

Limerick City & County Council

# Risk Assessment for Annex IV Species

Limerick Flood Relief Scheme

**MCW1078-RPS-05-ZZ-RP-Z-0102**

**A1 C01**

**05 May 2026**

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Prepared by	Prepared for
Tetra Tech	Limerick City & County Council

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# 1 Introduction

## 1.1 Overview

The Scheme area for the Limerick FRS is located within the Shannon Upper and Lower River Basin and is subject to both coastal and fluvial flooding. The Office of Public Works (OPW) working in partnership with LCCC and Clare County Council, completed the Shannon Catchment Flood Risk Assessment and Management (CFRAM) Study in 2018. The Shannon CFRAM Study identified Limerick City as an Area of Further Assessment and concluded that a flood relief scheme is to be undertaken.

Tetra Tech RPS have been commissioned by LCCC as Engineering and Environmental Consultants to design and progress the delivery of a Limerick FRS. The objective of the overall project is the identification, design and submission (for planning consent) of a flood scheme, that is technically, socially, environmentally and economically acceptable, to alleviate the risk of flooding to the community of Limerick to a determined standard of protection, and to procure, manage and oversee the construction of that scheme.

This Maritime Usage Licence Application (MULA) is required to undertake site investigations (hereafter referred to as the SI works), within the upper Shannon Estuary. These SI works, which are discussed in more detail in **Section 2** below, are required to inform detailed construction and engineering design of the Limerick FRS and to provide baseline data for any subsequent environmental assessments. Information collected by the SI works will support the overall Limerick FRS project in its aim to alleviate coastal and fluvial flooding in Limerick City and surrounding areas. Therefore, this MUL represents a critical step towards supporting future climate resilience within the community of Limerick.

For the avoidance of doubt, no construction works associated with the flood relief scheme are included under this MUL application.

Limerick Flood Relief Scheme - MUL

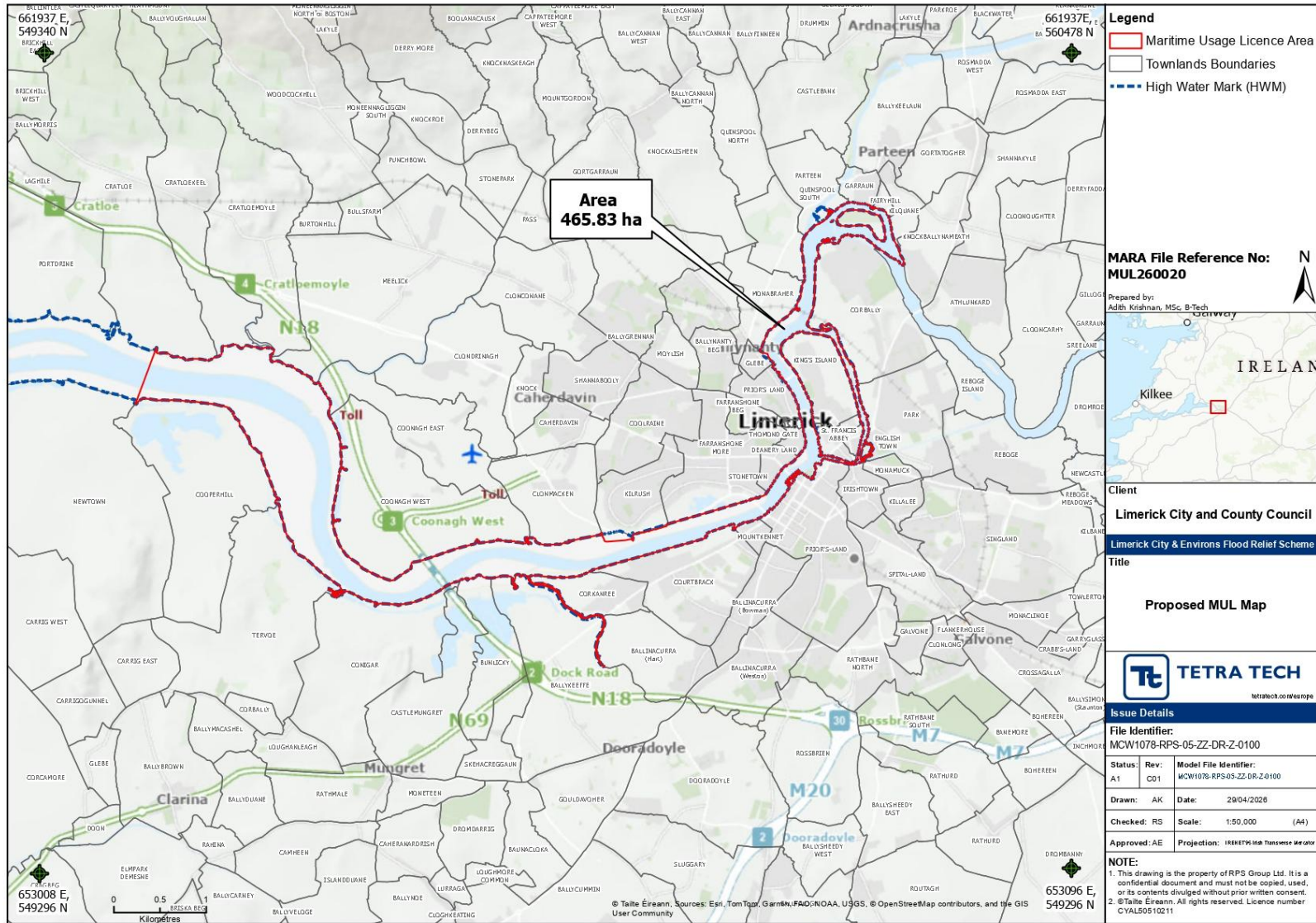


Figure 1-1 MUL Area for proposed SI works

## 1.2 Accompanying Report

The MULA consists of the following documents and reports:

- Maritime Usage Licence Application Form and relevant attachments;
- Project Description;
- Supporting Information for Screening for Appropriate Assessment (SISAA) report;
- Risk Assessment for Annex IV Species;
- Subsea Noise Technical Report; and
- Natura Impact Statement (NIS).

## 1.3 Purpose of this Report

This report has been prepared by Tetra Tech, on behalf of LCCC, to provide information on the SI Works proposed to be undertaken for the Limerick FRS project in support of the MULA to MARA. This Risk Assessment for Annex IV Species report provides the required level of detail to MARA for them to understand the risks to Annex IV species from the SI works.

This report provides a brief description of the SI works, consisting of land-based (below the high-water mark) and marine geophysical, geotechnical and environmental surveys and investigations that are proposed to be undertaken. A more detailed description is provided in the separate 'Project Description' document (Report ref: MCW1078-RPS-05-ZZ-RP-Z-0105). The Project Description includes details of the methods, equipment and quantities for proposed activities. The results of the SI works will be used to inform the construction and engineering design of the Limerick FRS and to provide baseline data for any subsequent environmental assessments.

## 1.4 Statement of Authority

The technical competence of the authors is outlined below.

**Aoife Edgeley** is an Associate Marine Scientist in the Environmental Services Business Unit at Tetra Tech. She has over 13 years' experience in the marine science field and is a Chartered Environmentalist and a Full Member of the Institute of Environmental Sciences. Aoife holds an honours degree in Environmental Science from Trinity College Dublin and a Master's in Marine Environmental Protection from Bangor University, Wales. She has delivered the environmental assessments for a wide range of marine and coastal projects, including environmental impact assessment, appropriate assessment and Annex IV species reports.

**Rachael Shaw** is a Project Scientist in the Environmental Services Business Unit at Tetra Tech. She holds a Bachelor's Degree in Marine Science from the University of Galway and Master's Degree in Climate Change and Managing the Marine Environment from Heriot-Watt University Edinburgh. She has four years' experience working in consultancy,

assisting on a wide range of projects from offshore renewable energy projects to flood relief schemes, including marine and terrestrial surveys. She is a full member with Institute of Environmental Sciences (IES).

**Róisín Murphy** is a Scientist in the Environmental Services Business Unit at Tetra Tech. She holds an honours degree in Zoology (B.Sc.) and Master's degree in Marine Biology, both from University College Cork. She has a years' experience as a Project Manager at Cork Nature Network, responsible for marine and river surveys, and is currently involved in marine licensing and flood relief projects. She is a qualifying IES member.

## 2 Project Description

A detailed Project Description report (Report ref: MCW1078-RPS-05-ZZ-RO-Z-1015), including drawings, has been included as a separate report to limit repetition and reduce the length of reports. Please refer to the Project Description for the detailed information on each of the SI activities summarised in the text below.

The MUL Area covers the geographical area where SI works are required below the HWM within and immediately downstream of Limerick City in the upper Shannon Estuary. The MUL Area encompasses an area of 466 ha and is illustrated in **Figure 1-1**.

The SI works will comprise geophysical, geotechnical and environmental surveys. It should be noted that all locations shown are provisional only and subject to change due to evolving project options or on-site due to the presence of obstructions/refusals at individual locations.

For the avoidance of doubt, no construction works associated with the flood relief scheme are included under this MUL application.

The activities proposed to be carried out within the MUL Area are summarised in **Table 2-1** below.

**Table 2-1: Proposed SI works Activities**

Survey Type	Survey Elements (indicative equipment)	Indicative Equipment (where applicable)	Maximum Quantity (where relevant)
Land-based Topographical Surveys (below HWM, on intertidal zone)	Survey station (e.g., tripod and total station) and mobile surveying equipment.	Hand-held pole mounted Global Navigation Satellite Systems (GNSS) devices.	N/A
Marine Geophysical Surveys (undertaken from survey vessel)	Multi Beam Echosounder (MBES)	Kongsberg EM series, Kongsberg Geoswath series, R2 Sonic series & Reson Teledyne Seabat series	N/A
	Side Scan Sonar (SSS)	Edgetech FS-4200 series, C-Max CM2 series and Klein System 3900-5000 or similar.	
	Sub-bottom profiler (SBP-C)	GeoAcoustics Geopulse series	

Survey Type	Survey Elements (indicative equipment)	Indicative Equipment (where applicable)	Maximum Quantity (where relevant)
	Sub-bottom profiler (SBP-P)	Innomar smart, quattro (QBM) sixpack (HBM), Innomar SES 2000 compact light, Innomar standard quattro (DBM) sixpack (DBM), Innomar medium 100	
Marine Geomagnetic Surveys (undertaken from survey vessel, no acoustic signal)	Magnetometer	Geometrics G-882, Marine Magnetics SeaSPY, G-Tec Magwing System or similar.	N/A
Marine Geotechnical Surveys (undertaken from survey vessel(s)/ jack-up barge; JUB/spud barge)	Rotary and cable percussive boreholes	Drill rig and JUB / drilling vessel	51
	Standard Penetration Tests (SPTs)	Split spoon sampler/JUB	
Marine Environmental Surveys (undertaken from survey vessel)	Drop-down video (DDV) and/or Remotely Operated Vehicles (ROV) survey.	Camera system	N/A
	Grab sampling (incl. contaminant sediment samples)	Hamon / Day / Van Veen Grab (0.1m <sup>2</sup> )	63
	Water quality samples, including conductivity, temperature and depth (CTD) Measurements.	CTD profiler and Niskin bottler sampler	20
Archaeological Surveys	Intertidal walkover surveys	See Section 2.7.1 of the Project Description Report	N/A
	Marine geophysical survey (this is the same campaign as the Marine	Same equipment as marine geophysical equipment listed	

Survey Type	Survey Elements (indicative equipment)	Indicative Equipment (where applicable)	Maximum Quantity (where relevant)
	Geophysical Surveys described above).		
	Sampling	See Section 2.7.3 of the Project Description Report	N/A
	Dive survey	See Section 2.7.4 of the Project Description Report	N/A
	Wade survey	See Section 2.7.5 of the Project Description Report	N/A

The drawings prepared in support of the MULA are included in the Project Description document. As described in more detail in the Project Description document, the proposed locations shown in the figures and drawings are subject to refinement based on the results of the geophysical, bathymetric and environmental surveys. Similarly, the location may be moved due to the presence of obstructions/ refusals at individual locations, i.e. where a physical object, e.g. a subsurface boulder, prevents the borehole from going to its target depth. In such circumstances, the borehole location is moved to another nearby location away from the obstruction and drilled again to the target depth.

LCCC are seeking a MUL for a period of five years from the date of the granting of the licence. The programme of works for the SI works will be dependent upon award of the MUL and the appointment and availability of survey contractors. Based on the proposed scope of works to be conducted, it is expected that each geotechnical sampling location will take two days to complete; however, this is dependent on weather conditions and contractor/vessel availability. The geophysical survey is likely to take approximately one week to complete, while the environmental survey is likely to take approximately two weeks to complete dependant on weather conditions and contractor/vessel availability.

## 3 Risk Assessment for Annex IV Species

### 3.1 Legislative Context

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

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

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

This protection only applies to the species listed above in their “natural range” in Ireland.

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

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<sup>1</sup> Including any action resulting in damage to, or destruction of, a breeding or resting place of an animal. Breeding or resting places are protected even when the animals are not using them.

## 3.2 Guidance

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

- NPWS (2025a) Applications for Regulation 54 Derogations for Annex IV species – Guidance for Applicants. Department of Housing, Local Government and Heritage.
- European Commission (2021) Guidance document on the strict protection of species of community interest under the Habitats Directive. C. (2021) 7301 final. Brussels.
- Mullen, E., Marnell, F. & Nelson, B. (2021) Strict Protection of Animal Species. National Parks and Wildlife Service Guidance Series, No. 2. National Parks and Wildlife Service, Department of Housing. Local Government and Heritage.
- NPWS (2021) Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland. National Parks and Wildlife Service Guidance Series, No. 2. Department of Housing. Local Government and Heritage
- DAHG (2014) Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters.

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

- Use existing information to determine the probability of the protected species being present in the area affected by the works.
- Ecological survey, if required.
- Examination of impacts and mitigation measures and satisfactory alternatives (if required).

For each of the relevant species discussed in **Section 3.4**, an assessment was made against each of the strict protections taking into account project details and the available evidence base for each species.

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

## 3.3 Relevant Annex IV Species

The SI works will be taking place across the MUL Area as shown in the drawings contained in the Project Description submitted as part of the MULA.

The Habitats Directive lists species of community interest ‘in need of strict protection’ within Annex IV. This list was reviewed and all species/species groups with the potential to occur within the MUL Area were considered further. Of the animal and plant species on Annex IV

known to occur in Ireland, the following species were identified as having the potential to occur within the MUL Area of the proposed SI works:

- All bat species;
- Otter;
- All cetacean species; and
- All turtle species.

Other Annex IV species found in Ireland, namely the natterjack toad and the Kerry slug, do not occur in the marine environment and have not been recorded within the SI works MUL Area by the National Biodiversity Data Centre (NBDC) (2026a, 2026b). Therefore, these Annex IV species are not considered in this assessment.

## 3.4 Evidence Base

### 3.4.1 Desk Study

In order to assess the probability of the above species/species groups being present in the Zone of Influence of the SI works, a desk study was undertaken, in addition to application of professional judgement and knowledge of the geographical area.

The following sources were consulted during the desk study in May 2026:

- Irish Whale and Dolphin Group Sightings Log [IWDG Reporting](#);
- Distribution records for Annex IV species held online by the NBDC <https://biodiversityireland.ie/>; and
- NPWS (2025b) The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished Report, National Parks and Wildlife Service. Department of Culture, Heritage and the Gaeltacht, Dublin.

### 3.4.2 Bat Species

All native bat species in Ireland receive the same level of strict protection. The presence or otherwise of bats is typically relevant only to onshore activities; although bats are known to forage and migrate over water and along coastlines, but they will not interact with underwater works (BCI, 2026a). Interaction between bats and the proposed SI works, although unlikely, is still possible due to the potential for disturbance caused by the lighting and noise from SI works within the Limerick City portion of the Shannon Estuary. According to the NBDC (2026c, 2026d, 2026e, 2026f, 2026g, 2026h, 2026i, 2026j, 2026k), there are numerous recordings of bat species along the Shannon Estuary within the 10 km grid squares that cover Limerick City and the Shannon Estuary.

All nine of the regularly occurring bat species in Ireland occur within or adjacent to the MUL Area. Evidence suggests that many bat species make use of semi-natural and less anthropogenically modified features, including rivers and parks, within urban centres (Warren et al. 2000) and Kusch & Smith (2013), as cited in Limpens et al., 2017). NBDC records also indicate the presence of the lesser Horseshoe bat within the MUL Area, a species whose distribution is closely associated with only six westerly counties: Clare, Cork, Galway, Kerry, Limerick, and Mayo. This Irish population of Lesser Horseshoe bats are considered of international importance given the species decline and/or extinction in other European countries (BCI, 2026b). There is potential for bat species to utilise the MUL Area for foraging or commuting, however as the proposed SI works including access/egress will not result in any direct or indirect impacts on any structure or feature which could be used by roosting bats. There is no likelihood of the SI works resulting in any bats being captured or killed and disturbed during periods of breeding, rearing or hibernation. No breeding site or resting place of such animals will be damaged or destroyed during the SI works.

Any artificial lighting used will be localised to either the vessels or at borehole locations. Limerick city including Limerick city docklands has existing artificial lighting which is used extensively across the MUL Area. Therefore, given the existing levels of artificial lighting adjacent to the MUL Area, there is no likelihood of any significant disturbance or displacement of foraging, commuting, or migrating bats.

### 3.4.3 Otter

Otter (*Lutra lutra*) occurs throughout Ireland, including along the Shannon Estuary with populations found along rivers, lakes, and coasts, where fish and other prey are abundant, and where the bank-side habitat offers plenty of cover (NPWS, 2025). They have diverse habitat preferences: lakes, canals, riverine (streams up to major river systems) marshland and estuaries. Otters are a mobile species and maintain territories. In lowland rivers and fish-rich lakes otters only need to maintain small territories (up to 6km), but along smaller river systems and in upland areas where prey may be less abundant, otter territories can stretch to 20 km (Mullen et al., 2021). Female territories range between  $7.5 \pm 1.5$  km for riverine and  $6.5 \pm 1.0$  km for coastal environments, whereas male territories are approximately  $13.2 \pm 5.3$  km along rivers but with a high degree of variability (Reid et al., 2013). In general, otters exploit a narrow strip of habitat, about 10 m wide at the aquatic-terrestrial interface (Mullen et al., 2021). For the purpose of this study, the MUL Area has been deemed a "River" water body as defined in NPWS (2009) as coastal systems are described by single shorelines. In rivers wider than 80 m (such as within the MUL Area), otter may forage up to 80m from either shoreline.

Otters are opportunistic predators with a broad and varied diet. In freshwater areas a variety of fish from sticklebacks to salmon and eels will be taken, while crayfish and frogs can be important locally or seasonally. (Mullen et al., 2021).

A desk-based study utilising records from NBDC (2026l) indicated that otters have been sighted in the last 10 years adjacent to the MUL Area. Three live otter sightings were recorded with the most recent sighting in 2023, approximately 210 m from the MUL Area at Bunlicky Lagoon. In 2017 and 2018 a live sighting was recorded at Limerick Boat Club and Curragower. It is therefore reasonable to conclude that otters, although rare, may be present within the adjacent areas of the MUL Area. No otter holts or couches were identified within or close to the MUL Areas by the desk study.

Impacts to otters can occur as a result of permanent loss of breeding or resting sites, habitat loss, disturbance/displacement and injury or mortality. The main threats to otter in Ireland include pollution, habitat disturbance and accidental deaths, e.g., road traffic (NPWS, 2025b). The most recent Article 17 conservation assessment for otters in Ireland deemed the species as being in favourable conservation status (NPWS, 2025c).

#### 3.4.4 Cetacean Species

Twenty-five species of cetacean have been recorded in the waters around Ireland. The Irish Whale and Dolphin Group (IWDG) hold 109 records of individual cetacean sightings in the upper and lower Shannon Estuary upstream of Kilcredaun Head Co. Kerry for the period of May 2025 to May 2026 (IWDG, 2025a). Species recorded include:

- Common dolphin (*Delphinus delphis*)
- Bottlenose dolphin (*Tursiops truncatus*)

No other cetacean species were recorded in the Shannon Estuary between May 2025 and May 2026.

Of the 109 individuals recorded, 27 sightings were common dolphin, 80 sightings were bottlenose dolphin, and two sightings were unidentified dolphin species. Two of the 109 records were recorded within the MUL Area, with no sightings further upstream than Sarsfield Bridge in Limerick City. These sighting comprised two common dolphins, recorded east of Shannon Bridge on the 12/06/2025.

No cetacean species was recorded within the MUL Area in 2026.

The majority of all cetacean sightings mentioned above were recorded west of Cahercon Co. Clare, approximately 42 km downstream of the MUL Area boundary. A desk-based study utilising records from NBDC (2026m, 2026n) also indicated that there have been sightings of common and bottlenose dolphin in the last 10 years adjacent to the MUL Area.

According to the most recent Article 17 conservation assessment, bottlenose dolphin and common dolphin are both deemed as being in favourable conservation condition (NPWS, 2025c)

Management Unit (MU) boundaries, defined by the IAMMWG (2015, 2023), refer to geographical areas in which the animals of a particular cetacean species are found, to which management of human activities is applied. These geographical areas are delineated

based on the best scientific knowledge of the population structure of the species while taking into account jurisdictional boundaries or divisions which are already used for managing human activities (IAMMWG, 2023).

The following sections provide more detail on the most commonly recorded cetacean species within and around the MUL Area.

#### **3.4.4.1 Common dolphin**

Common dolphin is frequently recorded off the western seaboard of Ireland with peak counts during summer (Wall et al., 2013), including off Loop and Kerry Heads. Common dolphins are present all year round in Irish waters. Although the highest concentrations are seen over the continental shelf and in deeper waters, they are frequently observed in shallow inshore waters off the southwest coasts and around the Aran Islands (IWDG, 2015).

A total of 27 individuals were recorded between May 2025 and May 2026 within the Shannon Estuary (IWDG, 2026b). The majority of common dolphin sightings were recorded west of Cahercon Co. Clare, 42 km westward of the MUL Area. Only two sightings of common dolphin were recorded within the MUL Area east of Shannon Bridge on the 12/06/2025. Therefore, it is likely that common dolphins utilise the MUL Area sporadically for foraging/commuting.

Common dolphins face threats such as underwater noise, interactions with fisheries through bycatch, ship strikes, chemical and plastic pollution (IWDG, 2015). Common dolphins have been assigned to a single MU, the Celtic & Greater North Seas MU, which covers the Shannon Estuary (IAMMWG, 2022).

#### **3.4.4.2 Bottlenose dolphin**

The Shannon Estuary is one of the most important areas for bottlenose dolphins in Ireland, and the species is a qualifying interest of the Lower River Shannon SAC (NPWS, 2012). In addition, the IAMMWG Shannon Estuary (SHE) management unit (MU) is one of two management units in the Republic of Ireland recognised for bottlenose dolphin (IAMMWG, 2023). The SHE MU bottlenose dolphin is considered a distinct inshore population in western Irish waters (IAMMWG, 2023). Bottlenose dolphins are found throughout the estuary, but regular concentrations occur off Kilcredaun Head in the outer estuary and Tarbert-Killimer, a location which is associated with foraging behaviour (Rogan et al., 2000). Previous surveys in 2002 (Ingram and Rogan, 2002), 2007 (Englund et al., 2007), 2010 (Berrow et al., 2010) and in 2018 (Rogan et al., 2018) have confirmed high site fidelity of dolphins within the Shannon Estuary.

The population of bottlenose dolphins in the Shannon Estuary is estimated at around 145 individuals with only 80 adults. Rogan et al. (2000) recorded bottlenose dolphins in the estuary all year round with a peak from May to September and noted the presence of neonatal calves from July to September as evidence of a well-defined breeding season in the

Shannon Estuary between June and September, with the peak calving period occurring in August (Rogan & Ingram, 2000).

A desk-based study utilising records from NBDC (2026n) indicated that bottlenose dolphin has been sighted in the last 10 years in the Shannon Estuary and within the MUL Area. In 2020, four individuals were recorded off Ted Russell Dock in Limerick City. Further west, approximately 10 km from the MUL Area off Ringmoylan Pier, seven individuals were recorded in 2023. The IWDG (2026c) records indicate that between May 2025 and May 2026, no bottlenose dolphin were recorded within the MUL Area. As the MUL Area is within the Lower River Shannon SAC and given that there have been sightings of bottlenose dolphins within and adjacent to the MUL Area, it is reasonable to assume that bottlenose dolphins may be present within the MUL Area.

The most recent Article 17 conservation assessment for bottlenose dolphin in Ireland deemed the species as being in favourable conservation status (NPWS, 2025). However, bottlenose dolphins can be subjected to local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). The main pressures involve commercial shipping-based or vessel-based activities that occur primarily on a local to regional scale and/or on a temporary to intermittent basis, which includes geophysical seismic exploration (DAHG, 2014). Bottlenose dolphins face threats such as underwater noise, interactions with fisheries through bycatch, industrial and agricultural pollutant contamination, disturbance from marine industrial activities, and harmful algal blooms (IWDG, 2015).

### 3.4.5 Turtle Species

Four Annex IV species of turtle are known to occur in Ireland: leatherback turtle (*Dermochelys coriacea*), Kemp's Ridley turtle (*Lepidochelys kempii*), loggerhead turtle (*Caretta caretta*) and hawksbill turtle (*Eretmochelys imbricata*). This section has been informed by data from the NBDC.

Leatherback turtle has been reported on a number of occasions around the Irish coastline and in the Irish Sea, most recently in 2025. Between 2000 and 2026, 308 observations of leatherback turtles were recorded in Irish waters (NBDC, 2026o). Leatherbacks are known to have an 'atypical migration pattern', as while they must return to tropical waters to breed and reach preferred nesting grounds, they are known to spend the summer months in productive temperate waters, like Ireland's, feeding on jellyfish and sea squirts (Doyle, 2007). Most records of leatherback turtle are reported in coastal waters, and rarely within estuaries. There have been no records of leatherback turtles entering the Shannon Estuary in the past 5 years. There has only been one recorded turtle sighting within the Shannon Estuary. In 1970 a live leatherback turtle was recorded in the waters off Ballylongford in Kerry.

No other turtle species has been recorded within the Shannon Estuary upstream of Kilconly. Between 2000 and 2026 there have been 71 sightings of loggerhead turtle around

the coast of Ireland, primarily along the west and south coasts (NBDC, 2026p). There have been no records of loggerhead turtles within the estuary in the last five years. The most recent sighting nearby was a stranded live individual in 1998 at Kilbaha, Clare. Between 2000 and 2026 there have been six sightings of Kemp's Ridley turtle around the coast of Ireland, primarily along the west coast (NBDC, 2026q). There have been no records of Kemp's Ridley turtle within the estuary in the last five years. The most recent nearby sighting was a stranded live individual in 1992 at Banna Strand, Kerry. There has only been one recorded hawksbill turtle in Ireland, identified in Cork Harbour in 1983 (NBDC, 2026r).

Apart from the above species, there has also been two recorded sightings of the vagrant green turtle (*Chelonia mydas*) along the west coast of Ireland. A stranding of a live female was recorded at Quilty Beach, Clare in December 2024. Another live stranding occurred in November 2007 at Dingle Bay, Kerry (NBDC, 2026s).

There has been no recorded turtle sighting within the MUL Area in the last 10 years. The closest recorded sighting was the leatherback identified off Ballylongford mentioned above, approximately 50 km downstream of the MUL Area.

## 3.5 Examination of Impacts to Strict Protections

### 3.5.1 Bat Species

Based on the available evidence, the proposed SI works will not result in any direct or indirect impacts on any structure or feature which could be used by roosting bats. Therefore, there is no likelihood of the SI works resulting in any bats being captured or killed and disturbed during periods of breeding, rearing or hibernation. No breeding site or resting place of such animals will be damaged or destroyed during the SI works. Works within the Shannon Estuary may be carried out day or night and will be subject to tidal conditions. Any artificial lighting, if used, will be localised to either the vessel (or JUB/spud barge) at the borehole location within the Shannon Estuary. Therefore, there is no likelihood of any significant disturbance or displacement of foraging, commuting, or migrating bats.

The proposed SI works conform with the strict protection afforded to bats under Article 12 of the Habitats Directive, and therefore, it is considered that no derogation is required.

### 3.5.2 Otter

Based on the available evidence gathered in the desk study, it is possible that otters may be present within the MUL Area and wider Shannon Estuary during the SI works. The land-based geophysical surveys will involve a small team of surveyors walking along the estuary (below the HWM) using non-intrusive hand-held equipment such as pole-mounted devices. Land-based geophysical SI works will not interact with otter holts or couches as these are non-intrusive survey techniques. The boat-based geophysical surveys will involve a vessel approximately 10-20 m in length utilising non-intrusive techniques, while a smaller vessel may be required to complete surveys in the River Abbey adjacent to George's Quay. For

most survey types, no above-water noise, vibration or light will be emitted beyond baseline levels. SI works with the potential to emit above-water noise and vibration beyond baseline levels are geotechnical sampling (boreholes). Otters are typically most active at night, particularly in riverine habitats. Recent studies indicate a trimodal activity pattern of Eurasian otters in river habitats, with peaks of activity after dusk, before dawn and in the middle of the night (Bouroş et al. 2019). As discussed in **Section 3.4.3**, there have been multiple records of otter within the MUL area in the last ten years, therefore it is reasonable to assume that otters may frequent the riverbanks of the MUL Area for commuting and foraging.

While there are no published underwater noise injury criteria for Eurasian otter, Southall et al. (2019) has provided injury criteria for the 'Other marine carnivores in water (OCW)' hearing group, which includes sea otters. The OCW criteria is extended to Eurasian otter in the current assessment in the absence of more suitable criteria. The underwater noise assessment, presented in the accompanying Subsea Noise Technical Report, undertaken to inform this Annex IV Risk Assessment has concluded the following with respect to injury and/or disturbance to OCW.

To assess the impacts of the geophysical surveys within the Shannon Estuary, two scenarios were modelled:

1. Geophysical survey using MBES, SSS, chirper/pinger SBP, parametric SBP and geophysical survey vessel. All equipment is assumed to be hull-mounted with no requirements for the use of a USBL.
2. Geotechnical survey using rotary coring, SPT, cable percussive drilling (which uses the SPT source as a proxy) and a tug vessel.

In the absence of mitigation, geophysical sound sources have the potential to cause auditory injury to OCW within <10 m of the sound source and temporary threshold shift (TTS) within <10 m. The range for behavioural disturbance in response to geophysical surveys in OCW is 1,400 m. In the absence of mitigation, geotechnical sound sources have the potential to cause auditory injury to OCW within <10 m of the sound source and TTS within < 10 m. The range for behavioural disturbance in response to geotechnical surveys in OCW is 750 m.

In summary, the proposed SI works within the Shannon Estuary will be conducted day or night, seven days a week and subject to tidal conditions. However, given the small risk ranges for auditory injury (<10 m) and TTS (<10 m), and the likelihood that the presence of the vessel will act as a visual deterrent, it is considered that there will be no killing or displacement of breeding, resting or commuting otters due to the proposed SI works in the Shannon Estuary.

### 3.5.3 Cetacean Species

With respect to cetaceans, the following potential routes to impacts to Strict Protections are associated with the SI works:

- Underwater noise generated during the geophysical, bathymetric and geotechnical surveys resulting in injury and/or disturbance; and
- Collision risk with survey vessels.

#### 3.5.3.1 Underwater noise

An underwater (subsea) noise assessment was carried out using indicative noise sources for the marine SI works. The assessment and results are presented in the accompanying Subsea Noise Technical Report (ref: MCW1078-RPS-05-ZZ-RP-Z-0104).

When assessing the potential impact of underwater noise sources on the estuarine environment a range of variables such as source level, frequency, duration, and directivity were considered. Increasing the distance from the sound source usually results in attenuation with distance. The factors that affect the way noise propagates underwater include water column depth, pressure, temperature gradients, salinity, as well as water surface and seabed type and thickness. When sound encounters the seabed the amount of noise/sound reflected back depends on the composition of the seabed, i.e., mud or other soft sediment will reflect less than rock. The sediment properties are assumed to be ISO coarse silt and “clayey silt” based on properties from historical boreholes in the MUL Area (Orrje & Co, 1965).

The active acoustic instruments, such as those proposed for this survey, operate by emitting extremely short pulses and are highly directional with narrow beams (Ruppell et al., 2022). While the swathe of the sonars and echosounders will have a maximum range of three to six times water depth, many of the sources used for this survey, such as side-scan sonar and sub-bottom profilers (SBP) operate at high frequency and attenuate quickly as they spread from the source.

##### 3.5.3.1.1 Assessment Methodology

The DAHG “Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters” 2014 (DAHG, 2014) contains the following statement:

“It is therefore considered that anthropogenic sound sources with the potential to induce Temporary Threshold Shift (TTS) in a receiving marine mammal contain the potential for both (a) disturbance, and (b) injury to the animal.”

This states that TTS constitutes an injury and should thus be the main assessment criteria<sup>2</sup>. However, the guidance goes on to specify the use of thresholds from a 2007 publication (Southall et al., 2007) which has since been superseded (Southall, et al., 2019; National Oceanic and Atmospheric Administration, 2024) and no longer represents best available science, nor reflects best practice internationally. Thus, the following excerpt from the guidance is relevant:

“The document will be subject to periodic review to allow its efficacy to be reassessed, to consider new scientific findings and incorporate further developments in best practice.”

As there has been no such update to date, but the guidance clearly states its intention to consider new scientific findings, we have applied the latest guidance (NMFS,2024) reflecting the current best available method for assessing impact from noise on marine mammals. This means that it is auditory injury “AUD INJ” (previously “PTS”) that is the criteria for injury, not “TTS”.

Auditory injury in cetaceans can be defined as AUD INJ leading to non-reversible auditory injury, or as a TTS in hearing sensitivity, which can have negative effects on the ability to use natural sounds (e.g., to communicate, navigate, locate prey) for a period of minutes, hours, or days. With increasing distance from the sound source, where it is audible to the animal, the effect is expected to diminish through identifiable stages (i.e., AUD INJ or TTS in hearing, avoidance, masking, reduced vocalisation) to a point where no significant response occurs. Factors such as local propagation and individual hearing ability can influence the actual effect (DAHG, 2014).

A summary of the equipment likely to be used in the SI Works is presented in **Table 4.1** of the accompanying Subsea Noise Technical Report.

Should the noise levels from sources provided in the accompanying Subsea Noise Technical Report exceed the thresholds (**Table 3-2**), there is the potential for underwater noise generated during the geophysical and bathymetric surveys to result in injury and/or disturbance to Annex IV cetacean species in the vicinity of the SI works.

Cetacean species can be split into functional hearing groupings, according to their frequency-specific hearing sensitivity (Southall et al., 2019). Minke, fin and humpback whales are considered low frequency cetaceans (LF), common, bottlenose and Risso’s dolphin are considered high frequency cetaceans (HF), harbour porpoise a very high frequency cetacean (VHF) and otters are included as Other Marine Carnivores in Water (OCW). See **Table 3-1** below for a list of species contained within each functional hearing group.

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<sup>2</sup> Injury being the qualifying limit in the Irish Wildlife Act 1976, section 23, 5c: <https://www.irishstatutebook.ie/eli/1976/act/39/enacted/en/print#sec23>

**Table 3-1: Functional Hearing Groups for Marine Mammal Species (Not all Annex IV Species)**

NMFS (2024) Hearing Group Name	Species Included in Group
Low-frequency cetaceans (LF)	Baleen whales (minke, fin and humpback whale).
High-frequency cetaceans (HF)	Most toothed whales and dolphins (bottlenose, common and Risso's dolphin, killer, and pilot whales).
Very high-frequency cetaceans (VHF)	Certain toothed whales and porpoises (harbour porpoise).
Other marine carnivores in water (OCW)	Includes sea lions, walrus, otters.
Phocid carnivores in water (PCW)	Earless seals (including harbour and grey seal).

Both the criteria for impulsive and non-impulsive sound are relevant given the nature of the sound sources used during the SI Works. The relevant AUD INJ and TTS criteria proposed by NMFS (2024) are summarised in **Table 3-2** which addresses peak pressure levels ( $L_{pk}$ ) and sound exposure levels (SEL).

**Table 3-2: AUD INJ and TTS thresholds for cetaceans (NMFS, 2024)**

Hearing Group	Parameter	Impulsive [dB]		Non-impulsive [dB]	
		AUD INJ	TTS	AUD INJ	TTS
Low frequency (LF) cetaceans	$L_{pk}$ , (unweighted)	222	216	Low frequency (LF) cetaceans	$L_{pk}$ , (unweighted)
	SEL, (weighted)	183	168	197	SEL, (weighted)
High frequency (HF) cetaceans	$L_{pk}$ , (unweighted)	230	224	High frequency (HF) cetaceans	$L_{pk}$ , (unweighted)
	SEL, (weighted)	193	178	201	SEL, (weighted)
Very high frequency (VHF) cetaceans	$L_{pk}$ , (unweighted)	202	196	Very high frequency (VHF) cetaceans	$L_{pk}$ , (unweighted)
	SEL, (weighted)	159	144	181	SEL, (weighted)

The following presents the results of an underwater noise assessment of the proposed SI works within the upper Shannon Estuary MUL Area.

To assess the impacts of the geophysical surveys within the upper Shannon Estuary there were two scenarios modelled:

1. Geophysical survey using MBES, SSS, chirper/pinger SBP, parametric SBP and geophysical survey vessel. All equipment is assumed to be hull-mounted with no requirements for the use of a USBL.
2. Geotechnical survey using rotary coring, SPT, cable percussive drilling (which uses the SPT source as a proxy) and a tug vessel.

The results have been summarised below to present the 'worst-case scenario', and it should be noted that no mitigation (i.e. soft-start measures, or marine mammal observers) has been applied at this stage, and both scenarios assume that all relevant equipment is active.

### **Geophysical Surveys, no mitigation<sup>3</sup>:**

- LF group (minke, fin and humpback whale), both auditory injury and TTS could occur within <10 m of the sound source.
- HF group (bottlenose/common dolphin), auditory injury could occur within <10 m of the sound source, and TTS could occur out to 370 m.
- VHF group (harbour porpoise), auditory injury could occur out 580 m from the sound source, while TTS could occur out to 1.4 km.
- For all cetaceans, behavioural disturbance could occur out to 1.4 km.

### **Geotechnical Survey, no mitigation<sup>3</sup>:**

- LF group (minke, fin and humpback whale), auditory injury could occur within <10 m of the sound source, TTS could occur out to 360 m and behavioural disturbance could occur out to 810 m.
- HF group (bottlenose/common dolphin), auditory injury could occur within <10 m of the sound source, TTS could occur within < 10 m and behavioural disturbance could occur out to 750 m.
- VHF group (harbour porpoise), auditory injury could occur out to 130 m from the sound source, TTS could occur out to 640 m and behavioural disturbance could occur out to 760 m.

In summary, the worst-case assessment concludes that there is a potential risk of inducing auditory injury (AUD INJ) within < 10 m of the sound source to the HF group (i.e. common dolphin and bottlenose dolphin) during the geophysical surveys. The risk range for inducing AUD INJ is a maximum of <10 m from the sound source to the LF group and out to 580 m to the VHF group. The same geophysical surveys have the potential to cause TTS within

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<sup>3</sup> \*Limited by line-of-sight – noise blocked by land, beyond these ranges.

370 m to HF group, within < 10 m to the LF group and 1.4 km within the VHF group. In all hearing groups behavioural disturbance could occur out to 1.4 km.

During the geotechnical surveys, the worst-case scenario concludes that there is a potential risk of inducing AUD INJ within < 10 m in both the LF and HF groups and could occur out to 130 m in the VHF group. The same geotechnical surveys have the potential to cause TTS within < 10 m of the sound source in both the LF and HF groups, and out to 640 m in the VHF group. Behavioural disturbance could occur out to 810 m from the sounds source in the LF group, out to 750 m in the HF group and out to 760 m in the VHF group.

This is mainly the result of activities being assumed to continue for up to 24 hours consecutively (meaning long duration of sound exposure accumulation, whereas in reality activities will not be undertaken for this long, where boat-based surveys will be entirely dependent on high tide, and therefore will not be undertaken for longer than one high tide (six hours), and the assumption that the activities from this study are the main contributors to the sound exposure of an animal – at ranges of a few kilometres from the source, any other larger vessel nearer an animal will be the primary contributor to its sound exposure, not these surveys.

Additionally, as stated above in **Section 3.4.4**, common dolphin and bottlenose dolphin have been infrequently recorded within the MUL Area (27 sightings of common dolphin, 80 sightings of bottlenose dolphin and two sightings of unidentified dolphin species between May 2025 and May 2026), while no LF or VHF cetacean species have been within or adjacent to the MUL Area in recent years. Given more suitable habitat and prey opportunities within the critical habitat downstream (Foynes), it is unlikely the proposed SI works would overlap with important habitats or foraging areas for marine mammal species. Therefore, it is considered extremely unlikely that cetacean species would be impacted by the temporary underwater noise within the MUL Area.

### 3.5.3.1.2 Mitigation

The mitigation measures proposed will reduce the impact of auditory injury on cetaceans from the proposed SI works. As stated above, cetacean species have been infrequently recorded within the MUL Area, with the most regular concentrations of bottlenose dolphin occurring off Kilcredaun Head in the outer estuary and Tarbert-Killimer, and further east into the estuary around Moneypoint and Tarbert/ Killimer. Bottlenose and common dolphin have been most recently recorded within the Shannon Estuary. Harbour porpoise are considered the most sensitive hearing group (VHF cetaceans), and are not commonly recorded within the MUL area, however, mitigation measures will apply to all hearing groups and will reduce impacts to as low as practically possible.

The risk of injury to all cetacean hearing groups is limited to a range of <10 m from the noise sources, with the exception of VHF cetaceans during the geophysical and geotechnical surveys, where the risks of injury were conservatively estimated to be 580 m and 130 m from the noise source respectively. TTS risk ranges are up to 1.4 km for all

hearing groups with the vessel noise driving this range due to the modelled output of a 24-hour potential active survey duration assuming a quiet estuary. It is expected that depending on the actual activity pattern (vessel speed, and use of thrusters) and presence of other vessels within the MUL Area that this will likely be reduced.

In line with DAHG (2014) guidance, a 20 or 40 minute soft-start will be applied prior to the start of geophysical survey operations. This will reduce the impact range considerably. In addition, a qualified and experienced marine mammal observer will be appointed to monitor for marine mammals prior to the soft-start, in line with DAHG (2014) Guidelines.

These measures will ensure that impacts on marine mammals will be reduced to the lowest possible risk to ensure there is no significant risk to marine mammals from underwater noise. Therefore, underwater noise produced by the SI works will not have an impact on cetacean species which would lead to implications on their strict protections under Article 12 of the Habitats Directive.

#### **3.5.3.1.3 Conclusion**

Based on the current evidence base, it is considered that with the implementation of appropriate and precautionary mitigation measures as outlined above, the proposed SI works will conform with the system of strict protection of cetaceans under Article 12 of the Habitats Directive.

#### **3.5.3.2 Risk of Collision**

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

It has been calculated that a maximum of one vessel and one JUB/spud barge could be operating at any one time within the MUL Area. For the geophysical, the vessels will be travelling in a predefined trajectory. It is considered that this will allow animals to predict the movement of the vessels and therefore avoid collisions. It is likely that the other survey vessels (i.e. benthic survey and/or geotechnical survey vessel) will be stationary for extended periods throughout their operations which will reduce the potential for collision with these vessels.

The area supports low levels of baseline maritime traffic, with mainly cargo vessels, tugboats and fishing vessels traversing the MUL Area to access commercial ports i.e. Ted Russel Dock and further upstream within the Shannon Estuary. It is, therefore, reasonable to assume that marine mammals in the area are exposed to vessel traffic on a regular basis and may exhibit some habituation. The typical speed of the survey vessel while on survey

will be below 5 knots<sup>4</sup>, and it will be travelling in a predefined trajectory, allowing marine mammals to predict movements and avoid collisions. The increase in vessel traffic at any one time is considered to be very low, given the location of the MUL Area.

It can be excluded on the basis of objective evidence that there is potential for collision risk with cetacean species by the SI works. Therefore, it is considered the proposed SI works do not present a collision risk and therefore conform with the system of strict protection of cetaceans under Article 12 of the Habitats Directive in this regard.

### 3.5.4 Turtle Species

Data on turtle hearing is limited; however, turtles are adapted to detect sound in water and are known to detect sound at less than 1,000 Hz (Popper et al., 2014). While the majority of the survey equipment to be used operates across higher frequency range (see **Table 4-1** in the Subsea Noise Technical Report), injury and disturbance to turtles due to noise impacts is unlikely given the lack of turtle occurrence. Due to the lack of evidence of turtles occurring within the MUL Area, the limited scale and duration of the survey activities, it is concluded that there will be no significant disturbance, injury, or death of turtle species as a result of the SI works. There will be no deterioration or destruction of breeding sites or resting places. Therefore, in view of the current evidence base, it is considered that no derogation is required, and the proposed SI works will conform with the system of strict protection of turtles under Article 12 of the Habitats Directive.

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<sup>4</sup> [Boater information for the Shannon Navigation](#). Accessed May 2026

## 4 Summary and Conclusion

The potential for death, injury, disturbance, or damage to or destruction of breeding or resting sites to occur to Annex IV species as a result of the SI works is considered to be low. This risk will be further reduced by the implementation of the mitigation measures outlined in this document and the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (DAHG, 2014). It is concluded that the SI works will not deliberately capture or kill any species listed under Annex IV of the Habitats Directive. The SI works will not disturb Annex IV species during periods of breeding or migration, and breeding or resting places of such Annex IV species will not be damaged or destroyed. The conservation status of the Annex IV species will not be impacted by the proposed SI works. The habitat available to Annex IV species will also continue to be sufficiently large to maintain their populations on a long-term basis.

Following the assessment of the evidence base and available information on relevant Annex IV species, it is concluded that the SI works comply with the system of strict protections afforded by Article 12 of the Habitats Directive and Regulations 51 and 52 of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. This applies to the following Annex IV species:

- All bat species;
- Otter;
- All cetacean species; and
- All turtle species.

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