MERC Consultants
environmental and conservation services

Natura Impact Statement (NIS)

Uisce Éireann - Waterford City Wastewater Treatment Plant Upgrade Survey

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1. Introduction

Uisce Éireann is seeking a Marine Usage Licence (MUL) to undertake marine site investigations in the River Suir Estuary (Figure 1) to progress a Waterford City Wastewater Treatment Plant (WwTP) Upgrade. The proposed site investigation works comprise a suite of geophysical, geotechnical, bathymetric, ecological, archaeological and CCTV surveys within the River Suir estuary. Their purpose is to gather high-quality baseline data on seabed conditions, subsurface geology, environmental receptors and the condition of the existing outfall. This information is essential for determining the optimal route for a new marine outfall, informing the detailed engineering design, and potentially supporting future environmental consenting processes. All works are temporary and limited to the defined MUL area.

Waterford City Wastewater Treatment Plant (WWTP), commissioned in 2010, serves the Waterford City agglomeration and provides preliminary, primary, and secondary treatment, including a dedicated sludge treatment facility that produces biosolids. The plant operates under an EPA Wastewater Discharge Licence issued in 2010 and is currently constrained by nitrogen removal capacity within the secondary treatment process, with an assessed maximum capacity of 113,000 population equivalent (PE). Forecast population growth, industrial expansion and the designation of the site as a Bioresources Regional Centre are expected to result in a substantial increase in hydraulic and organic loading, with capacity demands projected to reach approximately 276,000 PE by 2040 and 290,000 PE by 2055. These increases, together with the need to comply with increasingly stringent requirements of the Urban Wastewater Treatment Directive and to protect sensitive receiving waters, necessitate the proposed upgrade of the WWTP and associated outfall infrastructure.

The proposed survey area, corresponding to the MUL application area, covers 71 ha. It encompasses an area of the Suir extending upstream from the existing Waterford City WWTP outfall location at Gyles Quay (Kilkenny) south to Little Island (Waterford) and eastwards to Bellview Port beyond the confluence of the Kings Channel and River Suir (Figure 1). This NIS report provides an assessment of the potential impact the proposed project might have on Habitats Directive (92/43/EEC) Annex IV species identified as having the potential to be present in the project area.

A report containing Supporting Information for Screening for Appropriate Assessment (SISAA) was prepared (MERC, 2026) to assist the Competent Authority, in undertaking Screening for Appropriate Assessment (AA). The SISAA concluded that the proposed project, without mitigation, may have the potential to lead to significant negative effects on Lower River Suir SAC (002137) and River Barrow and River Nore SAC (002162).

Based on that conclusion, this report represents a Natura Impact Statement (NIS) for the proposed project.

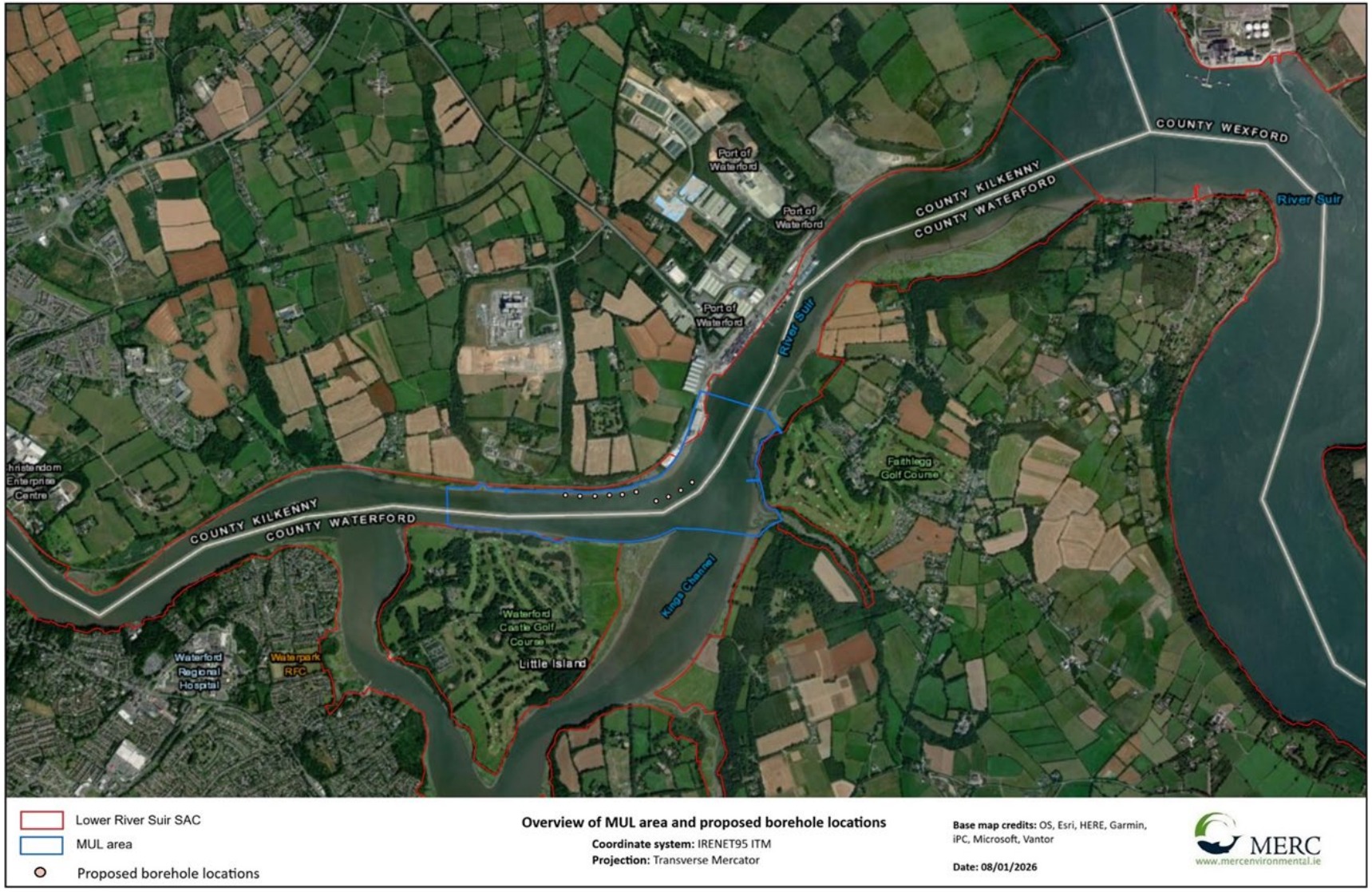

Figure 1. Survey area (71 ha) and borehole locations.

2. Statement of authority

This report was prepared by Ronan Browne and Louise Scally of MERC Consultants. MERC are a specialist marine ecological survey and consultancy firm. Core staff have more than 60 years of combined experience and specialist knowledge in relation to Irish marine habitats and species in addition to the assessment and management of conservation interests. MERC have been responsible for conducting national surveillance monitoring of EU Annex I marine habitats for compliance under Article 17 of the EU Habitats Directive since 2015. In this context MERC have been responsible for surveillance monitoring, under Article 11, and reporting under Article 17 of the EU Habitats directive for the 2019 and 2025 reporting cycles. Between 2005 and 2010 MERC conducted the survey, monitoring and assessment of sensitive subtidal habitats in Ireland to inform the conservation objective setting for Irish marine SACs.

Louise Scally MCIEEM is a professional marine ecologist with a wide range of experience in the field of conservation biology, marine habitat mapping and ecology. She completed a M.Sc. in ecology and taxonomy at Trinity College Dublin in 1989 and a Ph.D. in taxonomy also at Trinity College Dublin in 2001. She is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). For the last 20 years she has specialised in the ecology of marine ecosystems. She has specialised in the assessment of benthic habitats with a focus on intertidal and subtidal reef habitats and sensitive seabed species and habitats. Over the last 20 years she has conducted extensive marine monitoring surveys and assessments of EU Habitats Directive marine Annex I habitats and their associated species within European sites in Ireland to assist Ireland in complying with monitoring obligations under the EU Habitats Directive.

Ronan Browne is a marine and environmental scientist with extensive experience in coastal ecology, WFD water-quality monitoring, and the assessment of intertidal and subtidal habitats. He holds qualifications in aquatic biology, shellfish biology, and fisheries (MSc, Bangor), and in fisheries science (PhD, University of Galway). He has worked across national marine monitoring programmes and applied research with organisations including BIM, the Marine Institute, CLS and MERC Environmental.

3. Methodology

3.1 Guidelines and legislation

This report has been prepared, *inter alia*, with reference to the following European Directives, national legislation and guidance on the appropriate assessment of projects and plans with regard to the implementation of the provisions of Article 6(3) and (4) of the EU Habitats Directive 92/43/EEC.

- 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 2018. 7621 final. Office for Official Publications of the European Communities, Luxembourg.

- Assessment of plans and projects significantly affecting Natura 2000 sites; Methodological Guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission, 2002.
- Appropriate Assessment Screening for Development Management. OPR Practice Note PN01. Office of the Planning Regulator. March 2021.
- Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters. Department of Arts, Heritage and the Gaeltacht, 2014.
- JNCC. 2023. JNCC guidance for the use of Passive Acoustic Monitoring in UK waters for minimising the risk of injury to marine mammals from offshore activities. JNCC, Peterborough.
- MARA (2025). Guidance for Applicants: Marine Usage Licence (MUL) Applications. Version 7, updated 5 November 2025.
- MARA (n.d.). Marine Usage Licence (MUL) – Application Form. Accessed December 2025.
- MARA (n.d.). Technical Mapping Guidance Notes for MAC/MUL Applications under the Maritime Area Planning Act 2021 (MAPA). Accessed December 2025.

3.2 Impact assessment approach

The following steps were carried out in the preparation of the SISAA to determine the Zone of Influence (ZoI) of the proposed project and determine the potential for Likely Significant effects (LSEs) on the conservation objectives of all European Sites within that ZoI. The assessment methodology is detailed in the SISAA (MERC, 2026) and summarised below.

- A description of the proposed project was compiled.
- A source-path receptor (SPR) model and used to determine the ZoI of the individual elements of the project.
- Once the ZoI of the proposed project was determined, European sites within this ZoI were documented, and an analysis of the sensitivity of ecological receptors therein was conducted. In determining the sensitivity of ecological receptors, consideration was given, *inter alia*, to the scale, scope and location of the proposed project relative to the aforementioned receptors.
- An assessment of likely significant adverse effects on the conservation objectives of European sites within the ZoI was compiled.
- A review of relevant publicly available data bases was conducted to determine the potential for in-combination effects of the proposed project in-combination with other projects and plans.

4. Proposed survey activities

4.1 Overview

Uisce Éireann proposes to undertake a suite of geophysical, geotechnical, bathymetric, ecological, archaeological, and CCTV surveys within the River Suir estuary. Their purpose is to gather high-quality baseline data on seabed conditions, subsurface geology, environmental receptors and the condition of the existing outfall. The proposed survey area, which corresponds to the MUL application area, is 71 ha. It encompasses an area of the Suir extending upstream from the existing Waterford City WWTP outfall location at Gyles Quay (Kilkenny) south to Little Island (Waterford) and eastwards to Bellview Port beyond the confluence of the Kings Channel and River Suir (Figure 1).
The following survey investigations are considered necessary and are detailed further in Table 1.

- Geophysical survey, including:
    - Side-scan sonar (SSS)
    - Magnetometer

    - Sub-bottom profiler (SBP) - Parametric Sub Bottom Profiler
    - Sub-bottom profiler (SBP) - Boomer
    - Sub-bottom profiler (SBP) - Sparker
    - Multibeam Echo Sounder (MBES)
    - Marine Refraction Seismic
    - Marine Electrical Resistivity Tomography (ERT)
- Marine Environmental/Ecological surveys, including:
    - Benthic ecology Subtidal Drop down video and intertidal walkover/drone surveys
    - Grab sampling
    - Intertidal hand coring
- Archaeological surveys, including:
    - Intertidal walkover surveys potentially with the use of a metal detector
    - Potential diver surveys
- Geotechnical surveys, including:
    - Drop-down camera survey
    - Boreholes
    - Standard Penetration Testing (SPT)
    - Grab sampling
- Bathymetric surveys
    - Multibeam Echo Sounder (MBES)
- CCTV Survey of the Existing Outfall
    - Diver-operated cameras/Remotely Operated Vehicle (ROV)
- Additional potential surveys
    - Deployment of tidal gauges
    - Deployment of Sondes
    - Collection of water samples

It is intended that surveys will commence as soon as practicable following an award of the Marine Usage Licence (MUL). A high-level programme, including indicative numbers of samples, durations and timings, is outlined in Table 1. The surveys estimated time and duration are shown in **Table 2**, while the vessels and equipment to be used are described in sections 4.2 and 4.3, respectively.

Table 1. Proposed Survey activity estimated time and maximum duration of survey work.

Survey	Method	Method detail	Sampling Effort
Geophysical **Up to 16 weeks**	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 Profiling (SBP) - Sparker	The applied Acoustics Dual 400 Tip is an indicative example of a 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	SBP Sparker 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.

Survey	Method	Method detail	Sampling Effort
		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.	
	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 **Up to 5 days**	Benthic ecology samples (including subtidal and intertidal habitats surveys)	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 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.

Survey	Method	Method detail	Sampling Effort
Archaeological **Up to 5 days**	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 **Up to 16 weeks**	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 will be advanced to depths of up to 10 m below the riverbed, with drilling terminated earlier where competent bedrock is encountered. Drilling within the river channel will be carried out using cable percussion and rotary coring techniques through the overlying sediments, with rotary coring employed to progress into the underlying bedrock where present. Standard Penetration Tests (SPTs) will be undertaken at appropriate depth intervals in accordance with BS EN ISO 22476-3 to assess in-situ soil resistance and stratigraphy. All drilling equipment and procedures will comply with relevant BS EN ISO technical specifications for geotechnical investigations. In-river boreholes will be drilled from a jack-up barge or stable floating platform to ensure safe working access during tidal or flowing water conditions. Deployment of the jack-up legs may result in minor, localised and temporary disturbance to the riverbed, with each leg typically occupying a footprint of less than 1 m^2. Preliminary investigation point locations are shown in Figure 3. The locations may require adjustment to address localised access conditions.	A maximum of **10 no**. boreholes of a diameter of 300 mm will be required within the proposed MUL Area.
	Standard Penetration Tests (SPTs)	Standard Penetration Tests (SPTs) will be undertaken within the proposed foreshore and in-river boreholes to characterise subsurface stratigraphy and assess in-situ soil resistance. The test involves driving a split-spoon sampler at the base of the borehole using a 63.5 kg hammer dropped from a height of 760 mm, with the resulting blow count recorded in accordance with BS EN ISO 22476-3. The sampler is driven through a total penetration of 450 mm, and the number of blows required for the final 300 mm is reported as the N-value. SPTs will be performed at appropriate depth intervals or where changes in strata are observed to provide a representative profile of the ground conditions within the foreshore investigation area. All testing equipment and procedures will comply with the relevant international standards to ensure consistency and reliability of the	A total of approximately 40 no. SPTs will be carried out within the foreshore and in-river investigation area. SPTs will be undertaken in the 10 no. boreholes located within the river channel, with tests performed at appropriate depth intervals in accordance with the marine investigation specification.

Survey	Method	Method detail	Sampling Effort
		results.	
	Grab samples	Grab samples will be collected from the foreshore and in-river investigation area to obtain disturbed sediment suitable for geotechnical classification and chemical testing. The samples will be analysed to determine particle size distribution, soil grading, moisture content, Atterberg limits, organic content, particle size distribution, and other parameters required to characterise the natural sediments present within the foreshore zone. Engineering tests such as moisture condition value (MCV) testing, California Bearing Ratio (CBR) analyses and soil compaction testing on bulk samples will also be undertaken. Chemical testing will also be undertaken to assess potential aggressivity, including measurements of pH, sulphate concentration, redox potential and resistivity, to inform the design of concrete and other construction materials associated with the proposed works. All sampling, handling and testing procedures will be carried out in accordance with relevant international standards to ensure the acquisition of consistent and reliable geotechnical and chemical data.	A maximum of 14 no. grab samples will be collected within the proposed MUL Area.
Bathymetric Surveys **Up to one week**	Multibeam echo sounders (MBES)	This survey will provide high-resolution data on seabed features, depths, and morphology of the intertidal and subtidal zones within the proposed MUL Area. Bathymetric surveys will be conducted using multibeam echo sounders (MBES) and associated positioning systems. The MBES system may be mounted on a dedicated survey vessel or towed behind a smaller craft, depending on site conditions and water depths. The system emits wide acoustic signals to generate three-dimensional maps of the seabed, with line spacing between 5 and 20 meters, depending on depth. Operating frequencies will typically range from 300 to 700 kHz, with a peak operating frequency of approximately 400 kHz. Sound pressure levels are expected to be approximately 215–220 dB re 1µPa @ 1m. Exposure time is approximately 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). The survey will focus on the marine section of the existing outfall route, potential alternative corridors, and the intertidal zone delineated by the high-water mark, as required for the MUL application. The survey will be undertaken in accordance with best practice guidelines to minimize environmental impact, including adherence to the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (DAHG, 2014).	Bathymetric surveys will 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, subject to weather, tidal conditions, and vessel availability

Survey	Method	Method detail	Sampling Effort
		The maximum extent of the bathymetric survey area is presented in Figure 4.	
CCTV Survey of the Existing Outfall **Up to one week**	Diver-operated cameras/Remotely Operated Vehicle (ROV)	The outfall has been in continuous service since the plant was commissioned in 2010. While significant defects are not expected, there has been no recent condition assessment to confirm its current state. A Closed-Circuit Television (CCTV) survey is therefore proposed to ensure continued performance and compliance. The survey will be undertaken using either diver-operated cameras or a Remotely Operated Vehicle (ROV), depending on site conditions and accessibility. In deeper or higher-risk sections of the outfall, high-resolution imaging and sonar-equipped systems will be used to ensure safe and comprehensive inspection. The survey will help identify any defects or deteriorations such as cracking, deformation, leakages or blockages, any of which could compromise discharge performance or regulatory compliance.	CCTV Survey of the Existing Outfall will be undertaken along the existing outfall within the proposed MUL Area. This activity is anticipated to occur within daylight hours over a period of up to 5 days.

Table 2. Surveys and their timeline

Survey	Timeline
Geophysical survey	Up to 16 weeks
Marine Environmental / Ecological survey	Up to 5 days
Archaeological survey	Up to 5 days
Geotechnical survey	Up to 16 weeks
Bathymetric survey	Up to one week
CCTV survey of the existing outfall	Up to one week

4.2 Survey vessel

A multipurpose workboat will be used, based on suitable vessel available at the time of mobilisation. It is considered that a shallow draught vessel with a large wheelhouse, suitable for survey support and operations requiring frequent manoeuvring in confined waters will be used. A vessel size in the range of 16 m with a shallow draught and gross tonnage of ~45 is assumed. Noting that survey operations are typically undertaken at low speeds, appropriate to equipment deployment and data acquisition, vessel speeds are likely to be in the range of < 10 knots. Deck equipment will include a crane, hydraulic A-frame and winch system, allowing safe deployment/recovery of towed sensors and ancillary equipment. Standard navigational and communications equipment includes VHF, radar, electronic chart plotter, GPS, autopilot, echo sounder and AIS. Figure 2 shows an example of the type of survey vessel that would be required. Other smaller vessels supporting project works, have yet to be identified, as their availability will be subject to grant of MUL licence.

Figure 2. Example of required vessel type.

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, including the requirements of MARPOL. 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 Organization (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 vessels to be considered for the provision of survey works will be represented by small and medium size vessels. Acoustic broadband source pressure levels with smaller vessels (<50 m) having source pressure levels 160-175 dB (re 1µPa at 1m) and medium size vessel (50-100 m) 165-180 dB (re 1µPa at 1m) (DECC, 2011). The survey 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.

4.3 Equipment description and specifications

A suite of instruments will be used for the site investigation survey as detailed in Table 1. The choice of equipment will depend on factors such as depth of interest below the seafloor, the nature of shallow rock likely to be encountered, and the resolution required for mapping subsurface materials.

Table 3 provides a consolidated list of all proposed survey equipment—including geophysical, geotechnical, benthic, metocean, and passive devices—with example models, deployment methods, companies, and indicative sound pressure levels to represent a worst-case assessment scenario.

Table 3. Indicative specifications, models, deployment method and sound pressure levels.

Equipment	Example Model	Deployment	Company	Sound Pressure level re 1µ in water @ 1m from source
Geophysical Equipment				
Multibeam Echo Sounder	EM2040 (200–400 kHz)	Retractable hull mount	Kongsberg Maritime	210 dB
Side Scan Sonar	Edgetech 4205 (300–900 kHz)	Towed system	Edgetech	228 dB
SBP – Parametric Sub Bottom Profiler	TBC	Vessel mount	TBC	N/A

Marine Refraction Seismic	Small airgun + hydrophone streamer	Towed system	Applied Acoustics / Seistec	186–220 dB
Marine ERT System	AGI SuperSting Marine or ABEM Terrameter	Electrode streamer or seabed array	AGI / ABEM	N/A (non-acoustic)
Geotechnical Equipment				
Equipment	Example Model	Deployment	Company	Sound Level
Borehole Drilling	Geobor S or similar	From vessel	Fugro / similar	145–190 dB
Standard Penetration Tests (SPT)	SPT hammer (63.5 kg, 760 mm drop)	Conducted within boreholes	Fugro / similar	N/A (mechanical impact only)
Geotechnical Grab Sampling	14 sediment grabs	Overboard	Contractor	N/A
Benthic Sampling & ecological survey Equipment				
Equipment	Example Model	Deployment	Company	Sound Level
Day Grab	N/A	Overboard	N/A	N/A
Hammon Grab	N/A	Overboard	N/A	N/A
Drop-down Video Camera	N/A	Overboard	N/A	N/A
Diver Surveys	SCUBA	Overboard	N/A	N/A
0.1 m^2 Benthic Grab	0.1 m^2 Van Veen-type	Overboard	N/A	N/A
Intertidal Sediment Corer	0.01 m^2 hand corer	Hand deployed	N/A	N/A
ROV System	BlueROV2 or equivalent	Tethered from vessel	Blue Robotics / similar	N/A
Metocean & passive recording Equipment				
Magnetometer	TBC	Towed	TBC	N/A
Additional Equipment				
Tidal gauge	InSitu AquaTroll,	Post installed	e.g. YSI/ InSitu	NA
Multi parameter Sonde	e.g. YSI Exo2/ In Situ Aqua Troll, Hydrolab – sensors - Turbidity, conductivity,	Post installed	e.g. YSI/ *In Situ*	NA

	pH, temperature			
*Note: Where the exact model to be used is yet To Be Confirmed (TBC) a worst-case scenario has been used to determine the upper-level sound pressure possible. The equipment type and model are indicative only, exact equipment to be specified by the contractor but the examples provided are consisted standard and any variations will be minor.				

4.4 Geophysical equipment

Survey vessel

A multipurpose workboat will be used, based on suitable vessel available at the time of mobilisation. It is considered that a shallow draught vessel, suitable for survey support and operations requiring frequent manoeuvring in confined waters will be used. A suitable vessel in the range of 16 m with a shallow draught and gross tonnage of ~45) is assumed.

Side scan sonar

Side scan Sonar (SSS) is another device that transmits sound pulses that provide the information required to map the seabed. It differs from MBES in that SSS has a finer beam width and smaller footprint to MBES and therefore higher resolution. It is generally towed behind the vessel very close to the seabed and emits fan-shaped acoustic pulses directed down toward the seafloor which are recorded as a series of cross-tracks. The sound frequencies used by side-scan sonar range generally range from 100 to 1000kHz; higher frequencies yielding better resolution but less range.

Magnetometer

A magnetometer is a passive instrument that measures the Earth's magnetic field, allowing magnetic anomalies to be measured. It is towed behind the survey vessel where it samples background magnetism. When the magnetometer detects an anomaly, such as ferrous objects such as fragments of a ship hull or a geological formation of basalt. This is detected as a change to the background magnetic field. This tool can detect artifacts above or below the seabed.

Sub-bottom profiler

A Sub-bottom profiler employs an acoustic signal, to provide the information required to identify and measure marine sediment layers that exist below the sediment/water interface. The proposed equipment comprises a Knudsen Chirp system or similar which transmit a sweep of frequencies (e.g. 2-10 kHz) in a single pulse. Depending on the profile of the seabed (rock, sand, mud etc.) and level of compaction, the energy reflected back can be related to the sub-bottom composition.

Sub-Bottom Profiling (SBP) - Boomer

A sub-bottom profiler boomer is an instrument used to image sediment layers beneath the seafloor. A Boomer system is a seismic reflection profiling instrument that operate in the 700 to 2000 Hz region.

Boomers are generally used in oastal waters down to a few hundred meters depth when sub-bottom penetration requirements can not be met with higher frequency systems. The proposed equipment will operate at frequencies within the range of 85-115kHz and 2-22kHz, respectively, and sound pressure levels of up to 232 dB (typically operated at <200dB) re1µPa @ 1m.

Sub-Bottom Profiling (SBP) - Sparker

A Sub-Bottom Profiling Sparker is an instrument used to used to image sediment and rock layers beneath the seafloor, it has a similar purpose to that of the boomer described above but is designed when deeper penetration is required. The proposed equipment will operate at frequencies within the range of 0.5 kHz to 5 kHz, with sound pressure levels in the range of 205-211dB re1µPa @ 1m

Multibeam echosounder

A multibeam echosounder (MBES) is a type of sonar frequently used to map bathymetry. It operates by emitting an acoustic wave in a fan shape beneath the point of its transceiver attached to the hull of the vessel. The time it takes for the sound waves to bounce off the seabed and return to the transceiver is used to calculate the water depth within the arc of the fan. The proposed MBES operates at a sound pressure level of ~215–220 dB re 1 µPa @1m and 300–700 kHz (peak ~400 kHz).

Marine Refraction Seismic

Marine Refraction Seismic systems are used to determine the structure and properties of subsurface layers beneath the seafloor by analysing refracted seismic waves. They use controlled seismic sources, such as small airguns or sparkers, to generate acoustic waves that travel through the sediment and refract along geological boundaries. Arrays of hydrophones or geophones record these refracted waves, allowing interpretation of sediment thickness, bedrock depth and structural features. Peak frequencies typically range between 5–90 Hz, with expected source levels in the range of 186–220 dB re 1 µPa @ 1 m.

Marine Electrical Resistivity Tomography (ERT)

Marine Electrical Resistivity Tomography (ERT) is a non-invasive geophysical method used to image the subsurface beneath the seabed or coastline by measuring variations in electrical resistance. It involves deploying a series of electrodes along the seabed, either in a fixed layout or towed configuration. Low-voltage electrical currents are passed through the seabed, and resulting potential differences are measured to map variations in subsurface electrical resistivity. As a non-acoustic, non-invasive technique, ERT produces no underwater noise and is used to assess sediment layering, groundwater influence, and bedrock morphology.

4.5 Marine environmental/ecological surveys

Seabed imagery- drop down video/ROV surveys

Underwater camera systems or Remotely Operated Vehicles (ROVs) may be used for visual inspection of the existing benthic conditions within the MUL area. High quality video recordings and stills may be collected for further analysis and confirmation of suitable conditions for further intrusive activities e.g. benthic sampling or geotechnical works.

Benthic sampling

A Day grab is an instrument used for sampling soft seabed sediments. When deployed overboard it is lowered on a winch to the seabed where the jaws open to take a small (approx. 5L) sample of the surface sediment (top 20cm). A Hammon grab is a very similar type of sampler, but the jaw mechanism is slightly different which allows it to sample coarser sediments (e.g. gravel and shelly sediments). The samples retained can then be analysed to obtain an overview of the sediment fauna, and particle size. Both samplers are routinely used for surveillance monitoring to support a number of EU Directives such as the Habitats Directive and Water Framework Directive. Day or Hammon grabs do not introduce noise into the underwater environment other than that produced from a slight impact with the grab making contact with the seabed.

Intertidal coring and walkover surveys

For intertidal sediment assessment a 0.01m^2 hand core taken to a depth of 20cm for benthic faunal analysis will be used. Additional surveys of intertidal hard strata may also be carried out by conducting walk over surveys of the relevant hard strata to record biotopes and species present.

4.6 Archaeological surveys

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.).

4.7 Geotechnical surveys

Boreholes

Up to 10 boreholes with a diameter of up to 300mm and a depth of up to 10m below the seabed will be carried out. To facilitate this, a drill head is lowered to the seabed from the vessel via a drill string and stabilised using a seabed frame. The drill head penetrates the seabed via rotation of the drill string and the application of a downward pressure. Soils and rock samples are then retrieved for laboratory testing via the drill string. Borehole drilling may be combined with *in-situ* testing such as cone penetration testing or down the hole testing at some investigative locations.

Standard Penetration Tests (SPTs)

Standard Penetration Tests may be undertaken within selected boreholes. A 63.5 kg hammer is dropped from a height of 760 mm to drive a split-spoon sampler into the sediment. The blow count for the final 300 mm of penetration is recorded as the N-value. Up to 40 SPTs may be undertaken to characterise sediment density and stratigraphy.

Geotechnical grab samples

Up to 14 grab samples may be collected within the MUL area for geotechnical classification, including grain size, moisture content, Atterberg limits and associated chemical testing to assess sediment aggressivity (pH, sulphates, redox and resistivity).

4.8 Ancillary data collection

Additional ancillary data may be collected. This may include collecting water samples and data on temperature, turbidity, and conductivity/salinity using a multi-parameter sonde deployed during the deployment and deployment of tidal gauges.

5. Assessment of Likely Significant Effects on European Sites

The screening determination identified the following as having the potential for likely significant effects on European sites within the ZoI of the proposed project:

1. Disturbance to Annex II migrating fish from underwater noise, resulting from the operation of

- Borehole drilling
- Standard Penetration Tests (SPTs)
- Side Scan Sonar
- Sub-Bottom Profiling (SBP) – Parametric Sub Bottom Profiler
- Sub-Bottom Profiling (SBP) – Boomer
- Sub-Bottom Profiling (SBP) – Sparker
- Multibeam Echo Sounder (MBES)
- Marine Refraction Seismic

2. Disturbance to otters from vessel operations and survey staff within close proximity to potential intertidal resting places and intertidal and subtidal foraging habitats for otters with the potential for them to temporarily abandon their resting places and/or foraging habitat.

3. Potential for damage to Atlantic salt meadows (Glauco-Puccinellietalia maritimae) resulting from the positioning of the Jack-up barge and survey staff accessing the lower shore of the MUL area.

4. Potential for in-combination effects related to 2 projects and 3 plans resulting from a temporal overlap with underwater noise generating activities.

The rationale for this assessment is given below:

5.1 Migratory fish

The Lower Suir Estuary lies within the migration corridor for Atlantic Salmon, Twaite Shad and Lamprey (Sea and River). Brook Lamprey are non-migratory and confined to smaller streams upstream of the MUL area and outside of its ZoI.

Migration times for Salmon, Twaite Shad and Lamprey species varies depending on a number of factors including, *inter alia*, environmental conditions and the age of the fish. However, the peak migration period for the upstream migration of Salmon to spawn is during June and July, with migration also occurring in August to October. Smolts generally migrate downstream from late March through June. Twaite Shad migrate upstream to spawn from late April to early June, peaking in May. Sea Lamprey generally migrate upstream from April, with their main upstream migration and spawning activity peaking from late May through to July. River Lamprey begin their inward migration from mid-September. Therefore, for all species combined, the period between April to October represents the time of year when one or more species may be migrating through the MUL. Noting the habitat within the MUL is not suitable ground for spawning.

While exposure to very intense sounds (e.g., seismic guns) may result in mortal injuries, less intense sounds that are detectable by fishes may affect their behaviour, causing them to move away from their migration routes or leave favoured habitats (Normandeau Associates, Inc., 2012).

Hearing range and sensitivity varies considerably among fish species depending on the hearing mechanism of the species e.g., whether a swim bladder is involved in the hearing mechanism or not. Furthermore, within that class, some species with a swim bladder are sound pressure-sensitive at higher frequencies while others having a swim bladder are not e.g., Atlantic salmon (Hawkins, 1978). Lamprey are known to be able to detect sound at low frequencies and behavioural responses from sound, in sea lamprey, at the low frequency range are known from limited studies (Mickle *et al,* 2018). Twaite Shad are known to be able to detect sound at frequencies greater than 1.8Mhz, typically moving away from the sound source (Gregory *et al*, 2007).

The U.S. National Marine Fisheries Service (NMFS), as well as other agencies, currently uses 150 dB re 1 µPa (rms) as the sound pressure level that may result in onset of behavioural effects (Caltrans, 2015). Sound pressure above the 150 dB_{rms} level are expected to cause temporary changes in behaviour and these might include startle responses, feeding disruption, area avoidance, etc. Popper *et al* (2014). Most vessels, and especially large ships, produce predominately low frequency sound (i.e., <1 kHz) Popper *et al* (2014). The estimated noise level from the site investigation vessel is below 145dB. However, the noise levels associated with some of the proposed site investigations are above 150dB (maximum of 228dB).

Both bore hole drilling and bathymetric surveys could lead to the introduction of noise in the range of 145-232 db re 1µ in water @ 1m from source which is within the range level that may lead to temporary changes in behaviour of these fish species.

Therefore, there is potential for temporary changes in the behaviour of fish species, which form a qualifying interest for the Lower River Suir SAC, should they be migrating through the project site during periods of underwater noise inducing activity without mitigation.

5.2 Otters

Otters use freshwater, estuarine and coastal habitats for foraging, commuting, drinking and bathing, with resting and holt sites typically located in vegetated banks well above tidal influence. They favour marine areas where freshwater inflow is available. In Ireland, typical female territories extend approximately 7.5 +/- 1.5 km along mesotrophic rivers and ~6.5 +/- 1.0 km in coastal systems, whereas males may hold territories of ~13.2 +/- 5.3 km in riverine environments, with substantial variation depending on social dynamics (Reid et al., 2013).

Within this estuarine system, otters forage along the intertidal margin, but holt and couch sites occur inland along undisturbed riparian cover. The mapped EPA WFD River waterbody dataset indicates suitable otter habitat and a commuting/foraging corridor, but no formal NPWS otter survey has been undertaken at this location. No holts or resting structures are recorded at or near the proposed borehole locations.

The survey footprint is limited to small, discrete boreholes, undertaken during daylight hours, with only short-term human presence and no vegetation clearance required. As a result, disturbance pathways are weak and short-range, confined to brief, localised noise or activity during drilling. No meaningful pathway exists for water-quality deterioration.

For screening purposes, the Zone of Influence (ZoI) is conservatively defined as the shoreline and nearshore waters within ~300 m of the works, extending ~15 km along the estuary (7.5 km on either side of the site), reflecting typical territory lengths and potential commuting routes.

Therefore, there is the potential for disturbance to otters from vessel operations and survey staff working within close proximity to potential intertidal resting places and intertidal and subtidal foraging habitats for otters with the potential for them to temporarily abandon their resting places and/or foraging habitat without mitigation.

5.3 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

This habitat occurs along the margins of the MUL area. High levels of physical impact, such as trampling can lead to damage of the structure of salt marsh and the characterising species within it. While no survey activity is proposed to be conducted within this habitat it was screened in on a precautionary basis as it is bordering on the MUL area.

Therefore, there is the potential for damage to Atlantic salt meadows (Glauco-Puccinellietalia maritimae) resulting from the positioning of the Jack-up barge and survey staff accessing the lower shore of the MUL area without mitigation.

5.4 In combination effects

While a single project or plan may not in itself result a significant effect on the conservation objectives of a site, a combination of projects within a localised area may cause a significant effect on a site. Therefore, the cumulative impacts must be taken into consideration when assessing the possible impacts of a project.

Potential project related impacts were identified in the SISAA, and included pressures resulting from vessel presence, acoustic surveys and benthic surveys. Additional projects identified as having potential to act in-combination with the proposed project are considered to be those projects most likely to contribute to these pressures and generate additional underwater noise, vessel disturbance and impacts on benthic habitats.

A total of 2 projects and 3 plans were identified that had the potential to introduce underwater noise into the marine environment. Should there be a temporal overlap between the proposed project and these additional projects and plans and cumulative impact might arise.

Therefore, the potential for likely significant in-combination effects, between the identified projects and plans and the introduction of underwater noise, as a result of the proposed project, are possible without mitigation.

In summary, The SISAA identified four European sites within the ZoI of the proposed project: Lower River Suir SAC, River Barrow and River Nore SAC, Slaney River Valley SAC and Blackwater River (Cork/Waterford) SAC. Table 4 provides a summary of the assessment for Likely Significant Effects (LSEs) on the qualifying interests of these sites without mitigation.

Table 4. Summary of assessment

European site	Site code	Distance from proposed MUL (KM)	Qualifying interests	Potential for LSEs
Lower River Suir SAC	002137	Within MUL area	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	**Yes** Possible physical damage related to jack-up barge positioning
			Petromyzon marinus (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106]	**Yes** Possible disturbance and displacement from underwater noise from bathymetry and borehole drilling
			Lutra lutra (Otter) [1355	**Yes** Possible disturbance and displacement due personnel conducting intertidal surveys and borehole drilling
			Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] *Taxus baccata* woods of the British Isles [91J0]	No No SPR link identified

			Austropotamobius pallipes (White-clawed Crayfish) [1092] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Lampetra planeri* (Brook Lamprey) [1096]	
River Barrow and River Nore SAC	002162	2.2	*Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355]	**Yes** Possible disturbance and displacement from underwater noise from bathymetry and borehole drilling
			Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170]	No SPR link too weak for any Likely Significant effects related to sediment mobilisation
			Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Lampetra planeri* (Brook Lamprey) [1096]	No No SPR link identified
Slaney River Valley SAC	000781	>75 (Hydrologically)	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140]	No No SPR link identified

			Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Old sessile oak woods with Ilex and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] *Lutra lutra* (Otter) [1355] *Phoca vitulina* (Harbour Seal) [1365] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Lampetra planeri* (Brook Lamprey) [1096]	
			Petromyzon marinus (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106]	**Yes** Possible disturbance and displacement from underwater noise from bathymetry and borehole drilling
Blackwater River (Cork Waterford) SAC	002170		Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	No No SPR link identified

			Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Lutra lutra* (Otter) [1355] *Vandenboschia speciosa* (Killarney Fern) [6985] *Lampetra planeri* (Brook Lamprey) [1096]	
			Petromyzon marinus (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106]	**Yes** Possible disturbance and displacement from underwater noise from bathymetry and borehole drilling

6. Mitigation measures

The following measures are recommended

6.1 Otter

- Prior to the commencement of any element of the proposed project taking place, an otter survey should be carried out by a qualified ecologist with demonstrable experience in otter surveys. This survey should be conducted within 2-3 months of the proposed commencement date.
- Any holt/couch sites or resting places within the MUL area should be clearly identified. A protection zone of 30 m around any otter holt or couch sites and of 150 m around any natal dens identified should be established.
- Buffer zones should also be established either side of the mouth of the Rathpatrick and Gorteens Streams which enter the MUL area along the northern shore. These areas should be avoided, even in the absence of signs of active use by otters.
- Intertidal surveys (e.g. handheld benthic coring) is normally conducted at low spring tide. This is the time coastal otters are least likely to be foraging and should be adhered to.

6.2 Annex II fish:

To avoid the potential for underwater noise related disturbance to Salmon, River Lamprey, Sea Lamprey and Twaite Shad, surveys that will introduce noise into the marine environment specifically:

- Borehole drilling
- Standard Penetration Tests (SPTs)
- Side Scan Sonar
- Sub-Bottom Profiling (SBP) – Parametric Sub Bottom Profiler
- Sub-Bottom Profiling (SBP) – Boomer
- Sub-Bottom Profiling (SBP) – Sparker
- Multibeam Echo Sounder (MBES)
- Marine Refraction Seismic

shall not be undertaken during the months of April to October to avoid periods of inward and, as may be applicable, outward migration of the aforementioned species.

6.3 Atlantic Salt meadows (Glauco-Puccinellietalia maritimae)

Prior to the project commencing, an appropriately qualified ecologist will be appointed to inspect the area of “potential” Atlantic Salt Meadows along the northern boundary of the site and determine the type of salt meadows present (noting the conservation objectives for the site indicate this area as “Potential” rather than confirmed Atlantic Salt meadows). Once determined, access routes to, from and across the shore will be clearly determined and marked to ensure no impact on this habitat.

The environmental Risk Management Plan for the project will subsequently clearly define the access routes and assign the responsibility for ensuring that only approved access routes are used by survey staff and in particular the operator of the jack-up barge.

6.4 In-combination effects

Provided the measures recommended in section 6.2 above are implemented, no LSEs on Annex II migratory fish, in combination with other projects and plans, are considered possible.

7. Transboundary effects

Transboundary effects concern the likelihood of significant impacts on a site within the Natura 2000 network that lies outside our national boundaries. Since 1 January 2021 nature conservation areas in the UK (including Northern Ireland) are no longer part of the Natura 2000 network (OPR, 2021).

The ZoI of the proposed project has been estimated and all European sites with the potential for project related impacts have been assessed, including *ex-situ* effects. The SISAA did not identify any potential for impact on *ex-situ* sites, due to the scale and scope of the project and the likely magnitude of any effects.

Therefore, no transboundary effects are considered possible.

8. Residual impacts

No residual impacts of the proposed project have been identified or are considered possible.

9. Natura Impact Statement Conclusion

This assessment is based on complete, precise and definitive findings in the light of the best scientific knowledge. It objectively concludes that, provided the mitigation measures recommended in this document are fully implemented, **no adverse effect on the integrity** of any European site will occur.

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