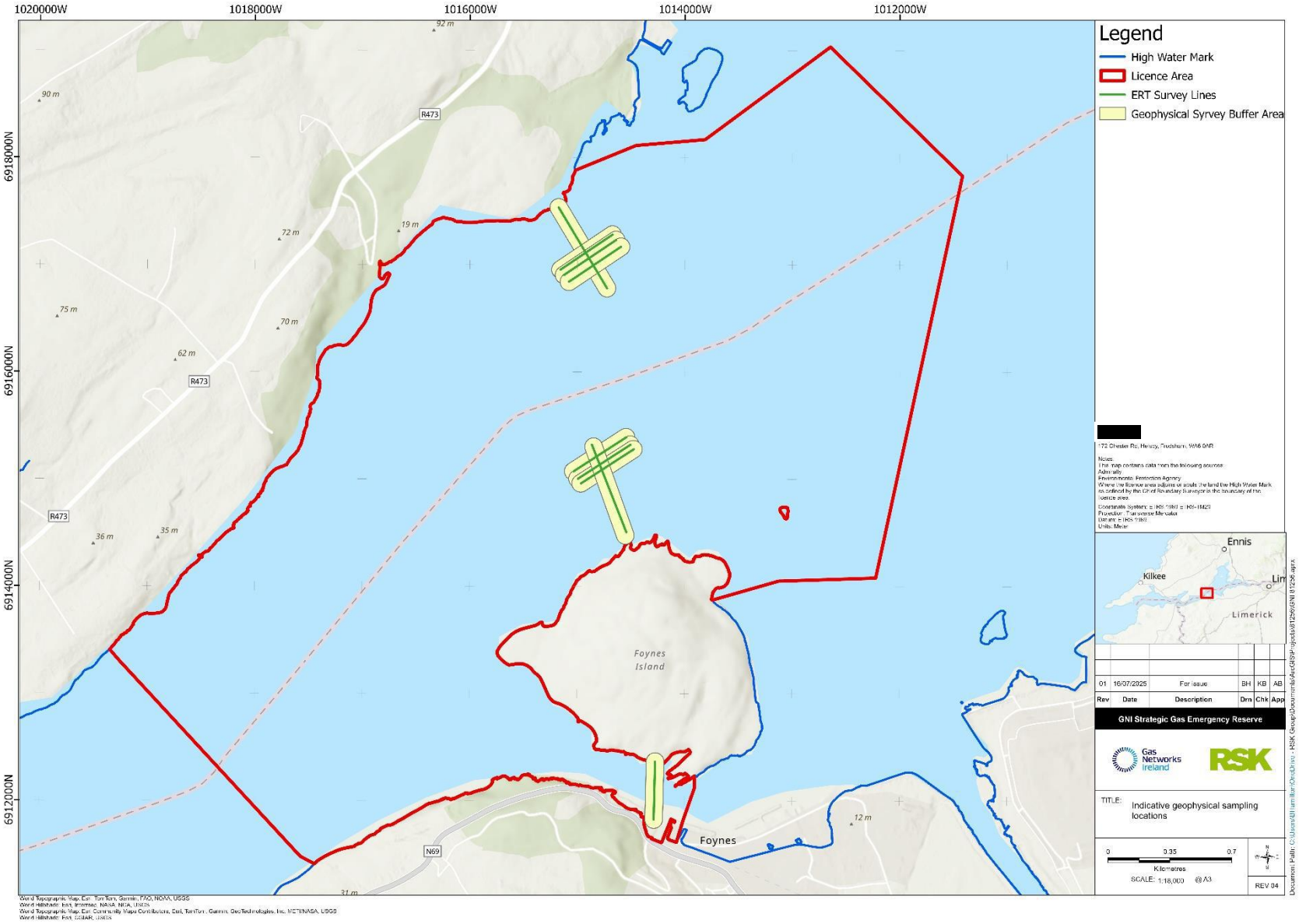

Figure 2.3

Indicative Geophysical Survey and Electrical Resistivity Tomography (ERT) electrode deployment locations

2.2 Description of the works

2.2.1 Overview

The objective of the proposed surveys is to provide high-quality data that can contribute to a reliable baseline for site selection and subsequent project design and development as well as informing the EIA. As such, the following survey investigations are considered necessary and detailed further in Table 2.1 :

- Drop-down camera survey
- Geophysical survey, including:
  - Magnetometer
  - Sub-bottom profiler (SBP)
  - Side-scan sonar (SSS)
  - Multibeam Echo Sounder (MBES)
  - Marine Refraction Seismic
  - Marine Electrical Resistivity Tomography (ERT)
- Boreholes
- Cone penetration tests (CPTs)
- Grab samples
- Surface water samples
- Intertidal walkover survey
- Intertidal core samples
- Archaeological surveys and other investigations (i.e. underwater inspections, walkovers, metal detectors, dive surveys).
- Deployment of metocean monitoring buoys to collect physical oceanographic data.

These works are collectively referred to as the Site Investigation (SI) works throughout this report.

Indicative sampling locations within the proposed MUL Area are designed to inform a potential jetty and vessel, with the addition of potential pipeline route options from the southwest side of Foynes Island to the mainland. It should be noted that all locations shown for sampling within the proposed MUL Area are indicative and may be subject to a degree of change on-site.

The following drawings have been prepared in support of the Maritime Usage Licence application to the MARA:

- Proposed Licence Area Map
- Proposed Grab Sample Locations Map
- Proposed Borehole Locations Map
- SI Indicative Table of Coordinates

The exact technical specification of the equipment to be used will not be known until the survey contract has been awarded. However, descriptions of typical equipment and survey parameters has been used within this report.

Predicted time and footprint for the activities are presented in Table 2.2. It is noted that the requirement for additional and more refined works may arise as the SI works progress and are analysed. This may

include areas of particular interest using more targeted techniques and/or refined borehole locations and quantities.

There will be no permanent structures and all site investigation works will be temporary in nature. The moving marine plant will remain on site for the duration of the works.

2.2.2 SI Schedule

The intention is to begin SI activities as soon as feasible following MUL award. Timing of the SI activities is dependent on many factors including weather, tidal flows, availability of vessels and the grant of the MUL. The granting of the MUL will have a direct effect on the timing of SI activities. The duration of the phase 1 SI works is approximately 16 weeks and are currently scheduled for Q3 2025. Phase 2 SI works (if required) will be carried out at a later date to coordinate with the detailed design stage which is dependent on consenting for the main project. The proposed licence duration is for 5 years to account for potential delays in the consenting process.

Table 2.1
Description of proposed works

Survey	Method	Method detail	Sampling Effort
Geophysical	Side Scan Sonar (SSS)	SSS surveys are used to determine sediment characteristics and seabed features. The EdgeTech 4205 may be taken as an indicative example of an SSS device and for these surveys will have a potential operating frequency range of approximately 300/600kHz in the offshore area and 600/900kHz in the shallower nearshore area with sound pressure levels of 220-230dB re1µPa @1m. The SSS will be towed behind a small survey vessel using 20 m spacing of main lines and cross lines at 100 m spacing.	SSS may be undertaken across the proposed MUL Area to a suitable percentage coverage. This activity is anticipated to occur within daylight hours over a period of up to 10 days.
	Magnetometer	A magnetometer is used to identify magnetic anomalies and hazard mapping for metal obstructions, shipwrecks and unexploded ordnance on the surface and in the shallow sub-surface. The Geometrics G-882 can be taken as an indicative equipment example. It is a passive device (i.e. it does not emit any sound waves into the marine environment) the sensor responds to local variability in magnetic field. The magnetometer will be towed behind a small survey vessel using 20 m spacing of main lines and cross lines at 100 m spacing.	Magnetometer survey may be undertaken across the proposed MUL Area to a suitable percentage coverage. This activity is anticipated to occur within daylight hours over a period of up to 10 days.
	Sub-Bottom Profiling (SBP) – Parametric Sub Bottom Profiler	SBP is used to develop an image of the subsurface, identifying different strata encountered in the shallow sediments. The Innomar "standard" Sub-Bottom Profiler is an indicative example of a parametric system with a primary and secondary frequency range of 85-115kHz and 2-22kHz, respectively, and sound pressure levels of up to 232 dB (typically operated at <200dB) re1µPa @ 1m, which would be used in both nearshore and offshore areas. The SBP will be towed behind a small survey vessel using 20 m spacing of main lines and cross lines at 100 m spacing.	SBP Parametric Sub Bottom Profiler may be undertaken across the proposed MUL Area to a suitable percentage coverage. This activity is anticipated to occur within daylight hours over a period of up to 10 days.
	Sub-Bottom Profiling (SBP) - Boomer	The Applied Acoustics AA301 is an indicative example of a boomer, the instrument consists of a piezo electric plate transducer mounted on a surface tow catamaran frame. Reflected sound signals are recorded using a separate hydrophone such as the Applied acoustics HYD-360/08 (50m). The Boomer SBP operates in a frequency range of 0.5 kHz to 5 kHz, with sound pressure levels in the range of 205-211dB re1µPa @ 1m which would be used in the nearshore shallower area. The SBP will be towed behind a small survey vessel using 20 m spacing of main lines and cross lines at 100 m spacing.	SBP Boomer may be undertaken across the proposed MUL Area to a suitable percentage coverage. This activity is anticipated to occur within daylight hours over a period of up to 10 days.
	Sub-Bottom	The applied Acoustics Dual 400 Tip is an indicative example of a sparker	SBP Sparker may be undertaken

Survey	Method	Method detail	Sampling Effort
	Profiling (SBP) - Sparker	system used in sub-bottom profiling. Reflected sound signals are recorded using a separate hydrophone such as the Applied acoustics HYD-360/08 (50m) or a multi-channel hydrophone such as the Geometrics GeoEel LH-16™ Digital Streamer. The sparker source has a frequency range of between 0.4-5kHz and a recorded sound pressure of 203dB re1µPa @1m. The SBP will be towed behind a small survey vessel using 20 m spacing of main lines and cross lines at 100 m spacing.	across the proposed MUL Area to a suitable percentage coverage. This activity is anticipated to occur within daylight hours over a period of up to 10 days.
	Multibeam Echo Sounder (MBES)	A bathymetric survey will be conducted using multibeam echo sounders. These systems may be mounted on a dedicated survey vessel or towed behind a smaller vessel, depending on site conditions and water depths. Multibeam systems emit wide acoustic signals to generate high-resolution images, creating three-dimensional maps of the seabed. Line spacing will be between 5 and 20m, depending on depth. The operating frequencies emitted from MBES will be 300-700 kHz with a peak operating frequency of approximately 400kHz. Exposure time is approx. 0.05 ms per 1 ms for multibeam operating with 200-400 kHz, or 0.05 per 0.3 ms for higher frequencies (>400 kHz). Sound pressure levels will be approximately 215-220dB re 1µPa @ 1m.	MBES may be undertaken across the proposed MUL Area to a suitable percentage coverage. This activity is anticipated to occur within daylight hours over a period of up to 10 days.
	Marine Refraction Seismic	Marine refraction surveys use controlled seismic sources, such as air guns or weight drops, to generate seismic waves that travel through sediment and rock layers. Arrays of hydrophones or geophones deployed on the seabed record the refracted seismic waves as they bend and travel along subsurface interfaces. By analysing the travel times and velocities of these refracted waves, detailed models of sediment thickness, bedrock depth, and structural features can be developed. Airgun impulse energy is mostly concentrated within low frequencies, with peak frequencies between 5 and 90kHz. Source levels are predicted to be within the range of 186-220dB re 1µPa @1m.	Marine Refraction Seismic may be undertaken across the proposed MUL Area to a suitable percentage coverage. This activity is anticipated to occur within daylight hours over a period of up to 8 days.
	Marine Electrical Resistivity Tomography (ERT)	ERT surveys are conducted to investigate the electrical properties of subsurface sediments and rocks. The technique involves deploying a series of electrodes along the seabed, either towed or fixed. As a non-invasive, non-seismic geophysical method, marine ERT produces no significant underwater noise and has minimal environmental impact.	Maximum **20 ERT lines** of 315m length line with diameter of 20mm. This activity is anticipated to occur within daylight hours over a period of up to 8 days.
Marine Environmental / Ecological	Benthic ecology samples (including subtidal and	Identify benthic communities and habitats at the site. Subtidal sample locations may be subject to drop down video in advance of sampling, intertidal sample locations may be subject to walkover/drone survey in advance of sampling.	There will be up to **30 no.** dedicated subtidal benthic ecology grab sampling locations within the proposed MUL Area and multiple samples (max 4) may

Survey	Method	Method detail	Sampling Effort
	intertidal habitats surveys)		be taken at each location. Samples would be of volume 0.1 m^2. There will be up to **30 no**. dedicated intertidal coring /grab locations if shoreline conditions allow for sediment sampling.
Archaeological	Walkover	Intertidal walkover to be undertaken at low tide to assess for the presence of sensitive archaeological features. Survey methodology may also involve the use of a metal detector along the foreshore. Pending the results of geophysical surveys there may be a requirement for further archaeological surveys (i.e. underwater video, dive surveys, etc.)	To be confirmed pending the results of the geophysical surveys.
Geotechnical	Drop-down video	Drop-down video survey to inspect the seabed and identify any reef structures in the vicinity without disturbance to the seabed.	There will be up to **30 transects** of up to 30 m each using a drop down camera and video surveillance.
	Boreholes	Boreholes may be up to 50 m below bed level but some may be terminated if sufficient bedrock is encountered. The boreholes will be carried out using sonic methods through the seabed sediment, with rotary coring used to advance through the bedrock. The typical frequencies emitted from rotary drilling are between 0.001-0.120kHz and a recorded sound pressure of approximately 145dB re1µPa @1m. Marine rotary drilling involves rotating a drill bit attached to a drill string and applying downward pressure to cut through the rock formations. Geotechnical sampling tools, including push and piston samples, can then be deployed into the ground to recover intact material. All drilling equipment used will follow the ISO and API technical specifications for drilling equipment. All boreholes will be drilled from a jack-up barge to maintain stability when drilling. Each location would require the 4 legs to penetrate the seabed and cause a temporary disturbance on each occasion. Each leg is typically less than 1m^2 in footprint.	A maximum of **80 no**. boreholes of a diameter of 300 mm will be required within the proposed MUL Area.
	Cone penetration tests (CPTs)	CPTs are to progress to a maximum depth of 20m but will be terminated when bedrock is encountered. In the CPT, an instrumented electronic probe (cone penetrometer) is situated at the front end of a string of steel rods that are hydraulically pushed into the ground at a constant rate of 20mm/s to measure soil response, geo-stratigraphy, and engineering	**80 no. CPTs** will be conducted of a diameter of 44mm. 60 of the CPTs will be at borehole locations to clear for unexploded ordnance (UXOs) and 20 as standalone

Survey	Method	Method detail	Sampling Effort
		parameters. A CPT vehicle or hydraulic ram set are often used to provide the reaction and pushing force. The equipment used will conform to relevant international standards, such as ISO, ensuring consistent and reliable geotechnical data.	investigation sites.
	Grab samples	Grab samples using 0.1 m^2 grabs will be collected for grading, loss on ignition and assessment of benthic community.	A maximum of **50 no**. grab samples of volume 0.1 m^2 will be collected within the proposed MUL Area.
	Metocean monitoring buoys	Metocean monitoring buoys are floating sensors with an anchorage system secured on the seabed. The buoys record various metocean conditions through the following monitoring equipment: • Conductivity, Temperature, Depth Sensors • Optical Salinity Sensor • Acoustic Doppler Current Profiler (ADCPs operating in the range of 600 Khz or 1 Mhz will be used. The instrument emits low amplitude "pings" of sound at a sampling rate of 1-minute average every 10 minutes. These pings will be emitted in a narrow sound beam (typically a few degrees in width) with a typical echo intensity profile of 80 dB (+/- 1.5 dB)) • Optical or Electrochemical Dissolved Oxygen Sensor • pH Sensor/Probe • Turbidity sensor • Turbidity meter/sediment trap. Metocean monitoring buoys will be anchored with two anchors per buoy. Anchors will have a maximum footprint of 4m^2 each.	**2 buoys** will be placed within the study area initially, with the possibility for **up to a further 4**.

Table 2.2
Predicted time and footprint of each survey activity

Survey Activity	Total time for activity	Maximum number of samples	Footprint per sample (m^2)	Maximum total footprint per activity (km^2)
Geophysical survey	Up to 4 months	SSS, Magnetometer, SBP 20 m spacing of main lines and 100 m spacing of cross lines with 25% overlap onto neighbouring lines MBES: 5 -20 m line spacing	-	Area up to 2.155
Marine refraction seismic	Up to 4 months	20 m line spacing	-	Area up to 2.155
ERT	Up to 4 months	20 maximum ERT lines	6.3	0.0000063
Marine Environmental / Ecological	Up to 4 months	120 subtidal (30 no. grab locations with max 4 samples taken at each location) 120 intertidal (30 no. grab locations with max 4 samples taken at each location)	0.1	0.000024
Geotechnical: Drop down video	Up to 4 months	30 transects	30	0.0009
Geotechnical: Boreholes	Up to 4 months	80	0.071	0.00000568

Survey Activity	Total time for activity	Maximum number of samples	Footprint per sample (m^2)	Maximum total footprint per activity (km^2)
CPTs	Up to 4 months	80	0.00152	0.0000001216
Jack-up barge leg	Up to 4 months	640 legs*	1	0.00064
Geotechnical: Grab samples	Up to 4 months	50	0.1	0.000005
Metocean monitoring buoy anchors	Maximum of 24 months (2 years)	12 anchors	4	0.000048

** 80 Borehole locations and 80 CPT locations x 4 legs*

2.3 General Survey Requirements

All appointed survey contractors shall obtain and comply with all necessary marine operational permits including routine and customary vessel/crew/equipment clearances from Customs Agencies, Port Authorities, Marine Survey Office, etc. This will include adherence to all major international shipping conventions adopted by the International Maritime Organization (and the International Labour Organization) concerning maritime safety and pollution prevention.

2.3.1 Quality Assurance

Each of the appointed survey contractors shall comply with the following as a minimum:

- Quality and Environmental Management Systems based on ISO9001:2015
- Provision of site and activity specific Method Statements for all the marine operations within their scope
- Provision of Quality Management Plans for all the marine operations.

2.3.2 Health & Safety

Health, safety, environment, and welfare considerations will be a priority in the evaluation of possible contractors for the various survey scopes and will be actively managed during the survey work.

Appointed contractors will be required to comply with all legislation relevant to the activities within their scope of work, such as the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005) and Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007), as amended.

Project / survey specific Health, Safety and Environment (HSE) plans will be put in place which will form part of the project / survey execution plans.

2.3.3 Working Hours

The working hours for the SI works are proposed to be up to 24 hours per day, seven days a week. It is anticipated that the main SI works will be carried out over a period of approximately four months including mobilisation and demobilisation. While metocean monitoring buoy deployment will be for period of up to two years, the devices will be autonomous apart from maintenance visits every two to four months. Such maintenance visits will occur during daylight hours only

Weather conditions and/or sea-state will impact on the working hours, and it may be necessary to temporarily suspend operations when adverse weather conditions and/or sea-state are encountered or forecast. As such, survey plans will remain flexible to take advantage of optimal weather windows. Similarly, equipment or vessel maintenance and repair may impact on the SI works resulting in changes to the survey schedule.

2.3.4 Environmental Procedures

Environmental procedures to be followed by the appointed survey contractors are detailed within the Appropriate Assessment report.

2.3.5 Vessels

All vessels will be fit for purpose, certified and capable of safely undertaking all required survey work. Marine vessels will be governed by the provisions of the Sea Pollution Act 1991, as amended. In addition, all vessels will adhere to published guidelines and best working practices such as: the National Maritime Oil/HNS Spill Contingency Plan (NMOSCP), Marine Pollution Contingency Plan (MPCP), Chemicals Act 2008 (No. 13 of 2008), Chemicals (Amendment) Act 2010 (No. 32 of 2010) and associated regulations.

Vessels shall have a Health, Safety and Environmental Managements system which should conform to the requirements of the latest International Maritime Organisation (IMO), Safety of Life at Sea (SOLAS) and environmental requirements for their classification and with any national requirement of the territorial or continental / EEZ waters to be operated in.

The SI works will be undertaken from vessels in accordance with the relevant guidelines required to manage the risk to marine mammals from man-made sound sources in Irish waters (NPWS, 2014).

3 Risk Assessment for Annex IV Species

3.1 Legislative Context

Under Article 12 and 13 of the Habitats Directive, Member States must establish systems of strict protection for animal and plant species which are particularly threatened, and which are listed on Annex IV of the Directive. Article 16 provides for derogations from these legal protections under certain, specific, circumstances. Article 12, 13 and 16 of the Habitats Directive are transposed into Irish law by Regulations 51, 52 and 54 of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

Annex IV species are afforded strict protection throughout their range, both inside and outside of designated protected areas. It is an offence to:

- Deliberately capture or kill any specimen of these species in the wild
- Deliberately disturb these species particularly during the period of breeding, rearing, hibernation and migration
- Deliberately take or destroy eggs of these species in the wild
- Damage or destroy a breeding or resting place of such an animal[1]
- Deliberately pick, collect, cut, uproot, or destroy any specimen of [plant] species in the wild
- Keep, transport, sell, exchange, offer for sale or offer for exchange any specimen of [animal or plant] species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Directive[2].

The granting of another statutory consent (e.g., planning permission; MARA licence) does not remove the obligation to obtain a derogation licence in the event of the consented works being likely to not conform with the strict protections afforded to Annex IV species. As such, an application for derogation may have to be made to the Minister for Housing, Local Government & Heritage via the National Parks and Wildlife Service (NPWS) under Regulation 54, in addition to an application for development consent. If satisfied that an application meets the criteria for derogation, the Minister may grant a derogation licence, which may be subject to such conditions, restrictions, limitations, and requirements as the Minister considers appropriate, and these will be specified in the licence.

3.2 Methodology

This risk assessment for Annex IV species has had regard to the following guidance:

- European Commission (2021) Guidance document on the strict protection of species of community interest under the Habitats Directive. C. (2021) 7301 final. Brussels
- Mullen, E., Marnell, F. & Nelson, B. (2021) Strict Protection of Animal Species. National Parks and Wildlife Service Guidance Series, No. 2. National Parks and Wildlife Service, Department of Housing. Local Government and Heritage
- NPWS (2021) Guidance on the Strict Protection of Certain Animal and Plant Species under the

[1] Including any action resulting in damage to, or destruction of, a breeding or resting place of an animal. Breeding or resting places are protected even when the animals are not using them.
[2] National Parks and Wildlife Service (2021) Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland

Habitats Directive in Ireland. National Parks and Wildlife Service Guidance Series, No. 2. Department of Housing. Local Government and Heritage.

- Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (2014, Department of Arts, Heritage and the Gaeltacht)
- Department of Housing, Local Government and Heritage (2025) Applications for Regulation 54 Derogations for Annex IV species, Guidance for Applicants

This risk assessment for Annex IV species broadly follows the methodology structure outlined in NPWS (2021), as follows:

- Use existing information to determine the probability of the protected species being present in the area affected by the works
- Ecological survey, if required
- Examination of impacts and mitigation measures and satisfactory alternatives (if required). For each species or species group, an assessment was made against each of the strict protections considering project details and the available evidence base for each species.

If the examination of impacts concludes that the SI works will not conform with the strict protections afforded to Annex IV species, then an application will be made for a derogation licence under Regulation 54 of the Regulations.

3.3 Relevant Annex IV Species

3.3.1 Cetaceans

Bottlenose dolphin (*Tursiops truncatus*) are a QI of the Lower River Shannon SAC, within which the proposed SI works will occur. Bottlenose dolphins are present throughout the year and are genetically discrete compared to bottlenose dolphins found elsewhere in Irish waters due to geographical and social isolation (Mirimin et al., 2011) and that the estuary is an important calving area (MERC, 2021). The population is estimated at around 145 individuals with only 80 adults (Baker et al., 2018 in MERC, 2021). This small, genetically discrete population is vulnerable to even small increases in adult mortality or a reduction in reproduction rates (Blásquez et al., 2021 in MERC, 2021). An overview of existing data on bottlenose dolphin populations in the Lower Shannon Estuary shows that there is a well-known hotspot for the species in the waters off Moneypoint Power Station (MERC, 2021). Rogan et al. (2000) recorded bottlenose dolphins in the estuary all year round with a peak from May to September and noted the presence of neo-natal calves from July to September as evidence of a well-defined breeding season in the Shannon Estuary. There have been a total of 19 dolphin sightings within the last 12 months along the Shannon Estuary, concentrated in the area of the Shannon Ferry route, with 3 dolphin sighted within approximately 3 km of the proposed MUL Area (IWDG, 2025). Hence, there is potential for them to overlap with SI works.

Very few sightings of harbour porpoise (*Phocoena phocoena*) have been recorded within the Shannon Estuary (IWDG, 2025). There was one sighting adjacent to Moneypoint in 2018 (IWDG), and strandings have been recorded as far up the estuary as Foynes (O'Callaghan et al., 2021). Violent interactions have been recorded between bottlenose dolphins and harbour porpoise (Ross and Wilson., 1996; Gross et al., 2020) and suggested reasons for this aggression include interspecies territoriality, defence of group members, food competition, feeding interference and object-orientated play (Gross et al., 2020). Two

sightings of harbour porpoise occurred within the past 12 months, located at the entrance of the Shannon Estuary off Aill Na Brun (IWDG, 2025). From the lack of recorded sightings of harbour porpoise within the Shannon Estuary, it is likely that they largely avoid the area.

3.3.2 Pinnipeds

Telemetry data indicates that harbour seal (*Phoca vitulina*) foraging trips in the south-west of Ireland extend no further than 20 km from haul-out sites (Cronin et al., 2008). No sightings of harbour seal have been recorded in the Shannon Estuary within the last 12 months (IWDG, 2025). The closest European site designated for harbour seal is the Kenmare River SAC, located more than 85 km from the proposed MUL Area. It is therefore highly unlikely that individuals will overlap with the SI works.

Grey seals (*Halichoerus grypus*) have been recorded undertaking foraging trips over hundreds of kilometres, although the mean distance travelled in a telemetry study carried out in 2011 for NPWS was 50.85 km (Cronin et al., 2011). NPWS-funded aerial thermal-imaging of seal in Ireland (Morris and Duck, 2019) shows very low usage of the Shannon Estuary by both harbour seal and grey seal, indicating that the estuary is not likely to be an important area for hauling out. No sightings of grey seals have been recorded in the Shannon Estuary within the last 12 months (IWDG, 2025). Additionally, the closest European site designated for grey seal is the Blasket Islands SAC, located approximately 112 km by sea from the proposed MUL Area. It is therefore considered unlikely that individuals will overlap with the SI works; the proposed MUL Area are not likely to represent an important foraging ground and as a result SACs with grey seal as a QI are not considered relevant for ex situ effects.

3.3.3 Otter

Otter (*Lutra lutra*) are a designated feature of the Lower River Shannon SAC and inhabit coastal sites where there is suitable habitat, food availability, and shelter for resting and breeding. The population was estimated to be 140 (+/- 12 individuals) in 2006. The shoreline of the Shannon Estuary, including through the proposed MUL Area, is designated as potential otter habitat.

3.3.4 Basking Shark and Reptiles

Basking sharks (*Cetorhinus maximus*) tend to arrive in Irish waters during spring, with numbers peaking in May and June. There have been several sightings of this species in proximity to the Shannon Estuary over the past 12 months, with recordings concentrated to Aill Na Brun and Derrynadivva (IWDG, 2025). However, sightings of basking shark within shallow estuarine environments is considered rare and, indeed, there have been no records of sightings within the Shannon estuary itself (IWDG, 2025). Therefore, it is unlikely basking sharks will be present within the proposed MUL Area during the SI works.

Four Annex IV turtle species known to occur in Ireland include the leatherback turtle (*Dermochelys coriacea*), Kemp's Ridley turtle (*Lepidochelys kempii*), loggerhead turtle (*Caretta caretta*) and hawksbill turtle (*Eretmochelys imbricata*). Leatherback turtles have been recorded along the west coast of Ireland and within the Lower Shannon Estuary (at Ballylongford (1970) and at Kilkee (IWDG, 2025)); however, no sightings of leatherback turtles have occurred in the proposed MUL Area within the last 12 months (IWDG, 2025). Kemps Ridley have been recorded along the west coast at Banna Strand in Co. Kerry (approximately 40 km south-west). This is beyond the proposed surveys boundary with no suspected

impacts from the proposed surveys; there have additionally been no recorded sightings of Kemps Ridley turtles and Loggerhead turtles in the Shannon Estuary within the last 12 months (IWDG, 2025), and therefore no significant impacts are expected. One record of hawks bill has been recorded in the south of Ireland at Cork Harbour as bycatch, no records have been noted along the west coast or in close proximity to the proposed MUL Area. Of the turtle species noted in Ireland, Leatherback turtles have the potential to utilise the Lower River Shannon Estuary based on historical records, but as these counts only amount to one or two individuals across many years it is unlikely that they will be present within the proposed MUL Area during the proposed SI works.

3.3.5 Bats

The proposed MUL Area has low suitability for bats, largely attributed to the absence of preferred bat habitats (e.g. woodland, hedgerows, freshwater) or roost sites. Considering this has been concluded the SI works will have no impact on bats and they are therefore not considered further within this report.

4 Examination of Impacts to Strict Protections

4.1 Cetaceans and Pinnipeds

Potential impacts to cetaceans, and on the strict protections afforded to these species, associated with the SI works are:

- Noise, vibration, lighting, and human presence-related species disturbance
- Underwater noise generated during the geophysical, seismic, sonic drilling and geotechnical surveys resulting in injury and/or displacement
- Accidental pollution events
- Collision risk with survey vessels, resulting in injury
- Entanglement risk with towed and seabed equipment.

4.1.1 Noise, vibration, lighting, and human presence-related species disturbance

The Lower Shannon Estuary is a busy shipping area, handling up to 1,000 ships carrying 12 million tons of cargo per annum (Clare County Council, 2023). Animals within the area are likely to be habituated to marine traffic, and the increase in vessel traffic as a result of the SI works is very low and temporary. It is considered highly unlikely that there will be any significant disturbance to marine species as a result of the presence of survey vessels. The presence of the jack-up barge will introduce artificial light to the area while SI works happen during the hours of darkness, but this impact will be temporary and is not expected to result in any impacts beyond the SI works campaign. Therefore, it is considered that no derogation is required and the proposed SI works will not offend the system of strict protections of Annex IV species under Article 12 of the Habitats Directive.

Underwater noise impacts are considered below.

4.1.2 Underwater noise

There is potential for effects as a result of the underwater noise emitted by the SI works.

When assessing the potential impact of underwater noise sources on the marine environment a range of variables such as source level, frequency, duration, and directivity influence received sound levels. Increasing the distance from the sound source usually results in attenuation with distance. The factors that affect the way noise propagates underwater include; water column depth, pressure, temperature gradients, salinity, as well as water surface and seabed type and thickness. When sound encounters the seabed the amount of noise/sound reflected back depends on the composition of the seabed, i.e., mud or other soft sediment will reflect less than rock. The water depth within the proposed MUL Area ranges up to 50 m below chart datum with a mixed substrate type, of muds, sands, coarse gravels, and exposed bedrock. All factors listed above reduce the propagation of the sound, decreasing the zone of influence of the geophysical surveys, seismic and sonic drilling.

Auditory injury in cetaceans can be defined as a permanent threshold shift (PTS) leading to non-reversible auditory injury, or as a temporary threshold shift (TTS) in hearing sensitivity, which can have negative effects on the ability to use natural sounds (e.g., to communicate, navigate, locate prey) for a period of minutes, hours, or days. With increasing distance from the sound source, where it is audible to the animal, the effect is expected to diminish through identifiable stages (i.e., PTS or TTS in hearing,

avoidance, masking, reduced vocalisation) to a point where no significant response occurs. Factors such as local propagation and individual hearing ability can influence the actual effect (Department of Arts, Heritage and the Gaeltacht (DAHG), 2014). The underwater noise threshold levels for marine mammals as given in international guidance is shown in Table 4.1 As noted in Section 3.3.1, it is unlikely that harbour porpoise will be active within the estuary, but bottlenose dolphins (high frequency cetacean species) can be expected to be present. The expected sound parameters of the relevant survey activities are presented in Table 4.2.

Table 4.1

TTS- and PTS-onset thresholds for marine mammals exposed to non-impulsive noise

Marine mammal hearing group	TTS onset: SEL (weighted) dB re 1 µPa2s	PTS onset: SEL (weighted) dB re 1 µPa2s
Low frequency cetaceans (baleen whales)	179	199
High frequency cetaceans (most dolphin species)	178	198
Very high frequency cetaceans (harbour porpoise)	153	173
Phocid carnivores (seal species)	181	201
Other Carnivores (otters)	199	219

Table 4.2

Expected noise parameters for survey activities based on typical equipment and noise ranges

Survey activity	Frequency range (kHz)	Peak frequency (kHz)	Source level (dB re 1 µPa)
ADCP	600 - 1000	Variable	80 (+/- 1.5)
Rotary drilling	0.001- 0.120	0.045	145
SSS	300/600kHz (offshore area) 600/900kHz (shallower nearshore area)	Variable	220-230
SBP	85-115 (primary) and 2-22 (secondary)	Variable	232

Survey activity	Frequency range (kHz)	Peak frequency (kHz)	Source level (dB re 1 µPa)
MBES	300 - 700	400	215-220
Marine refraction seismic	0 - 10	0.005 and 0. 113	182-220

The ADCP devices on the metocean monitoring buoys do produce some lower frequency sounds that are within the hearing range of high-frequency marine mammal species, such as harbour porpoise. The proposed ADCP device installation will be temporary in nature and will emit a narrow sound beam (typically a few degrees in width) with a typical echo intensity profile of 80 dB (+/- 1.5 dB). This falls below the TTS and PTS threshold for all species. Therefore, the potential impact on protected species is considered to be negligible. As such, the possibility for impacts on protected species from underwater noise associated with ADCPs can be excluded from further consideration.

The type of coring and or drilling proposed as well as the size of the boreholes mean that sound levels from the activity is unlikely to exceed previously recorded level of similar setups with source levels of 130-147dB SPL1 (re 1 µPa) (Erbe & McPherson, 2017; MR, M, M, & I, 2010). Recent measurements of geotechnical drilling in shallow waters (Huang Long-Fei et al. 2023) recorded an SPL of 155.9 dB re 1µPa rms @ 1 m at a peak frequency of 45 Hz. These levels are below the source levels of even quiet vessels and at modest ranges of c. 100 m, below the commonly used 160dB SPL2 limit for behavioural effect for marine mammals. Considering that the weighted source level of the drilling/boring (147dB SPL) is below the TTS or PTS onset levels for all marine mammal species as listed in Table 4.1, it is extremely unlikely that the drilling/boring could cause hearing impact on marine mammals.

The geophysical survey will utilise active acoustic instruments. Active acoustic instruments, such as those proposed on this survey, operate by emitting extremely short pulses and are mostly directional or omni-directional (e.g., sparker) (Ruppell et al, 2022). The range of the geophysical equipment will have a range limited principally by water depth and attenuation particularly of high frequency sources. Coupled with the narrow beam angle and short duty cycles ('on' for microseconds or milliseconds per second) means that surveying sonars have relatively low acoustic range. The SSS and MBES, in particular, are higher frequency acoustic survey methods, with acoustic ranges above the hearing sensitive range for marine mammals, therefore not considered a risk for disturbance.

The SBP and marine refraction seismic survey methods fall within the sensitive hearing range of marine mammals and exceed the onset levels for TTS and PTS for marine mammals. Since the noise levels from these sources exceed TTS and PTS thresholds, there is the potential for underwater noise generated during the SBP and marine refraction seismic surveys to result in injury and/or disturbance to bottlenose dolphin in the vicinity of the SI works. The estimated zone of audibility for all species is largest for these low-frequency sources, which propagate over longer distances relative to the rapidly attenuating high frequencies. Thus marine mammals, if very close to the survey vessel during site investigations may lead to disturbance and, at worse, auditory injury. As such, impacts from SBP and marine refraction seismic are considered to have potential to give rise to auditory injury to common

bottlenose dolphin.

Adverse effects upon QI common bottlenose dolphin associated with the Lower River Shannon SAC, Slyne head Peninsula SAC, West Connacht Coast SAC and Slyne Head Islands SAC as a result of underwater noise and vibrational effects cannot be excluded in the absence of mitigation measures in respect of the proposed SBP and marine refraction seismic surveys only.

Continuous sources (i.e., survey vessels) are shown as almost 20 dB lower than the continuous noise threshold. Taking this and directionality into account there is no significant risk to marine mammals or fish from continuous noise.

In the absence of mitigation measures, geophysical surveys, seismic surveys, sonic drilling, and noise sources have the potential to disturb or displace Annex IV bottlenose dolphins.

4.1.3 Accidental Pollution Risk

The SI works will result in a slight increase in vessel traffic within the proposed MUL Area for the temporary duration of the SI works. Although the increase is slight, this could in theory increase the potential risk of an accidental release of pollutants (e.g., fuels, oils, and lubricants) to the marine environment, which has the potential to result in toxic effects to Annex I benthic habitats and, consequently, on Annex IV cetacean species that rely on these habitats for food.

The proposed MUL Area lies within a busy shipping area in which a lot of commercial and recreational vessels operate. Given that the survey would amount to, at most, one jack-up barge and one additional vessel operating in the area during the SI works period, the likelihood of a collision resulting in a pollution event is considered insignificant. The survey vessel will be diesel or petrol, will not use heavy fuel oil, and will operate at a low speed. 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. In addition, all substances handled and/or used whilst undertaking the works are required to be handled, used, stored, and documented in accordance with assessments and the Chemicals Act 2008 (No. 13 of 2008) and Chemicals (Amendment) Act 2010 (No. 32 of 2010) and associated Regulations.

Given the nature of the works, the limited scale and duration, and the insignificant increase in vessel activity, it is considered highly unlikely that there will be a pollution incident, e.g., accidental spills of small quantities of fuel. As such, the possibility for impacts on Annex IV protected species from accidental pollution events associated with the proposed works can be excluded from further consideration.

4.1.4 Risk of Collision

Vessel strikes have been known to cause mortality in marine mammals (Laist et al., 2001) as well as injuries from non-lethal collisions (Laist et al., 2001; Van Waerebeek et al., 2007). Injuries from such collisions can be divided into two broad categories: blunt trauma from impact and lacerations from propellers. Injuries may result in individuals becoming vulnerable to secondary infections or predation.

It is expected that a maximum of one vessel will be operating at any one time within the proposed MUL Area. Due to the nature of the works, the vessels conducting discrete sampling would be travelling directly to sampling locations and then remaining stationary during sampling while vessels conducting

the survey works will move in slow and predictable line patterns.

The Lower Shannon Estuary is a busy shipping area (Clare County Council, 2023). Marine mammals in the area are likely to be habituated to marine traffic, and the temporary addition of a single vessel operating at either low speeds or stationary for the proposed works is unlikely to constitute a significant increase in vessel activity given the levels of vessel activity typical for the area. As such, the possibility for impacts on cetaceans from collisions with survey vessels can be excluded from further consideration.

4.1.5 Risk of entanglement

There is potential for entanglement of marine fauna—including marine mammals, otters, fish, and diving birds—associated with the use of towed geophysical arrays (e.g. for seismic, MBES, and ERT surveys) and the deployment, recovery, and repositioning of seabed equipment such as seismic sensors. When assessing the potential impact of entanglement on the marine environment a range of variables should be considered, including the length of equipment, deployment methods and length of time in survey area. If seabed sensors are connected via cables rather than being individual nodes with acoustic release, this increases the potential entanglement risk, particularly for more mobile and inquisitive species like cetaceans and seals. However, given the short-term and localised nature of the proposed works, the low profile and limited vertical extent of deployed equipment, and the active management and monitoring of gear during operations, the overall risk of entanglement is considered negligible. As such, potential impacts from entanglement can excluded from further consideration.

4.2 Otter

The presence of otters is assumed, but the proposed SI works wouldn't have potential to give rise to any significant impacts to otter, as these areas are already subject to some levels of human disturbance and are part of much larger areas of suitable habitat for the species in the wider area, with coastal territories between 2km and 10km of shoreline. As such, the SI works will have extremely limited potential to impact upon terrestrial resting and breeding locations for otter.

4.3 Basking Shark and Reptiles

It is unlikely basking sharks and turtle species will be present within the proposed MUL Area during the SI works. As such, the possibility for impacts on these species can be excluded from further consideration.

5 NPWS Assessment

1. Do individuals or populations of Annex IV species occur within the proposed area?

Bottlenose dolphin are the most frequently recorded Annex IV species adjacent to the proposed MUL Area, whilst few sightings of harbour porpoise exist. Otters also occur at the site, alongside seals in low numbers; it is unlikely that marine turtles and basking shark will occur at the site.

2. Is the plan or project likely to result in death, injury or disturbance of individuals?

The activities proposed during SI works comprise boring, cone penetration tests, grab sampling, intertidal walkover and core sampling, ADCP, side-scan sonar, magnetometer and sub-bottom profiler surveys. It is possible that noise generated will be capable of causing disturbance or temporary hearing injury to a marine mammal without mitigation.

The project may cause injury and disturbance without the proposed mitigation, as impacts including noise associated with the project may travel a short distance potentially exposing a suite of Annex IV species to the activity. The risk of injury in the marine environment is considered moderate.

3. Is it possible to estimate the number of individuals of each species that are likely to be affected?

Abundance estimates for bottlenose dolphins within the Lower River Shannon SAC are available. The most recent estimate was carried out between June and September 2022 by Berrow et al. (2022) who provided a final best estimate of 116 ± 9 with a CV 0.08 and 95% Confidence Intervals of 103 to 122. However not all the Shannon dolphins use the inner estuary, and it is more likely a sub-set of 30 to 40 individuals may be exposed to the SI works. Seals occur in low numbers within the Shannon Estuary. Otters are also likely to occur in small numbers; other species (i.e., basking shark and marine turtles) are unlikely to be present.

4. Will individuals be disturbed at a sensitive location or sensitive time during their life cycle?

The proposed geophysical, seismic, sonic drilling and geotechnical survey works are scheduled to be carried out for a duration of up to four months. Bottlenose dolphins occur all year around with calving peaking late summer. Recent acoustic monitoring within the Shannon estuary suggested autumn was the highest predicted foraging period at Foynes Island. Seals and otters also occur year-round in small numbers.

5. Are the impacts likely to focus on a particular section of the species' population, e.g., adults vs. juveniles, males vs. females?

Bottlenose dolphin calves may be exposed to site investigations if born while the SI works are occurring. Immatures and dependant calves would also be exposed when present in the area.

6. Will the plan or project cause displacement from key functional areas, e.g., for breeding, foraging, resting or migration?

The area, although regularly visited by bottlenose dolphins, is not a critical habitat. It was concluded that the proposed SI works will not lead to any significant disturbance of Annex IV species known to occur in the area. Small numbers of seals may occur in the vicinity of the site but they are accustomed to human activities and are unlikely to be affected.

7. How quickly is the affected population likely to recover once the plan or project has ceased?

Any disturbance occurring with the proposed mitigation in place would be short term and local to the proposed MUL Area and not lead to any long term impacts.

6 Mitigation measures

The proposed SI works will incorporate a range of measures to safeguard the environment and potential impacts to Annex IV species. The impact of greatest concern for Annex IV species, specifically marine mammals, was determined in this assessment to be underwater noise and vibration from the noise-generating survey activities with the potential to harm or disturb marine mammals (SBP and marine refraction seismic survey); this will be mitigated as follows:

- Survey Marine Mammal Mitigation Plan: The following mitigation measures will be employed. These mitigation measures are in line with best practice guidance (NPWS, 2014):
    - A qualified Marine Mammal Observer (MMO) will be on board the survey vessel to monitor marine mammal activity and log all events;
    - Pre-start monitoring: relevant operations shall not commence if marine mammals are detected within a 500 m radial distance of the vessel (a conservative range which accounts for the maximum likely zone of influence for potential injury from geophysical surveys (SBP) of 130 m);
    - Survey operations shall only commence in daylight hours where effective visual monitoring by the MMOs has been achieved. Where effective visual monitoring is not possible, the sound-producing activities shall be postponed until effective visual monitoring has been completed;
    - Ramp Up: Following the pre-start monitoring, a ramp-up procedure will take place or a period of 20 minutes for all relevant survey equipment;
    - Where the duration of a survey line or station change will be greater than 40 minutes, the activity shall, on completion of the line/station being surveyed, either shut down and undertake a full pre-start monitoring and ramp-up procedure or reduce the sound energy output to a lower state with an output peak SPL of 165-170 dB re 1µPa @1m, and then undertake the full ramp up procedure;
    - If there is a break in sound output for a period of 5 – 10 minutes the MMO will be required to check that no marine mammals are observed within the monitored zone prior to recommencement of the sound sources at full power. Where a marine mammal is observed within the 500 m monitored zone during such a break, then all pre-start monitoring and a subsequent ramp-up procedure shall recommence as in a normal start-up operation; and
    - If there is a break in sound output for a period greater than 10 minutes, then all pre-start monitoring and a subsequent ramp-up procedure will be undertaken.

7 Conclusions

The potential for injury or disturbance to occur to Annex IV species consequent of the SI works in the absence of mitigation measures is considered to be moderate. The impact with the greatest risk as highlighted by this assessment was determined to be underwater noise and vibration from the SBP and marine refraction seismic survey activities. However, given the temporary nature of the works and with the implementation of the mitigation measures outlined in Section 6, it is considered that the potential impacts resulting from the SI works will be sufficiently reduced such that they will not give rise to significant impacts relating to species protected under Annex IV of the Habitats Directive.

Specifically, the SI works will not impact any of the Annex IV species ability to maintain its population on a long-term basis as a viable element of its natural habitats, nor will the natural range of the species be reduced or likely to be reduced for the foreseeable future as a result of the SI works. The habitat available to Annex IV species will also continue to be sufficiently large to maintain populations on a long-term basis.

Following the assessment of the evidence base and available information on relevant Annex IV species, it is concluded that the SI works comply with the system of strict protections afforded by Article 12, 13 and 16 of the Habitats Directive, transposed into Irish law by Regulations 51, 52 and 54 of the Regulations, as amended, and therefore no derogation under article 54 of the Regulations will be required.

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