Uisce Éireann

Surveys to inform construction of a WWTP outflow pipe at Liscannor Bay – Lahinch & Ennistymon

Risk Assessment for Annex IV Species

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1. Introduction

1.1 Background

This report has been prepared by AQUAFACT – APEM Group to provide the relevant information to the competent authority to inform the Risk Assessment for Annex IV Species for a Maritime Usage Licence. The MUL is being submitted for site investigations and surveys, including bathymetric and geophysical surveys, intertidal and subtidal habitat surveys, sediment and water sampling, and where necessary, boreholes to inform the design and construction of a new Wastewater Treatment Plant (WWTP) located in the Lahinch and Ennistymon area. The locations of the survey activities are shown in **Figure 1-1** and **Figure 1-2**.

The aims of the Project can be summarised as follows:

- To collect baseline marine environmental and geotechnical data to inform the design and assessment of the proposed Lahinch & Ennistymon WWTP marine outfall
- To characterise subtidal, intertidal, and benthic habitats within the potential outfall corridor in Liscannor Bay through geophysical surveys, bathymetric mapping, and targeted sampling.
- To obtain sediment, water quality, and habitat information required to support environmental impact assessments, Appropriate Assessment (AA), and Annex IV risk assessments.
- To ensure survey activities are carried out in compliance with regulatory requirements, minimising disturbance to sensitive habitats and species.

The benefits resulting from the completion of the Project would include:

Reduction of potential risks and uncertainties associated with construction and operation of the future WWTP outfall, thereby supporting compliance with EU Directives and the protection of the ecological integrity of Liscannor Bay.

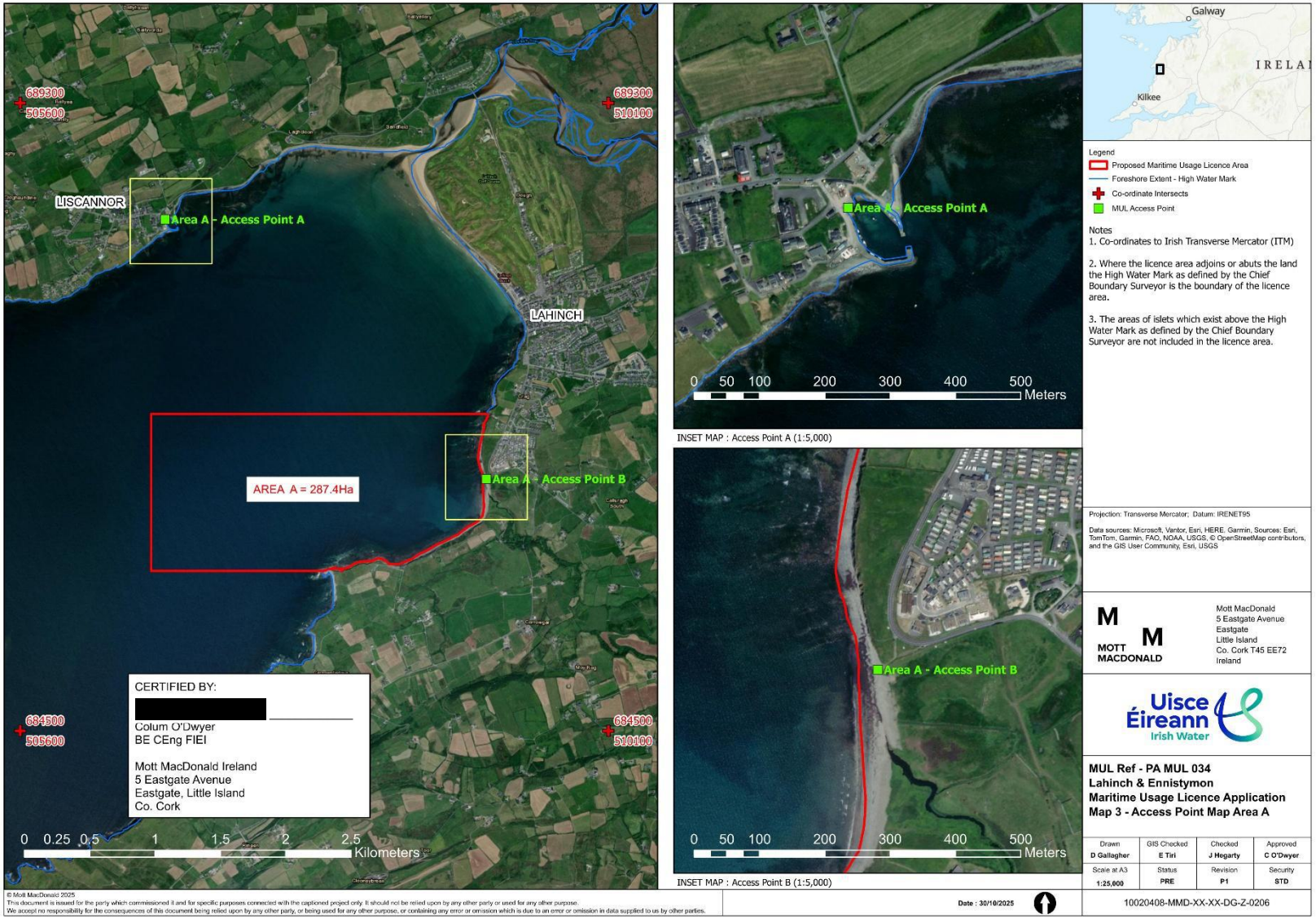

Figure 1-1: Area A of the proposed Maritime Usage Licence (MUL) area.

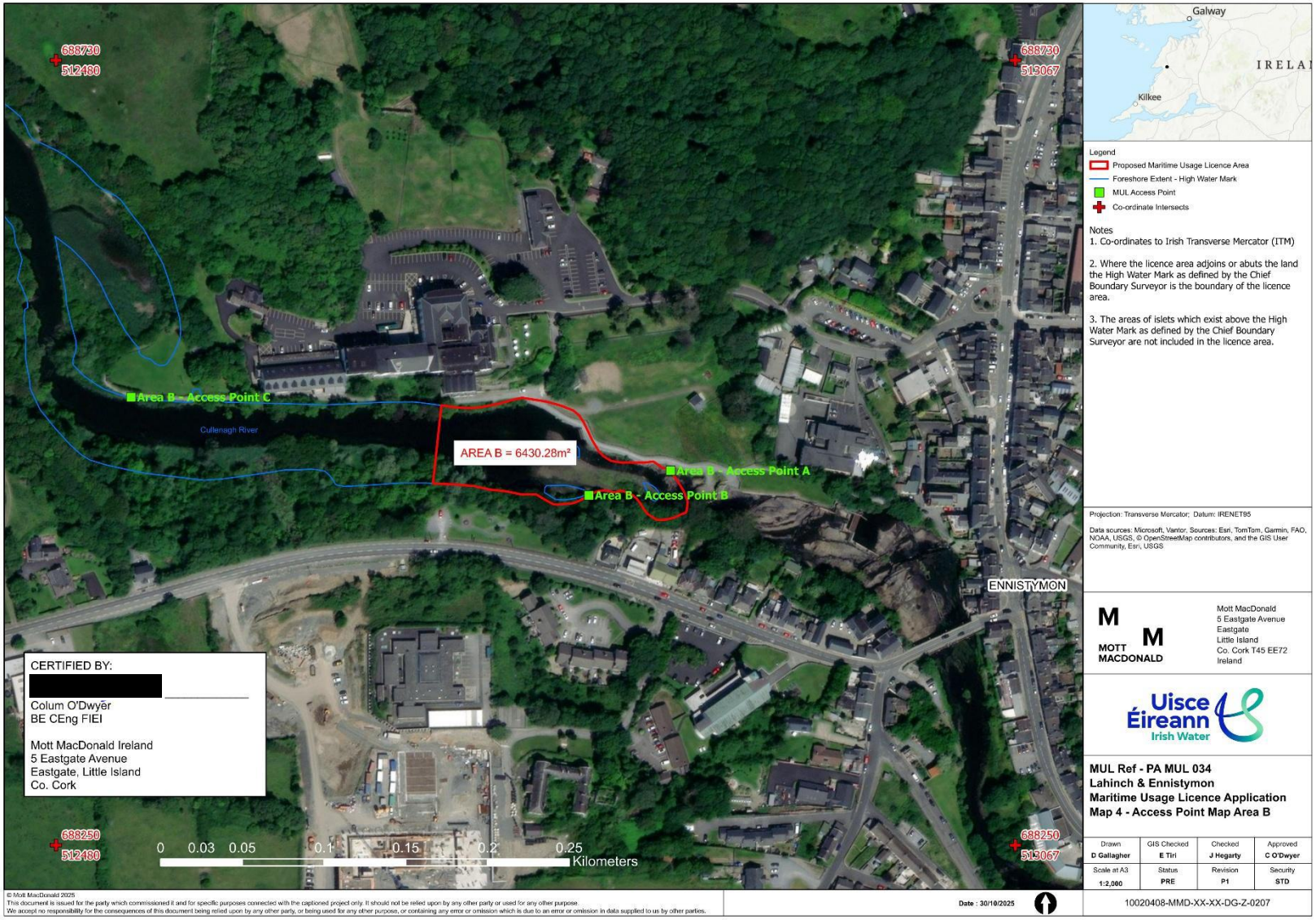

Figure 1-2: Area B of the proposed Maritime Usage Licence (MUL) area.

1.2 Proposed Survey Activities

The proposed Lahinch and Ennistymon Wastewater Treatment Plant (WWTP) project involves the construction of a new treatment facility on a greenfield site to serve both agglomerations, with an estimated design capacity of approximately 9,300 PE. The project will decommission the existing underperforming plants, which currently discharge untreated or inadequately treated effluent into the Inagh River, contributing to significant water quality concerns. The new WWTP will provide at least secondary treatment, improving compliance with the Water Framework Directive and protecting local riverine and coastal environments.

A key element of the scheme is the development of a new marine outfall system, comprising a rising main and long sea outfall discharging treated effluent into Liscannor Bay.

To inform environmental assessments and final design, a programme of site investigations is required, including bathymetric and geophysical surveys, intertidal and subtidal habitat surveys, sediment and water sampling, and where necessary, boreholes. These investigations will support consideration of Annex IV species by identifying habitats, seasonal use of the bay by marine mammals and otters, and potential for disturbance.

The proposed surveys will employ a suite of marine and intertidal investigation techniques designed to characterise the receiving environment within Liscannor Bay and at the proposed landfall location at Cregg Beach. These will provide essential baseline environmental and geotechnical information to support the design and assessment of the long sea outfall (see **Figure 1-1** and **Figure 1-2**). Full details of the Proposed Maritime Usage is presented in Attachment 3.1 Description of the Proposed Maritime Usage.

Bathymetric and Geophysical Surveys

A multibeam echosounder will be used to map seabed topography and features along the proposed pipeline corridor. Side-scan sonar will be deployed to provide high-resolution imagery of seabed conditions, habitats, and potential obstructions, while sub-bottom profiling (using a boomer or sparker system) will assess sediment stratigraphy and bedrock depth, critical for evaluating proposed trenchless construction feasibility. A towed magnetometer survey will be undertaken to detect ferrous objects and unexploded ordnance (UXO) hazards along the route.

Geotechnical Site Investigations

Boreholes will be drilled at the entry point for the proposed trenchless construction at Cregg Beach, near the proposed trenchless construction exit point/diffuser location, and at regular intervals along the alignment (up to 20 in total). These will provide continuous core samples of superficial deposits and underlying bedrock. Cone Penetration Tests (CPTs) will be performed both offshore and in the intertidal area to determine in-situ

soil strength and confirm trenchless construction feasibility. Vibrocores and grab samples (Van Veen or Day grab) will be collected to provide sediment classification, environmental chemistry, and faunal analysis. Intertidal trial pits and dynamic sampling/probing using a tracked mini rig will be undertaken at Cregg Beach to confirm shallow ground conditions and inform trenchless construction design.

Benthic and Water Quality Surveys

Benthic sampling using a day grab will be carried out to establish baseline faunal communities and support biotope classification, ensuring potential effects of outfall installation on benthic ecology are fully assessed. Sediment and faunal samples will undergo laboratory analysis to identify invertebrate communities and any contamination. Water quality sampling will also be undertaken at selected points within Liscannor Bay to establish baseline conditions for future comparison during and after construction.

Freshwater Investigations

At Area B, located upstream of the Falls Hotel in Ennistymon, kick sampling and water quality sampling will be carried out within the Inagh River. These activities will characterise freshwater ecological conditions and establish a baseline for assessing potential improvements once existing untreated discharges are decommissioned.

Survey Logistics

Marine survey vessels will mobilise from Liscannor Pier, providing direct access to the outfall corridor. Intertidal surveys at Cregg Beach will be scheduled around tidal cycles to ensure safety and minimise disturbance to the public and sensitive habitats. The site investigation surveys are provisionally scheduled to take place from Q4 2026 to Q1 2027. However, to account for contingency in sourcing appropriate contractors to carry out all SI activities, potential weather down-time, unforeseen issues with scheduling or sequencing, a total duration of 24 months is being sought for this MUL. A list of survey types, coverage, equipment and operations can be seen in **Table 1-1** and **Table 1-2**.

The results of these surveys will provide essential baseline data to inform the Appropriate Assessment process under the Habitats Directive and ensure that potential effects on designated sites and qualifying interests are fully assessed.

Table 1-1: Geotechnical survey methodology.

Investigation Type	Location Focus	Max Quantity / Spacing	Worst-Case Equipment & Justification	Vessel Operations (Length, Width, Duration)
Boreholes	1 at landfall (Trenchless construction entry), 1 near trenchless construction exit/diffuser, others positioned at 100m centres	Up to 20 total (including for contingency for repositioning / redrills to overcome obstructions)	Jack-up barge with soil and rotary drilling rig equipment (e.g., Dando 2000 / Commachio 3000 / GeoborS Drilling rig). Needed to confirm stratigraphy and trenchless construction feasibility; barge ensures safe access offshore.	Length: 20–30m, Width: 10–15m; 24hrs – 36hrs per borehole (24hr working conditions assumed)
CPTs (Overwater and Intertidal)	At landfall, at 200m centres along route, and diffuser zone	Up to 10 total	CPT rig on jack-up barge or floating platform (e.g., ROSON). Provides in-situ soil strength for trenchless construction pullback and trench stability.	Length: 15–25m, Width: 8–10m; 0.5 - 1 day per CPT
Vibrocores	Distributed along route, with focus on diffuser zone and sediment variability	Up to 15 total	OSIL Vibrocorer deployed from floating vessel. continous sediment sampling for classification and environmental assessment.	Length: 10–15m, Width: 3–4m; 0.5 - 1 day per vibrocore
Seabed Sediment Sampling	Nearshore, mid-route, and diffuser zone	Up to 20 total	Van Veen or Day grab sampler from vessel. Environmental and chemical analysis; supports MARA's ecological impact review.	Length: 10–15m, Width: 3–4m; 3 – 4 days to complete seadbed sampling campaign
Trial Pits (Intertidal)	Cregg beach landfall area, spaced across beach width	Up to 4 total	Mini-excavator or hand-dug pits. Confirms constructability of trenchless construction entry pit or trench; low-impact equipment for sensitive zone.	Land-based mini-excavator; 1 day per pit

Investigation Type	Location Focus	Max Quantity / Spacing	Worst-Case Equipment & Justification	Vessel Operations (Length, Width, Duration)
Dynamic Sampling and Probing (Intertidal)	Cregg beach landfall area, spaced across beach width	Up to 4 total	Tracked mini rig (Terrier or similar) to characterize ground conditions with insitu testing	Mini boring rig with probing attachment 0.5 day per position

Table 1-2: Geophysical survey methodology.

Survey Type	Coverage / Location Focus	Max Quantity / Spacing	Worst-Case Equipment & Justification	Vessel Operations (Length, Width, Duration)
Sub-bottom profiling	Corridor extending 50–100m either side of the indicative pipeline route, including diffuser zone and trenchless construction exit area	25–50 m line spacing	Towed boomer/sparker system from survey vessel. Required to map sediment layers and bedrock depth for trenchless construction feasibility and diffuser siting.	Length: 10–15m, Width: 3–4m; 3 - 5 days duration
Magnetometer	Corridor extending 50–100m either side of the indicative pipeline route and diffuser zone (UXO check, seabed obstructions)	25 m line spacing	Marine magnetometer (e.g., Geometrics G-882). Detects ferrous objects that may interfere with trenching or diffuser installation.	Length: 10–15m, Width: 3–4m; 3 - 5 days duration
Side Scan Sonar	Corridor extending 50–100m either side of the indicative pipeline route and diffuser zone, especially nearshore and outlet areas	Dual-frequency, full coverage	Edgetech 4200 or Klein 3000 side scan sonar. Maps seabed features, habitats, and potential obstructions for routing and diffuser design.	Length: 10–15m, Width: 3–4m; 3 - 5 days duration

1.3 Purpose of this report

This report has been prepared to assess the impacts of the Project on relevant Annex IV species identified as having potential to be present in the Project, under Article 12 of the European Community (EC) Directive (92/43/EEC) on the conservation of natural habitats and of wild flora and fauna (commonly known as the Habitats Directive).

2. Legislation

2.1 Legislative background

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (commonly known as the Habitats Directive) is European Community legislation regarding nature conservation established to ensure biodiversity is conserved through the conservation of natural habitats and wild fauna and flora in Europe.

The Habitats Directive was originally transposed into Irish law by the *European Communities (Natural Habitats) Regulations, 1997* (S.I. No. 94 of 1997). The 1997 Regulations were subsequently revoked and replaced by the *European Communities (Birds and Natural Habitats) Regulations 2011*, as amended (herein referred to as the 2011 Birds and Natural Habitats Regulations).

A network of sites of conservation importance hosting habitats and species as needing to be either maintained at or restored to favourable conservation status have been identified by each Member State. These sites are known as European sites within the Natura 2000 network.

European sites in Ireland that form part of the Natura 2000 network of protected sites comprise Special Area of Conservation (SAC) sites designated due to their significant ecological importance for habitats and species protected under Annex I and Annex II respectively of the Habitats Directive, and Special Protection Areas (SPA) sites designated for the protection of populations and habitats of bird species protected under the EU Birds Directive (Council Directive 2009/409/EEC). The sites are formally designated by the relevant minister under a statutory instrument. Candidate SAC and candidate SPA sites (*i.e.,* cSAC or cSPA) have the same level of protection as fully designated sites under Irish Law[1]. The specific named habitats and/or (non-bird) species for which an SAC or SPA are selected are called the 'Qualifying Interests' (QIs), of the site. The specific named bird species for which a SPA is selected is called the 'Special Conservation Interests' (SCIs). QIs and SCIs are collectively referred to as conservation features (OPR, 2021).

The Habitats Directive requirements are divided in two group chapters. The first includes the Articles 3 to 11, designated as ‘Conservation of natural habitats and habitats of species’. The second group includes the Articles 12 to 16, designated as ‘Protection of Species’, which focus on establishing a system of strict protection for the animal species listed under Annex IV(a) of the Habitats Directive.

[1] Candidate sites are those that have been submitted to the European Commission, but not yet formally adopted under Ministerial Statutory Instrument (S.I.). Legal protection, and therefore, the requirement for AA, arises from the date that the Minister gives notice of his/her intention to designate the site.

Article 12 of the Habitats Directive, under Regulation 51 of the 2011 Birds and Natural Habitats Regulations states:

1. *Member States shall take the requisite measures to establish a system of strict protection for the animal species listed in Annex IV(a) in their natural range, prohibiting:*

   (a) all forms of deliberate capture or killing of specimens of these species in the wild;

   (b) deliberate disturbance of these species, particularly during the period of breeding, rearing, hibernation and migration;

   (c) deliberate destruction or taking of eggs from the wild;

   (d) deterioration or destruction of breeding sites or resting places.

2. *For these species, Member States shall prohibit the keeping transport and sale or exchange, and offering for sale or exchange, of specimens taken from the wild, except for those taken legally before this Directive is implemented.*

3. *The prohibition referred to in paragraph 1(a) and (b) and paragraph 2 shall apply to all stages of life of the animals to which this Article applies.*

4. *Member States shall establish a system to monitor the incidental capture and killing of the animal species listed in Annex IV(a). In the light of the information gathered, Member States shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned.*

Additionally, protection measures implemented under Article 12 of the Habitats Directive should ensure or contribute to the maintenance or restoration, at favourable conservation status, of Annex IV species of Community Interest. In the marine environment, Annex IV animal species of the Habitats Directive include all cetaceans (whales and dolphins), the otter and some marine turtles.

2.2 Guidance

This report has been prepared in accordance with the following guidance:

- DAHG (2014) Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters
- MARA (2024) Applicant Technical Guidance (V7) for Maritime Area Consents and Licensing.
- EC (2021) Guidance document on the strict protection of animal species of Community interest under the Habitats Directive. Commission Notice (2021) and
- JNCC *et al.* (2010) The protection of marine European Protected Species from injury and disturbance: Guidance for the marine area in England and Wales and the UK offshore marine area' published by the Joint Nature Conservation Committee (JNCC), Natural England and Countryside Council for Wales (now Natural Resources Wales).

An overview of the previous literature regarding the Annex IV species baseline in Irish waters, included the following sources:

- Baseline desk studies and field surveys carried out for the proposed project area, including National Biodiversity Data Centre (NBDC) records for otter presence and cetacean sightings within Liscannor Bay. These are supported by national surveys such as Reid *et al*. (2013a) National Otter Survey of Ireland 2010/12, Berrow *et al*. (2010) Irish Cetacean Review, and Hammond *et al*. (2013) SCANS-II abundance estimates for the south and west coasts along with seal distribution data from Cronin *et al*. (2007) and Morris & Duck (2019).
- Site Synopsis, Conservation Objective Reports and Natura 2000 Forms available from NPWS,
- Published and unpublished NPWS reports on protected habitats and species including Irish Wildlife Manual reports such as Bailey & Rochford (2006) *Otter Survey of Ireland 2004/2005*, Reid *et al*. (2013a) *National Otter Survey of Ireland 2010/12*, and Morris & Duck (2019) *Aerial thermal-imaging survey of seals in Ireland*, Species Action Plans, and Conservation Management Plans and reviewed include NPWS Conservation Status Assessment Report for otter (*Lutra lutra*) [NPWS, 1355] and cetacean management plans such as Berrow *et al*. (2012) *Abundance estimate of bottlenose dolphins in the Lower River Shannon SAC*.

Existing relevant mapping and databases *e.g.* waterbody status, species and habitat distribution *etc*. (sourced from the Environmental Protection Agency - http://gis.epa.ie/, the National Biodiversity Data Centre - http://maps.biodiversityireland.ie and the NPWS - http://www.npws.ie/mapsanddata/.

3. Annex IV species in the Project area

Introduction

All cetacean species are listed under Annex IV of the Habitats Directive, which affords them strict protection within Irish waters. To date, 25 species of cetaceans have been recorded in Ireland, ranging from resident populations to wide-ranging migratory species. Within the Liscannor Bay project area, cetaceans are regularly recorded, with common dolphin and harbour porpoise occurring throughout the year (NBDC[2]). Minke whales are frequently observed during the summer and autumn months (typically May to September), while larger migratory species such as humpback and fin whales are occasionally recorded further offshore along the Clare and southwest coast.

The Eurasian otter (*Lutra lutra*), also an Annex IV species, is present in coastal habitats surrounding Liscannor Bay throughout the year, with evidence of foraging and commuting activity (NPWS[3], NBDC[4]). Grey seal and harbour seal are also recorded within the bay, generally in small numbers, typically feeding within inshore waters (NBDC[2], Morris & Duck, 2019). Given the relatively shallow nature of Liscannor Bay and its proximity to the coast, the presence of deep-diving cetaceans such as sperm whales is considered highly unlikely.

The project will therefore carefully assess potential risks of disturbance or displacement during survey and construction phases, and appropriate mitigation measures will be developed to ensure compliance with the Habitats Directive.

The Zone of Influence (ZoI) for the proposed survey works is defined as the maximum spatial extent over which the activities could plausibly give rise to effects on Annex IV species, taking account of the nature, scale and duration of the works, the relevant impact pathways, and the ecological characteristics of potential receptors. The ZoI has been established using a source–pathway–receptor approach, ensuring that all realistic mechanisms by which Annex IV species could be affected have been considered.

Given the temporary and small-scale nature of the proposed geotechnical and geophysical surveys, the direct ZoI is restricted to the immediate footprint of sampling and vessel activity. This includes highly localised seabed disturbance associated with boreholes, vibrocores, CPTs and grab sampling, as well as short-term physical disturbance arising from vessel presence and manoeuvring in the survey area. These effects are confined to very small spatial areas and are fully reversible.

The indirect ZoI relates primarily to underwater noise generated by survey vessels and acoustic equipment. The geophysical systems to be used (including side-scan sonar and sub-bottom profilers) operate at high

[2] https://maps.biodiversityireland.ie/Species (accessed 01/12/2025)

frequencies (typically in the range of approximately 100–600 kHz), which are known to attenuate rapidly in the marine environment. As a result, the acoustic ZoI is expected to be limited to a relatively small area surrounding the active vessel, extending no more than a few hundred metres from the noise source. Beyond this range, sound levels are not anticipated to be distinguishable from background conditions or capable of eliciting behavioural responses in Annex IV species. Species-specific ecology has also been considered in defining the ZoI. Annex IV cetaceans are highly mobile and wide-ranging, while otter activity is confined primarily to the shoreline and intertidal zone. No Annex IV resting, breeding or other fixed-location habitats occur within the survey footprint. Consequently, the ZoI does not extend to distant coastal or offshore areas where no plausible source–pathway–receptor linkage exists.

Overall, the ZoI for Annex IV species is spatially limited, localised around the survey activities, and constrained by the low intensity, short duration and rapidly attenuating nature of the identified impact pathways.While there are no SACs for Annex IV species in the area, NBDC records confirm their presence in the area.

Overview of the Annex IV species distribution and abundance estimations are summarised in **Section 3.1** to **Section 3.7**, while **Section 3.8** provides a brief summary of other (non-Annex IV) species.

3.1 Otter (*Lutra lutra*)

The Eurasian otter is a top predator in freshwater systems; thus, its presence has a significant role in the well-being of these ecosystems (Reid *et al*., 2013a). Aquatic prey and shelter availability are two basic requirements in the growth of otter populations. This species is strictly protected under Annex II and IV of the Habitats Directive, thus requires Member States to designate SACs for their protection. Otters have also been designated as species of conservation concern and high priority, due to major decline in numbers because of alterations in water quality chemistry (eutrophication) in river and estuaries habitats, habitat destruction, and introduction of alien invasive species (Reid *et al.,* 2013a; Gutleb & Kranz 1998; Leppakoski *et al*., 2002). Consequently, otters have been designated as 'sentinel species' for the dynamics and diversity of pesticides in aquatic food webs (Reid *et al*., 2013a; Lemarchand *et al*., 2011). The Eurasian otter is currently listed as Near Threatened on the IUCN Red List global assessment of the species (Loy *et al.*, 2022).

In Ireland, the species is widespread throughout the country and there are 44 SACs[3] with otter as a QI, with associated habitats ranging from estuaries, lakes, coastal lagoons, dunes and alluvial forests (Bailey and Rochford 2006). For the proposed Project area, the closest SACs which include the otter as a QI are the Lower River Shannon SAC (0002165), Galway Bay Complex SAC (000268) and Kilkieran Bay & Islands SAC (002111) All located over 50km hydrologically from the Project area. Within the vicinity of the proposed Project, the otter

[3] NPWS 1355 *Lutra lutra* Conservation Status Assessment Report.https://www.npws.ie/sites/default/files/general/otter-conservation-status-report.pdf (Accessed 21/10/2025)

has been recorded along the Inagh River, Lahinch Estuary, and the coastal margins of Liscannor Bay, where the proposed marine and intertidal surveys will take place. Records of European otters in the vicinity of the proposed surveys were obtained from the NBDC[4] online database. According to the NBDC database the most recent evidence of otter activity in the Liscannor Bay area dates back to 2010, documented in Atlas of Mammals in Ireland 2010 – 2015. Recent data from the NPWS National Otter Survey 2023–2024 (Reid *et al*., 2025) confirms that otters frequently utilise rocky shorelines and intertidal zones within Liscannor Bay, especially during dawn and dusk periods. The NBDC species profile further identifies their use of estuaries (MW4), sea inlets and bays (MW2), and saltmarshes, demonstrating their habitat flexibility across freshwater–marine interfaces. Supporting this, Lélias *et al*. (2021) documented feeding and commuting activity along wave-exposed marine coasts, a behaviour consistent with observations in west Ireland. No otter holts, couches or other resting or breeding sites occur within or adjacent to the survey footprints, and otter activity recorded in the wider Liscannor Bay area relates primarily to shoreline foraging rather than use of the offshore environment. Otters have shown breeding habitat selectivity, preferring well preserved areas with low human disturbance choosing areas with reduced human accessibility (Tolrà *et al*., 2024).

Given the very small footprint and short duration of intertidal works at Cregg Beach, no meaningful disturbance to otter foraging or commuting behaviour is expected, and no pathway exists for impacts on resting or breeding sites.

Ó Néill (2008) calculated estimates of otters in Ireland during 1981 to 1982 based on species incidence from Chapman & Chapman (1982). Reid *et al*. (2013a) compared these estimates with updated estimates for 2010–11. The most recent Otter Survey of Ireland 2023–24 (Reid *et al*. 2025) continues this trend analysis, providing comparable population estimates across the same seven River Basin Districts, which can be seen in the following table:

Table 3-1: Otter estimates for the coastline of Ireland, based on Appendix 9. of Reid *et al.* (2025).
***Population estimates (adult females) derived from CORRECTED species incidence (accounting for likely negative bias) in the 1980s, 2010s and 2020s (with a confidence interval of 95%) by which to evaluate percentage change within River Basin Districts.**

Country	River Basin District	Population estimates			Percentage change	
		1980s Estimate	2010s Estimate	2020s Estimate	1980s→2020s	2010s→2020s
Republic of Ireland	Eastern	605 [567-650]	711 [635-733]	590 [507-673]	-2%	-17%
	Neagh Bann	121 [104-138]	134 [115-138]	107 [83-132]	-12%	-20%
	North Western	927 [898-956]	907 [742-946]	859 [771-956]	-7%	-5%
	Shannon	1515 [1484-1531]	1468 [1265-1515]	1265 [1156-1359]	-17%	-14%
	South Eastern	932 [887-977]	1056 [954-1089]	999 [921-1078]	+7%	-5%
	South Western	1152 [1114-1190]	1203 [986-1241]	1267 [1191-1280]	+10%	+5%
	Western	1748 [1712-1784]	1693 [1330-1766]	1548 [1421-1693]	-11%	-9%

[4] National Biodiversity Data Centre, Ireland, Otter (*Lutra lutra*), https://maps.biodiversityireland.ie/Species/119290> (Accessed 22/10/2025)

3.2 Common bottlenose dolphin (*Tursiops truncatus*)

Common bottlenose dolphins are one of the most studied delphinid species and are widely distributed in both temperate and tropical marine waters worldwide with the species currently classified as Least Concern on the IUCN Red List (Wells and Scott, 2009; Wells *et al*., 2019). Bottlenose dolphins are among the most commonly recorded cetaceans in Irish waters (NPWS, 2019), where they are observed year-round. The species is strictly protected under Annex II and IV of the Habitats Directive and therefore require Member States to designate SACs for their protection, with twelve SACs designated for this QI in Ireland. At least three genetically distinct populations occur in the waters off the west coast of Ireland including the resident group from the Shannon Estuary of which a small group of individuals utilise outer Cork Harbour, a more mobile population moving along the west coast referred to as the Connemara-Mayo-Donegal population and a less defined more oceanic population primarily represented by stranded animals (Rogan *et al*., 2018).

The proposed surveys are located within Liscannor Bay, on the west coast of County Clare. While the area does not lie within any designated SAC for cetaceans, bottlenose dolphins are regularly recorded along the Clare coastline, including Liscannor Bay, Lahinch Bay, and adjacent waters extending north towards Lisdoonvarna and south towards Spanish Point (NBDC[2]). These individuals are considered to be part of the wider Irish coastal bottlenose dolphin population, which ranges along the Atlantic seaboard and is genetically and behaviourally distinct from the resident Shannon Estuary population (Rogan *et al*., 2018; Blázquez *et al*., 2020).

Bottlenose dolphins are known to occupy shallow coastal habitats such as bays, estuaries, and inlets, and they are frequently observed foraging close to shore, often in association with schools of fish or near areas of tidal mixing. Opportunistic and effort-based surveys conducted off the west Clare coast (Berrow *et al*., 2010; Rogan *et al*., 2018) have confirmed the regular presence of this species within nearshore waters, particularly during the summer and early autumn months when prey availability is highest. While sightings in Liscannor Bay are occasional compared to more intensively used areas such as the Shannon Estuary SAC, Galway Bay, or the Blasket Islands SAC, these coastal waters form part of the species' broader foraging and transit range.

The bottlenose dolphins using Liscannor Bay are therefore likely to be transient individuals, moving between foraging grounds along the Clare coastline rather than maintaining year-round residency within the bay. Given the short-term and temporary nature of the proposed marine surveys, the localised footprint of vessel operations, and the mobility of this species, any potential interactions would be brief and spatially limited. No alteration of key foraging areas or long-term displacement is anticipated as a result of the proposed activities.

The Lower River Shannon SAC which lists bottlenose dolphins as a QI due to the presence of the resident Shannon population, making the Shannon Estuary one of the most important habitats for cetaceans in Ireland and Europe (O' Brien *et al*., 2009; Rogan *et al*., 2018) is located approximately 55.4 Km from the project.

Standardised boat surveys combined with mark–recapture photo-identification in the Lower River Shannon SAC (June–October 2018) estimated a total population of 139 bottlenose dolphins (95% CI: 121–160; CV = 0.109), within the range of previous estimates since 1997 thus indicating a stable population size (Rogan *et al*., 2018). The population size estimated by Rogan et al., 2018 was similar to that estimated by Blázquez *et al*., 2020, based on surveys conducted in 2015 which provided an abundance of 145 extant individuals. Two critical areas of habitat within the SAC have been identified and have consistently shown to be important to dolphins in the estuary year-round, including a large area at the estuary mouth near Kilcredaun and a smaller area off Moneypoint (Rogan *et al*., 2018). Year-round surveys have shown a seasonal reduction in the number of bottlenose dolphins present within the estuary in winter which suggests the home range of this population extends beyond the extent of the Lower Shannon River SAC (Rogan et al., 2018).

The coastal and offshore waters of Ireland provide some of the most important habitats for cetaceans in Europe (O'Brien et al., 2009). In 2005, Small Cetaceans in the European Atlantic and North Sea project (SCANS-II) carried out shipboard and aerial surveys to estimate cetacean abundance in the continental shelf waters in the Northeast Atlantic. A total abundance of 313 individuals (CV = 0.81) was calculated around the coast of Ireland (Hammond *et al.,* 2013). The first attempt to assess the abundance estimates of bottlenose dolphins in the west coast of Ireland was by Ingram *et al.* (2009) which estimated a total of 171 ± 48 (CV = 0.28, 95% CI = 100 -294), however surveys were restricted to north of Slyne Head, Connemara. Ingram *et al.* (2009) also stated that animals recorded in this study were present beyond the survey area, with sightings around Youghal, Co. Cork and in Co. Donegal. Local abundance estimates were calculated for bottlenose dolphins in north-west Connemara by Nykänen *et al.* (2015), during the summer months of 2013 and 2014, and can be seen in the following table:

Table 3-2: Model averaged Bayesian multi-site estimates and maximum likelihood-based local M_{th} estimates of bottlenose dolphin abundance extracted from Table 6. in Nykänen *et al.* (2015).

(a) One encounter in Killala Bay has been included with the encounters in Donegal.

*Median given in the Bayesian multi-site estimates, local M_{th} estimates are averages.

Method	Area	Year	Total Abundance	(Confidence Intervals) CI 95%	CV (Coefficient Variation)	Θ
Multi-site	Connemara-Mullet Peninsula-Donegal	2013	145*	111-239	0.30	0.55
Multi-site	Connemara-Mullet Peninsula-Donegal(a)	2014	189*	162-232	0.11	0.57
Local (M_{th})	Connemara	2013	56	34-90	0.25	0.63
Local (M_{th})	Connemara	2014	83	49-140	0.27	0.56
Local (M_{th})	Donegal	2014	143	113-181	0.12	0.63

3.3 Minke whale (*Balaenoptera acutorostrata*)

Minke whales are the most frequently recorded baleen whale in Irish waters (Berrow *et al*., 2010, IWDG, 2015). They can be seen off most coasts of Ireland year-round, while most sightings of the species are recorded from the south and west coast between May and October when a seasonal inshore movement of the species occurs in summer and autumn (Wall *et al*., 2013; IWDG, 2015). While they are mostly observed in shallow waters of depths of 35-205 m (Wall *et al*., 2004), a lack of sightings of the species in coastal waters in winter suggests an inshore-offshore movement and they are more often observed in deeper offshore waters around continental shelf areas during winter (Rogan *et al*., 2018). There are recorded sightings of Minke whale in the Liscannor Bay area with the most recent being in 2020 and a recorded stranding in 2019. The minke whale is currently listed as a species of Least Concern on the IUCN Red List (Cooke *et al.*, 2018). Estimates of group abundance, mean group size, animal abundance and animal density (individuals km^{-2}) for minke whales calculated from SCANS-II for July 2005, around the south and west coast of Ireland (referred to as block R in Hammond *et al.,* 2013) can be seen in **Table 3-5**.

Table 3-3: Estimates of minke whale abundance, extracted from Table 5. in Hammond et al. (2013). Note: Aerial survey estimates are corrected for availability bias but not for perception bias.

Block	Group abundance		Mean group size		Animal abundance		Animal density	
	Estimate	CV	Estimate	CV	Estimate	CV	Estimate	CV
B	883	0.97	1.36	0.12	1199	0.98	0.010	0.98
J	614	1.03	1.36	0.12	833	1.04	0.022	1.04
O	789	0.91	1.36	0.12	1070	0.91	0.024	0.91
P	1531	0.43	1.14	0.18	1749	0.44	0.009	0.44
Q	1938	0.46	1.00	0.03	1938	0.46	0.013	0.46
R	1633	0.85	1.36	0.12	2216	0.86	0.057	0.86
T	1783	0.60	1.00	0.42	1783	0.60	0.013	0.60
U	3655	0.69	1.00	0.00	3655	0.69	0.023	0.69
V	4310	0.50	1.05	0.34	4515	0.51	0.028	0.51

3.4 Harbour Porpoise (*Phocoena phocoena*)

Harbour Porpoises are one of the most widely distributed and observed cetacean species in European waters (Hammond *et al.,* 2002), inhabiting shallow waters around the northern hemisphere (Todd *et al.,* 2020). This species is strictly protected under Annex II of the Habitats Directive, thus requires Member States to designate SACs for their protection (Berrow *et al.*,2014). There are sixteen SACs designated for harbour porpoises in Ireland. Inishmore Island SAC (000213) and Kilkieran Bay and Islands SAC (002111) are the closest SACs with harbour porpoise listed as a QI and are located approximately 26.4 km and 39.7 km respectively from the Proposed project. Additionally, Broadhaven Bay located in the northwest of Ireland, was also identified as a site of high diversity for cetacean species, including harbour porpoises, and has the longest marine mammal monitoring programme in Ireland (Anderwald *et al.*, 2012; Todd *et al.,* 2020).

Within the Liscannor Bay and Lahinch project area, harbour porpoises are regularly recorded, reflecting the species' preference for shallow, productive coastal waters with strong tidal currents and abundant prey (NBDC[2]). There are 3 recordings of strandings in the area on the NBDC database. Data from the ObSERVE Programme and records collated by the IWDG indicate that the species occurs frequently along the west Clare coastline, including Liscannor Bay, Spanish Point, and Loop Head, particularly during the summer and autumn months.

Previous studies have assessed the density and abundance of harbour porpoises in Irish waters. Berrow *et al.* (2014) surveyed eight sites around Ireland's east, south and west coast, and calculated density, abundance and group size for this species, which can be found in **Table 3-4**.

Table 3-4: Overall mean density and abundance estimates of harbour porpoises at the eight sites, extracted from Table 3. in Berrow *et al.* (2014).

N – Abundance; CI – Confidence Intervals; SE – Standard Error; CV – Coefficient Variation.

Site	N (95 % CI)	SE	CV	Density (km^{-2})	Mean group size (95 % CI)
North County Dublin	211 (137 - 327)	47.1	0.22	2.03	1.41 (1.26 - 1.56)
Dublin Bay	138 (86 - 221)	33.2	0.24	1.19	1.22 (1.11 - 1.34)
Carnsore Point	87 (39 - 196)	36.3	0.42	0.58	1.91 (1.25 - 2.92)
Cork Coast	173 (92 - 326)	56.6	0.33	0.53	2.67 (1.96 - 3.64)
Roaringwater Bay	159 (95 - 689)	42.4	0.27	1.24	2.21 (1.85 - 2.64)
Blasket Islands	372 (216 - 647)	105.3	0.28	1.65	1.76 (1.50 - 2.07)
Galway Bay	402 (267 - 605)	84.1	0.21	0.73	2.15 (1.84 - 2.51)
Donegal Bay	249 (106 - 586)	111.5	0.45	0.88	2.40 (1.63 - 3.53)

3.5 Short-beaked common dolphin (*Delphinus delphis*)

Short-beaked common dolphins (referred to as common dolphins) are one of the most abundant dolphin species around the Irish coast, inhabiting both continental shelf and offshore waters (Murphy *et al.,* 2013). Within the study area, NBDC records confirm occasional sightings of short-beaked common dolphins in Liscannor Bay and adjacent waters, particularly during summer months when prey availability is highest (NBDC[2]).This species is strictly protected under Annex II and IV of the Habitats Directive, thus requiring Member States to designate SACs for their protection. To this day, there are no SACs designated for common dolphins in Ireland, however previous literature has assessed that they are mostly sighted in water temperatures above 15°C at depths of 400-1000 meters (m) (Cañadas *et al.,* 2009). Cañadas *et al.,* (2009) also calculated an average group size of 15 ± 2.2 individuals (± standard error; range 1-239), which showed an increasing trend with depth from 8.0 ± 1.44 individuals in waters under 400 m of depth to 18.6 ± 2.76 individuals for water depths more than 2000 m. In the western European waters, Reid *et al.* (2003) reported high numbers of common dolphins in the Celtic Sea, St. George's Channel, west of the English Channel and off southern and western Ireland, during the summer months between 1978 and 1998. Estimates of group abundance, mean group size, animal abundance and animal density (individuals km^{-2}) for common dolphins calculated from SCANS-II for July 2005, around the south and west coast of Ireland (referred to as block R in Hammond *et al.,* 2013) can be seen in **Table 3-5.**

Table 3-5: Estimates of common dolphin abundance, extracted from Table 7. in Hammond *et al.* (2013). Note: Aerial survey estimates are corrected for availability bias but not for perception bias.

Block	Group abundance		Mean group size		Animal abundance		Animal density	
	Estimate	CV	Estimate	CV	Estimate	CV	Estimate	CV
B	378	0.73	13.00	0.36	4919	0.82	0.040	0.82
N	1256	0.58	1.75	0.14	2199	0.60	0.072	0.60
O	375	0.69	2.20	0.36	826	0.78	0.018	0.78
P	1058	0.33	11.60	0.30	15957	0.31	0.081	0.31
Q	558	0.98	3.08	0.32	2230	0.87	0.015	0.87
R	1266	0.70	9.21	0.19	11661	0.73	0.302	0.73
W	1470	0.29	12.30	0.27	18039	0.23	0.130	0.23
Z	314	0.84	1.25	0.20	392	0.86	0.012	0.86

3.6 Leatherback turtle (*Dermochelys coriacea*) and Loggerhead turtle (*Caretta caretta*)

Leatherback turtle is the most frequently sighted marine turtle species in Irish waters (King & Berrow, 2009), with a wide distribution throughout temperate waters during summer and autumn months (Houghton *et al.*, 2006). This species is strictly protected under Annex II and IV of the Habitats Directive, thus requires Member States to designate SACs for their protection, however there are no SACs designated for leatherback turtles in Ireland. The most recent NBDC records indicate that while leatherback turtles are primarily concentrated along the south and southwest coasts, occasional sightings and strandings have been reported off County Clare, including waters near Liscannor Bay (NBDC[2]), with the most recent sighting occurring in 2022. King & Berrow (2009) have collected a total of 1069 records of marine turtles in Irish waters, which calculated a total of 863 records for this species. Leatherback turtles were found to mostly occur in summer months between June and September representing 90.8% of all recorded sightings.

Loggerhead turtle is the second most frequently recorded marine turtle species around the coast of Ireland (King & Berrow, 2009), occurring throughout the temperate and tropical regions of the Atlantic, Pacific and Indian oceans. This species is strictly protected under Annex II and IV of the Habitats Directive, thus requires Member States to designate SACs for their protection, however there are no SACs designated for loggerhead turtles in Ireland. Loggerhead turtles are far less frequent, but the NBDC database includes sporadic records along the Clare coastline, with the closest validated occurrence offshore near Loop Head, southwest of Liscannor Bay (NBDC[2]). King & Berrow (2009) have collected a total of 1069 records of marine turtles in Irish waters, which calculated a total of 56 records for Loggerhead turtles. This species has recorded in every month, showing a peak in March representing 23.6% of all records and, 60% occurring between January to April.

Marine turtles were found to occur more frequently along the south coast and off the headlands in west Cork representing 41.5% of all records, north Dingle Peninsula in Co. Kerry (13.2%), Killala Bay in north Co. Mayo, and off Arranmore and Malin Head in the northwest off Donegal (11.9%) (King & Berrow, 2009). Distribution of these marine turtle species by county in Ireland can be seen in **Table 3-6**.

Table 3-6: Distribution of turtle species logged around Ireland, adapted from Table-2 King & Berrow (2009).

County/Sea	Turtle species				
	Leatherback	Loggerhead	Kemp's Ridley	Hawksbill	Green
Derry	4	1	0	0	0
Antrim	10	0	0	0	0
Down	12	0	0	0	0
Louth	3	0	0	0	0
Dublin	10	1	1	0	0
Wicklow	4	0	0	0	0
Wexford	25	1	0	0	0
Waterford	63	3	0	0	0
Cork	378	12	1	1	1
Kerry	113	15	2	0	0
Clare	18	3	1	0	0
Galway	21	11	2	0	0
Mayo	49	5	1	0	0
Sligo	14	2	0	0	0
Leitrim	1	0	0	0	0
Donegal	109	2	2	0	0
Celtic Sea	9	0	0	0	0
Irish Sea	4	0	0	0	0
Offshore	16	0	0	0	0
Total	**863**	**56**	**10**	**1**	**1**

The most up-to-date information on marine turtle distribution in Ireland is available from the National Biodiversity Data Centre (NBDC)[5], specifically through the *Irish Marine Turtle Records* dataset (last updated 8 May 2025). This dataset contains validated sightings, strandings, and captures from 1884 to 2023, contributed by researchers, citizen scientists, and verified expert observations. Records are dominated by the Leatherback Turtle. The Loggerhead Turtle (*Caretta caretta*) is also recorded, albeit far less frequently, with the most recent validated occurrence in November 2023. Occasional records also exist for other species such as the Green Turtle (*Chelonia mydas*), Hawksbill Turtle (*Eretmochelys imbricata*), and Kemp's Ridley (*Lepidochelys kempii*), though these are considered exceptional vagrants. The NBDC dataset integrates historic literature records (King and Berrow, 2009) with modern verified submissions, ensuring a comprehensive record of turtle presence in Irish waters.

Table 3-7: NBDC Marine turtle records.

Species	Total Records	Most Recent Record	Approx. Location
Leatherback Turtle	974	28 Nov 2021	Coastal waters – Irish Exclusive Economic Zone
Loggerhead Turtle	19	23 Nov 2023	Coastal and inshore waters
Other Marine Turtle Species	Cumulative (all species) 1,180 records across 421 sites (1884–2023)		

[5] National Biodiversity Data Centre, Irish Marine Turtle Records, https://newmaps.biodiversityireland.ie/Dataset/114 (Accessed 21/08/2025)

3.7 Bats

There are nine species of bats established in Ireland (Roche *et al.,* 2014; Aughney, 2022). All nine bat species resident in Ireland are protected under Annex IV of the Habitats Directive. While no bat species are Qualifying Interests for SACs in the immediate vicinity of Liscannor Bay, records from the National Biodiversity Data Centre (NBDC) confirm the presence of multiple species within the wider Clare region, including Common pipistrelle (*Pipistrellus pipistrellus*), Soprano pipistrelle (Pipistrellus pygmaeus), Leisler's bat (*Nyctalus leisleri*), and Brown long-eared bat (*Plecotus auritus*). Occasional records of Lesser horseshoe bat (*Rhinolophus hipposideros*) also occur in west Clare, though this species is primarily associated with traditional stone buildings and caves inland[6]. The bat landscape suitability modelling[7] for the Liscannor Bay area falls within the medium suitability band (≈21–36) for most species, reflecting the presence of linear features inland and proximity to freshwater (Inagh River) combined with open coastal exposure. Species-specific scores are expected to be highest for Leisler's bat (adapted to open landscapes) and pipistrelles, which exploit edge habitats and artificial lighting for foraging. Brown long-eared bats and Natterer's bats may occur at low densities in wooded areas inland but are unlikely to use the immediate outfall corridor extensively (**Table 3-8).** No structures within the proposed activities footprint offer high roost potential (*e.g.*, old buildings, bridges, caves).

Table 3-8 Bat habitat suitability indices for Liscannor Bay, overall "All bats" index = 24.44, with most surrounding land in the medium–high suitability band (≈21.33–36.44).

Common name	Scientific name	NBDC records	Suitability index
Common pipistrelle	*Pipistrellus pipistrellus*	Present	30
Soprano pipistrelle	*Pipistrellus pygmaeus*	Present	28
Leisler's bat	*Nyctalus leisleri*	Present	36
Brown long-eared bat	*Plecotus auritus*	Present	22
Natterer's bat	*Myotis nattereri*	Possible	21
Whiskered bat	*Myotis mystacinus*	Possible	21
Daubenton's bat	*Myotis daubentonii*	Present	24
Lesser horseshoe bat	*Rhinolophus hipposideros*	Occasional	18
Brandt's bat	*Myotis brandtii*	Rare	20

[6]NBDC, National Bat Database of Ireland, https://newmaps.biodiversityireland.ie/Dataset/128 (Accessed 10/11/2025)

[7] The bat landscape suitability index is a scoring system (Lundy, M.G., et al, 2011) and was assessed through on-line mapping on the NBDC webpage (https://maps.biodiversityireland.ie/). The degree of favourability ranges from 0 – 100, with 0 being least favourable and 100 most favourable for bats. The values of the grid squares represent the range of habitat suitability values the bat species can tolerate within each individual square.

3.8 Other (Non-Annex IV) Species

The species included in this section are:

- Harbour seal (*Phoca vitulina*) [1365]
- Grey seal (*Halichoerus grypus*) [1364]
- Basking shark (*Cetorhinus maximus*)

Although these species are not listed in Annex IV of the Habitats Directive, they are known for their foraging range which makes them a potential species to occur in the Project area. An overview of the distribution abundance of these species is summarised in **Section 3.8.1** through **Section 3.8.3**.

3.8.1 Harbour seal (*Phoca vitulina*)

Common seals (also referred to as Harbour seals) are semi-aquatic marine mammal from the Pinnipeds group with a wide distribution in the northern hemisphere (Cronin *et al.,* 2007). Harbour seals are one of two seal species that inhabit Irish waters, predominantly on the west coast of Ireland. This species is included under Annex II of the Habitats Directive, thus requires Member States to designate SACs for their protection. There are 13 SACs designated for this species in Ireland, with the closest ones Kilkieran Bay and Islands SAC and Galway Bay Complex SAC located 39.7 Km and 45.5 Km respectively from the Project area. There are no known harbour seal haul-out or breeding sites within Liscannor Bay; the nearest significant haul-outs occur further west along the Clare coast, such as at the Shannon Estuary and Loop Head (Morris & Duck, 2019; Cronin *et al.*, 2007).

Cronin *et al.,* (2007) performed a combination of aerial and ground surveys, aiming to gather information on the abundance and distribution of harbour seals along the Irish coast, during February – July 2003. While the ground-truthing sites listed did not list any near the project site, their results indicated a total of 142 individuals recorded in County Clare during that survey. Morris and Duck (2019) carried out thermal-imaging surveys along the coastline of Ireland in August 2017 and August 2018, which also compiled the counts of harbour seals from surveys in 2003, in 2011/2012 and in 2017/2018. The counts of harbour seals in the western coast of Ireland are provided in **Table 3-9** where area 1 includes the Project area.

Table 3-9: Count of harbour in the west region of Ireland, from surveys in 2003, 2011/2012 and 2017/2018, extracted from Table 1. in Morris and Duck (2019).

Region	Area	Harbour seals		
		2003	2011/2012	2017/2018
West	1	17	27	48
	2	39	53	41
	3	396	501	570
	4	152	358	349
	5	36	106	134
	6	124	282	311
	7	144	134	90*
	8	0	0	0
	9	47	34	87

3.8.2 Grey seal (*Halichoerus grypus*)

Grey seals are the other seal species to inhabit the coast of Ireland, with greatest numbers around the western coast. This species is included under Annex II of the Habitats Directive, thus requires Member States to designate SACs for their protection. There are 10 SACs designated for this species in Ireland; however, there are no SACs designated for this species within or in close proximity to the Liscannor project area. The closest significant SAC supporting grey seals is Slyne Head Islands SAC [000328], located over 78.6 Km away from the Project.

In combination with the harbour seal, Cronin *et al.,* (2007) performed a combination of aerial and ground surveys, aiming to gather information on the abundance and distribution of grey seals along the Irish coast, during February – July 2003. However, there were no haul-outs or significant numbers of grey seals within Liscannor Bay. Subsequent thermal-imaging aerial surveys carried out by Duck and Morris (2012) in 2011 and by Morris and Duck (2019) in 2017–2018 confirmed this pattern, showing that while grey seals are regularly recorded along the broader Clare coastline, including the Shannon Estuary and Loop Head, Liscannor Bay does not support any major haul-out or breeding sites.

Grey seals are therefore likely to occur within the project area only on a transient basis, moving through the bay while foraging along the west Clare coast. These counts of grey seals in the Irish western region are provided in **Table 3-10** where Area 1 includes the Project area.

Table 3-10: Count of grey seals in the west region of Ireland, from surveys in 2003, 2011/2012 and 2017/2018, extracted from Table 1. in Morris and Duck (2019).

Region	Area	Grey seals		
		2003	2011/2012	2017/2018
West	1	11	64	55
	2	11	73	53
	3	7	11	32
	4	58	238	192
	5	61	100	107
	6	4	17	21
	7	21	49	38
	8	176	304	531
	9	22	343	154

3.8.3 Basking shark (*Cetorhinus maximus*)

Basking sharks are the second-largest fish species, most frequently sighted between April and September in shallow coastal areas in the northern Atlantic (Doherty *et al.,* 2017). Basking sharks are protected under Section 23(2)(a) of the Irish Wildlife Act 1976, entitled the "Wildlife Act 1976 (Protection of Wild Animals) Regulations 2022", making it an offense to hunt, injure, or disrupt their breeding and resting sites. They are listed under international legislation, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the United Nations Convention on the Law of the Sea (UNCLOS) and they are also listed in the International Union for Conservation of Nature (IUCN) Red List, classified as endangered in 2019.

Distribution patterns of basking sharks show inter-annual site-fidelity in areas around the Isle of Man (Dolton *et al.,* 2019), with the Irish Sea being identified as a migratory corridor for this species (Lieber *et al.,* 2020). Basking sharks sampled off West Kerry during early spring were found to be genetically distinct from other Northeast Atlantic populations, suggesting overwintering and seasonal migration connectivity that have important conservation implications Due to their primary prey (zooplankton), basking shark abundance peaks have been shown to be positively correlated with peaks in plankton density, which can explain this species abundance during summer months (Sims and Quayle, 1998). Previous literature suggests that basking sharks go through extensive migrations from September to May (Doherty *et al.,* 2017), as an alternative to hibernation periods (Parker and Boseman, 1954).

Although their distribution patterns have been widely studied around Ireland and UK waters, their abundance and density estimations have not yet been assessed (Sims, 2008).

The number of sightings and average group sizes have dramatically increased. In 2024, the Irish Whale and Dolphin Group recorded 262 sighting events, with a total of 1,972 sharks observed, an average of about 7.5 sharks per sighting. That's nearly three times the average of around 2.6 sharks per sighting in 2009[8].

[8] https://iwdg.ie/whale-and-basking-shark-watch-ireland-2024-sat-18th-may-1700/

4. Potential Environmental Impacts

A detailed description of the proposed survey activities is provided in **Section 1.2** above. Given the nature of the proposed survey activities, the potential impact mechanisms identified to potentially have an impact on Annex IV species in the Project area are:

4.1 Potential Impact Mechanism 1: Pollution of marine environment from spills/leakages

The proposed survey works will involve the operation of a small number of vessels and jack-up barges undertaking geophysical and geotechnical investigations. As with any marine activity, there is a theoretical risk of minor accidental pollution events such as small fuel spills or hydraulic fluid leaks. However, the project does not require the storage or use of bulk hazardous materials, drilling muds or chemicals, and any credible spill scenario would involve very small volumes confined to the immediate water surface. The hydrodynamic conditions in Liscannor Bay would rapidly disperse minor sheens, and Annex IV cetaceans (harbour porpoise, bottlenose dolphin, common dolphin and minke whale) are highly mobile, enabling ready avoidance of any localised contamination. Otters using the shoreline are similarly unlikely to encounter or be exposed to spills due to the limited scale of intertidal activities and routine control of fuels and lubricants.

Standard best-practice pollution prevention measures including spill kits, drip trays, secure fuel storage, routine equipment inspection and an emergency response plan, will be implemented as part of normal operational management. These measures reduce the already low likelihood of accidental release and ensure rapid response if required. Given the limited scale, brief duration and highly localised nature of any plausible pollution event, coupled with the avoidance capacity of Annex IV species, there is no realistic pathway for pollution associated with the proposed survey works to result in injury, significant disturbance or deterioration of habitat conditions for these species. Accordingly, pollution is not considered a material impact pathway for Annex IV species and no specific mitigation beyond standard best practice is required.

4.2 Potential Impact Mechanism 2: Noise and vibration

The proposed survey activities will generate low-intensity underwater noise primarily associated with vessel movements, positioning of jack-up barges, and the operation of geotechnical equipment such as rotary drilling, vibrocorers and CPTs. These sources produce sound levels that fall well below thresholds associated with injury or permanent hearing damage in cetaceans and are comparable to, or lower than, noise emitted by routine commercial and fishing vessel traffic already present in the wider coastal environment. Noise emissions will be intermittent, of short duration at each sampling location, and limited to a small area surrounding the active vessel.

Annex IV cetaceans present in the region, principally harbour porpoise, bottlenose dolphin, and occasionally common dolphin or minke whale, may exhibit temporary behavioural responses when in close proximity to such activities. These may include brief avoidance or minor changes in dive patterns. Such reactions are expected to be short-lived and non-injurious, reflecting normal behavioural plasticity rather than significant ecological disturbance. Otter is not expected to be affected by underwater noise generated during offshore survey operations, as the species forages predominantly in very shallow coastal and intertidal areas and would not be exposed to noise sources of a magnitude or proximity capable of causing disturbance. There is no realistic mechanism by which the limited, reversible responses of cetaceans could translate into reduced foraging success, displacement from important habitats, or population-level impacts, particularly given the transient nature of survey operations and the absence of any sensitive life-history functions (*e.g.*, calving, breeding) within Liscannor Bay.

Although potential behavioural responses cannot be entirely excluded, underwater noise from the survey is not predicted to occur at intensities or spatial scales capable of constituting significant disturbance under Article 12 of the Habitats Directive. Standard and proportionate MMO monitoring, a 500 m pre-start visual check and a soft-start procedure will be implemented for drilling and vibrocore operations. These measures ensure that any cetaceans entering the immediate survey area are detected and that noise-generating activities commence only when no animals are observed within the monitoring zone. With these measures in place, underwater noise from the project will not result in injury or significant disturbance to Annex IV cetaceans and therefore will not infringe the strict protection requirements of the Directive.

4.3 Potential Impact Mechanism 3: Physical Disturbance

Physical disturbance associated with the proposed survey activities will arise from vessel movements, the positioning of jack-up barges, and the point-source seabed contact of boreholes, CPTs, vibrocores and sediment grabs. Each intrusive sampling event affects only a very small footprint on the seabed, typically limited to the diameter of the tool being deployed. Disturbance is localised, short-term and rapidly reversible, with no mechanism for effects to extend beyond the immediate sampling point. No Annex I habitats occur within or adjacent to the offshore survey area, and therefore there is no pathway for physical disturbance to affect qualifying habitat features.

For Annex IV species, particularly harbour porpoise and bottlenose dolphin, physical disturbance may involve temporary, low-level behavioural responses to the presence or movement of vessels. Any such responses are expected to be brief, non-injurious and similar to those elicited by routine vessel traffic within Liscannor Bay. There is no plausible mechanism by which short-duration avoidance behaviour at individual sampling points could reduce foraging efficiency, alter movement patterns or result in significant disturbance as defined under Article 12 of the Habitats Directive. Otter may occasionally use the intertidal areas near the landfall, but the

small scale and short duration of trial pits and probing works, together with the absence of any resting or breeding sites in the footprint, mean that no disturbance of ecological function or protected features will occur.

Physical disturbance associated with the surveys will be controlled through standard best-practice operational procedures, including careful vessel manoeuvring, minimisation of unnecessary seabed contact and adherence to normal marine environmental protection measures. These practices further reduce the already low magnitude of disturbance but are not required to avoid significant effects. Based on the temporary, localised and fully reversible nature of all potential interactions, the survey works will not cause injury, significant disturbance or deterioration of resting/breeding sites for any Annex IV species.

5. Risk Assessment

A number of Annex IV species and other protected marine fauna may occur in or near the Project site, either on a resident, transient, or occasional basis. These include the species listed in **Section 3**.

The potential for significant effects on these species from the proposed marine and intertidal survey works has been considered in relation to three primary impact mechanisms: pollution from accidental spills or leakages of hydrocarbons or other hazardous substances associated with survey vessels and drilling equipment; underwater noise and vibration arising from geophysical survey equipment (e.g. side-scan sonar, sub-bottom profiler) and vessel operations; and physical disturbance and habitat alteration from boreholes, CPTs, vibrocores, grab sampling, trial pits, and increased vessel traffic in and around the bay.

Given the short-term and temporary nature of the works, the localised survey footprint, and the small scale of activities relative to the available habitat in Liscannor Bay, any effects are expected to be temporary, highly localised, and reversible. Mobile species such as cetaceans and seals are capable of avoiding the survey area and are unlikely to experience sustained displacement or population-level effects. More site-associated species, such as otter using the intertidal zone, may experience short-term disturbance or foraging disruption if works overlap with feeding or commuting areas. However, otters in the area are generally tolerant of localised human and vessel activity, and impacts are expected to be of low magnitude.

While there is potential for localised disturbance and short-term prey reduction, the overall risk to Annex IV species from the proposed survey works is considered to be low. No significant adverse effects on the conservation status of these species are anticipated. A summary risk assessment of the potential impacts for Annex IV species is provided in **Table 5-1**.

Table 5-1: Annex IV Risk Assessment.

Species/Group	Pollution (Spills/Leakages)	Noise & Vibration	Physical Disturbance	Impact Assessment
Common dolphin	Neg	Low	Low	Wide-ranging, highly mobile species. May exhibit brief, localised avoidance of vessels or active equipment but will readily return once activity ceases. Any spill would be extremely small and dissipate rapidly, with no significant exposure risk.
Harbour porpoise	Neg	Low - Moderate	Low	Most sensitive to high-frequency sonar (100–300 kHz overlap). Temporary behavioural responses may occur close to operating vessels; effects are fully reversible and not significant. No meaningful pollution or habitat-related pathway.
Bottlenose dolphin	Neg	Low	Low	Not resident in Liscannor Bay but may occur occasionally. Any disturbance is expected to be minor, localised, and reversible. May exhibit brief, localised avoidance of vessels or active equipment but will readily return once activity ceases. Any spill would be extremely small and dissipate rapidly, with no significant exposure risk
Grey & harbour seals	Neg-Low	Low	Neg-Low	No haul-outs or breeding sites within the survey area. Transient individuals may briefly avoid vessels or sampling points, but no population-level effects anticipated.
Larger whales (e.g. minke, fin, humpback)	Neg–Low	Low	Neg–Low	Occasionally recorded further offshore; unlikely to overlap closely with survey area. No risk of sustained displacement or disturbance.
Basking shark	Neg	Low	Low	Seasonal visitor. May temporarily avoid areas of vessel activity, but effects are very localised and not significant. No significant interaction pathway.
Marine turtles	Neg	Neg	Neg	Very rare inshore occurrence. No realistic pathway for exposure to survey impacts.
Otter	Low	Low	Low	May use intertidal areas at Cregg Beach for foraging. Works have a very small, short-term footprint; no holts or resting areas occur near the access point. Any disturbance would be minimal and would not affect commuting or breeding behaviour.

6. Mitigation

To minimise potential impacts on Annex IV species and other protected marine fauna, the following measures will be implemented as part of the survey activities:

Noise and Vibration Control

- A suitably qualified Marine Mammal Observer (MMO) will be appointed for the duration of works. The MMO will conduct a 30-minute pre-start watch within 500 m of survey vessel or jack-up barge. If dolphins are observed within this zone, start-up will be delayed until animals have left, or a 30-minute clearance period has elapsed.
- A “ramp-up” or “soft start” procedure will be used to gradually introduce sound to the environment.
- If drilling is paused for more than 30 minutes, pre-start monitoring will be repeated before recommencement.
- Clear communication protocols will be established between the MMO and site management to control commencement and resumption of works.
- Vessel speeds will be limited to reduce the risk of collision with marine mammals.

Once intrusive survey works have commenced, operations may continue at night or during poor visibility, as continuous activity is considered less disruptive than repeated start-ups.

Implementation of these measures will ensure that the risk of significant adverse effects on Annex IV species and other protected marine fauna is reduced to negligible levels, consistent with the requirements of the Habitats Directive.

7. Conclusion

This Annex IV Risk Assessment has considered the potential for pollution, underwater noise and physical disturbance arising from the proposed marine and intertidal survey works associated with the WWTP outfall investigations at Liscannor Bay. The assessment has been undertaken with reference to the sensitivities and ecological requirements of Annex IV species known or likely to use the area, namely harbour porpoise, bottlenose dolphin, common dolphin, minke whale and otter.

The survey activities are temporary, small in spatial extent and predominantly confined to offshore areas that do not contain resting or breeding sites for any Annex IV species. Intertidal works at Cregg Beach occupy a very limited footprint and do not overlap with suitable otter holt or couch habitat. Underwater noise emissions from borehole drilling, geophysical equipment and vessel operations are of low intensity, short duration and rapidly attenuate. Behavioural responses by cetaceans, if they occur, would be brief, localised and fully reversible. There is no mechanism for sustained displacement, reduced foraging success or any population-relevant effect.

Physical disturbance from sampling equipment and vessel activity is similarly confined to very small point-source footprints. These effects will not result in habitat loss, deterioration of ecological functionality or disruption of otter movement along the shoreline. Pollution pathways are limited to accidental events and are controlled through standard best-practice environmental protection measures.

With the implementation of proportionate controls, including MMO monitoring and soft-start procedures for relevant acoustic activities, the project will avoid injury or significant disturbance to Annex IV cetaceans. No works will affect otter resting or breeding sites and no significant disturbance is anticipated for otter foraging or commuting behaviour.

Based on the nature and scale of the proposed survey works, the mobility of the species concerned, and the limited spatial and temporal extent of potential disturbances, **no deliberate capture, killing, significant disturbance or deterioration of breeding/resting sites of Annex IV species is predicted**. The project therefore complies with the strict protection requirements of Article 12 of the Habitats Directive, and **a derogation licence under Regulation 54 is not required**.

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