MERC Consultants
environmental and conservation services

EU Habitats Directive: Annex IV Risk Assessment

North Atlantic Shipwrecks Survey

Document control				
Document reference: ANNEX_IVRA_16082025-1				
Version	Date	Issue	Author/s	Approved by
1	16/08/2025	Final	[redacted]	[redacted]

Contents

List of Tables

1. Introduction

SalvOcean Ltd (SAL) is a limited liability company established in the United Kingdom with a USA subsidiary; specifically inaugurated as a project management company to enable execution of marine surveys, salvage recoveries from shipwrecks, submerged ordnance handling and disposal, environmental impact surveys, and marine operations within the oil, gas, and renewables sectors on behalf of their clients.

SalvOcean also operates in unison with academia, providing facilities onboard their vessels to allow for further scientific research into marine biology, ocean health and risks posed to the environment from potentially polluting shipwrecks.

SalvOcean wish to carry out non-intrusive subsea surveys on two shipwrecks (*MV Accra* and the *SS City of Simla*), hereafter referred to as the "proposed project". The SS City of Simla lies within Irelands Exclusive Economic Zone (EEZ) and currently designated Irish Continental Shelf Maritime Boundary (CSMB), the MV Accra lies within Irelands CSMB (Figure 1).

Both SS City of Simla and MV Accra are wartime casualties having been sunk during Second World War, with sinking brought about through submarine intervention. Relevant details of each individual wreck can be found in section 4.1 of this document.

The proposed project aims to complete a range of surveys including high resolution multibeam echosounder/photogrammetry surveys, hydrocarbon leak detection surveys, cultural heritage assessment surveys as well as side-scan-sonar surveys. Objectives are to confirm the location, identity and condition of the wrecks. The proposed survey campaign is projected to be completed over 20 days (*MV Accra*) and 5 days (*SS City of Simla*) of on-site survey activity respectively. The accuracy of present positional data for each wreck will influence the final duration of surveys. Current knowledge regarding the geographical positions of the *SS City of Simla* and *MV Accra* wrecks is approximate only for both vessels.

A number of Annex IV (Habitats Directive (92/42/EEC) species are known to utilise the sea areas in questions. The proposed surveys have the potential to affect marine mammals and other highly mobile Annex IV species which may use the areas in question for foraging or otherwise. This report provides an assessment of the potential impact the proposed project might have on Annex IV species.

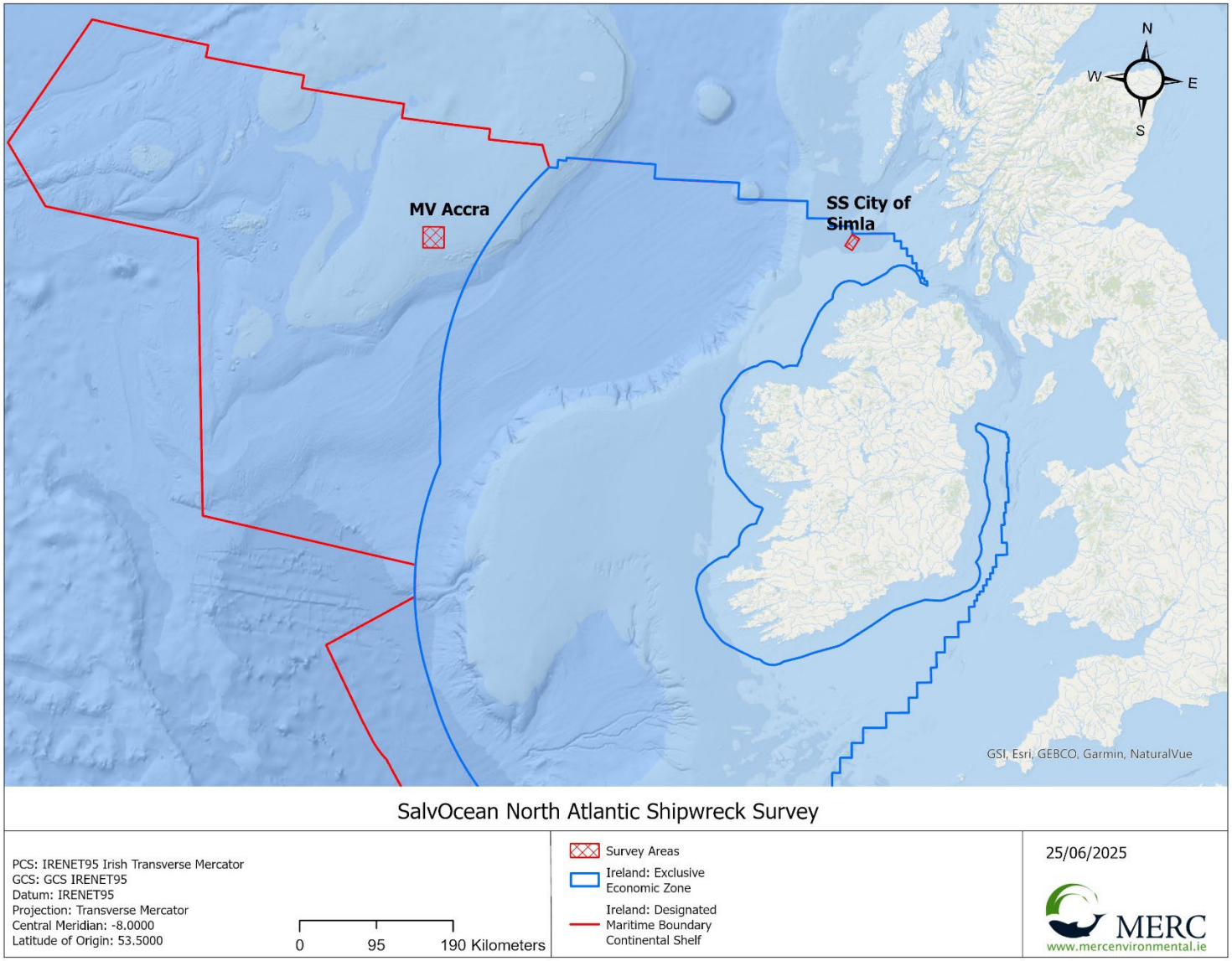

Figure 1 Overview of proposed seabed survey locations

2. Legislation

Article 12 of the EU Habitats Directive states:

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.

3. Proposed survey work

3.1 Overview

SalvOcean is planning a hydroacoustic and reconnaissance survey on two separate shipwreck sites in Irish waters to take place over a period of c.25 days. The work will preferably be completed between the months of March - November. Final survey dates are subject to vessel availability and other constraints as well as completion of consent processes.

Present knowledge of wreck location is imprecise in relation to both vessels. Because of this, proposed survey area geographical scope necessarily encompasses a larger (pre-determined) area, within which the wrecks (or sections thereof) are expected to lie. The reconnaissance survey data collected will determine precise locations for each wreck and provide detailed environmental, hydrographic and physical data in relation to each wreck site. The locations and known approximate positions of each wreck are detailed in Tables 1 and 2 below.

Table 1: MV Accra known details

Year of loss	1940	
GPS / PA	PA	
Position (Decimal degrees)	55.6671577°N -16.4670974°W	
Water depth	450 meters (estimated)	
SSS Target box area	678 sqkm	
Estimated target box coordinates	NE corner	55.7960844N -16.2840706W
	SE corner	55.5636285N -16.2383094W
	SW corner	55.5372053N -16.6481826W
	NW corner	55.7694260N -16.6963327W
Estimated time for SSS	297 – hours / 12.4 -days (maximum)	
Estimated time for residual surveys	7 - days	

Table 2: SS City of Simla known details

Year of loss	1940	
GPS / PA	GPS main body / PA missing stern section	
Position	55.9362568°N -8.1649909°W	
Water depth	175 meters	
SSS Target box area	178 sqkm	
Estimated target box coordinates	NE corner	55.9423227N -8.0739340W
	SE corner	55.8141417N -8.2192833W
	SW corner	55.8646599N -8.3613375W
	NW corner	55.9930073N -8.2162692W
Estimated time for SSS	120 – hours / 5 - days (maximum)	

A suite of mapping technologies will be deployed in this primarily hydroacoustic reconnaissance survey. This includes multibeam echosounder, sub bottom profiler, side scan sonar, ROVs, digital subsurface imagery and video as well as a USBL system for subsurface positioning. These will provide appropriate datasets for the location and characterisation of the wreck sites.

See Table 3 for proposed equipment and specifications.

Table 3: Acoustic sampling equipment proposed to be operated on board the Glomar Supporter

Acoustic survey equipment				
Equipment	**Model**	**Deployment**	**Company**	**Sound Pressure Level re 1 µPA in water @ 1m from source**
Survey Vessel	Glomar Supporter	Ocean Surface	Bharati Shipyard Goa, India	165–175
Vessel DP	DP2 Kongsberg Kpos 21	Ship's Hull	Kongsberg	178
Acoustic Transponders	EdgeTech CAT Coastal Acoustic Transponder	Equipment Mounted	EdgeTech	192
Underwater Navigational Signals	Sonardyne Compatt 6 8300-3111 (USBL)	Equipment Mounted	Sonardyne	187–196
Work Class ROV	Millennium® Plus Work Class ROV	Launched from Vessel	Oceaneering	130-160
Work Class ROV	Schilling Robotics HD Work Class ROV	Launched from Vessel	Schilling	130-160
Side Scan Sonar	EdgeTech 4200 Series	Towed System	EdgeTech	195-205
MBES	Sonic-V Series 2020, 2022,2024,2025	Hull Mounted	R2 Sonic	196-224
Ultra-High Resolution MBES	Teledyne RESON SeaBat® 7125	ROV Mounted	Teledyne	196-224
Sub Bottom Profiler	EdgeTech 3300	Hull Mounted	Edge Tech	167-175
Sub Bottom Profiler	Innomar Standard-ROV	ROV Mounted	Innomar Technologie GmbH	240

Towed equipment will be restricted to approximately 250m in length behind the vessel. This will slightly restrict vessel maneuverability during survey operations.

Further detail in relation to the survey vessel, equipment to be deployed and survey techniques is provided in sections 3.2 to 3.8.

3.2 Survey vessel

Under present proposals, surveys will be conducted from the charter survey ship MV Glomar Supporter. As a suitable survey platform, MV Glomar Supporter will be chartered for the proposed project. The below vessel specification should be used as a typical for a survey vessel that will be utilised in circumstances where MV Glomar Supporter is not available (Table 4).

Table 4: Glomar Supporter vessel specifications

Glomar Supporter **MMSI: 352110000** **Call sign: 3EKK8** **IMO Number: 9344227** **Flag: Panama**	
Length OA	60m
Beam	15m
Draft Max (Loaded)	5m
Classification (RINA)	*C X SUPPLY VESSEL; FIRE-FIGHTING SHIP – 1 – WATER-SPRAYING; UNRESTRICTED NAVIGATION* *X AUT-UMS X DYNAPOS DP2; SPS*
DP Type	DP2 – Kongsberg Kpos 21

3.3 Survey equipment inventory

3.3.1 Multibeam echo-sounder

A multibeam echosounder (MBES) is a type of sonar frequently used to map bathymetry. It operates by emitting an acoustic wave in a fan shape beneath the point of its transceiver attached to the hull of the vessel. The time it takes for the sound waves to bounce off the seabed and return to the transceiver is used to calculate the water depth within the arc of the fan. The proposed MBES operates at a sound pressure level of 196 to 224 dB re 1µPa at 1m with a peak frequency between 200-400 kHz.

3.3.2 Side scan sonar

Side scan Sonar (SSS) is another device that transmits sound pulses that provide the information required to map the seabed. It differs from MBES in that SSS has a finer beam width and smaller footprint to MBES and therefore higher resolution. It is generally towed behind the vessel very close to the seabed and emits fan-shaped acoustic pulses down toward the seafloor which are recorded as a series of cross-tracks. The sound frequencies used by side-scan sonar range generally range from 100 to 1000kHz; higher frequencies yielding better resolution but less range. The proposed Edgetech 4200 Series side scan sonar operates at frequencies between 100kHz and 900kHz and at a sound pressure level of 195 to 205 dB re 1µPa at 1m.

3.3.3 Sub-bottom profiler

A Sub-bottom profiler employs an acoustic signal, to provide the information required to identify and measure marine sediment layers that exist below the sediment/water interface. The proposed equipment comprises a hull mounted EdgeTech 3300 (1-16kHz) system along with an ROV mounted Innomar Standard (4 – 115kHz) ROV SBP. Depending on the profile of the seabed (rock, sand, mud etc.) and level of compaction, the reflected energy reflected can be related to the sub-bottom composition.

3.4 Survey campaign

3.4.1 Routing and planned schedule

The proposed mobilisation port is Aberdeen, Scotland. However, options closer to the operational areas may also currently be considered in the event of unforeseen logistical constraints emerging.

The planned routing of the survey vessel after departure from mobilisation port will be over the north coast of Scotland before engaging in survey work, initially at site NA/C7-D (*MV Accra*). On completion of survey programme for *MV Accra*, the vessel will then transit due east to the second wreck site of *SS City of Simla*.

3.4.2 Hull mounted Multibeam Echosounder and Sidescan Sonar

Wreck sites deemed Position Approximate (PA) will require the 'scanning' of a predetermined target box to locate the actual shipwreck within. The most efficient method identified for carrying out the scans is by means of a hull mounted MBES system. The hull mounted dual-head MBES system will allow the seabed to be scanned at a vessel speed of 4.5 knots.

To aid in identifying further anomalies, a towed side scan sonar (SSS) system will be utilised at the same time as the MBES.

3.4.3 General visual inspection of the wreck and digital video acquisition

A video survey will be conducted at the shipwreck and close vicinities. The adjacent areas will be surveyed to confirm the location of debris, fishing nets etc. Video equipment will be deployed using a work class ROV.

3.4.4 Multi Beam Echo Sounder survey

The MBES will acquire data continuously during the survey. The MBES settings will be optimised to provide the best profile quality and ensure the ping interval is set to achieve the required sounding density. It would be expected to achieve a density of 2-3 soundings for each cell at a ping rate of 10 Hz. This provides a real-time digital terrain model (DTM) so the data density can be reviewed. The ping rate can subsequently be increased or decreased as required.

3.4.5 Sub Bottom Profiler survey

Where necessary, a SBP survey will be carried out.

3.4.6 Hydrocarbon Leak Detection survey

Where considered necessary, a hydrocarbons/HNS survey will be carried out at the wreck site. As hydrocarbons are of lower density than seawater, such substances if emitting from a shipwreck can be detected using the ROV's OAS. A suitable grid will be overlaid on the survey navigation screen to allow the ROV to make passes across the wreck while searching for emissions.

3.4.7 Photogrammetry survey

Photogrammetry of each wreck will be carried out by collecting imagery of the wrecks and their environ by a ROV mounted SubSLAM X2 system, an underwater digital camera system.

.

4. Receiving environment: Annex IV Species

4.1 Cetaceans

Under Article 12 of the Directive, all cetaceans should receive strict protection within the Exclusive Economic Zone (EEZ). In the case of the proposed project, although the *MV Accra* wreck (NA/C7-D) and the proposed survey are is located outside of Ireland's EEZ, foraging ranges of a variety of cetaceans found in Irish waters share spatial overlap with the survey area. A total of 26 cetacean species have been recorded as using sea areas within the Irish EEZ. A marine Mammal Database compiled and managed by the National Biodiversity Data Centre has collated data from numerous sources (e.g. Irish Whale and Dolphin Group, ObSERVE project) on the distribution of cetaceans off the coast of Ireland. ICES's Working Group on Marine Mammal Ecology (WGMME) has also collated several relevant survey datasets for British and Scottish waters including the SCANS-IV multidenominational survey. These data are relevant due to the proximity of the *SS City of Simla* wreck (NA/C1-E) survey area, to the respective management units for highly mobile Annex IV species such as Harbour Porpoise (*Phocoena phocoena*) and Bottlenose Dolphin (*Tursiops truncates*). These data sources show that the areas surrounding the proposed project locations are used by a wide range of cetacean species, the density and distribution of which varies spatially and temporally.

Available data include sightings records for Common Dolphin (*Delphinus delphis*), Bottlenose Dolphin (*Tursiops truncates*), Risso Dolphin (*Grampus griseus*), White Sided Dolphin (*Lagenorhynchus acutus*), White Beaked Dolphin (*Lagenorhynchus albirostris*) Common/Harbour Porpoise (*Phocoena phocoena*), Pilot Whale (*Globicephala*), Fin Whale (*Balaenoptera physalus*), Humpback Whale (*Megaptera novaeangliae*), Sperm Whale (*Physeter macrocephalus*) and Minke Whale (*Balaenoptera acutorostrata*), in the general area of the proposed surveys. However, it should be noted that the Zone of Influence of the proposed project has been deemed to extend only to the bounds of the MUL application area due to the scale, scope and nature of the survey. The proposed project consists of a non-intrusive survey and there is no requirement at any time for direct contact with the seabed or either of the two shipwrecks. Therefore, potential impacts are limited to those associated with possible physical disturbance and hydroacoustic noise. The spatial extent for possible direct impacts from underwater noise is limited to the defined boundary of the survey i.e. the MUL licence area.

4.2 Otter *Lutra lutra*

Coastal otters are known to utilise the marine habitat for foraging, feeding on a variety of fish and shellfish species depending on the time of year. The proposed project areas are, at a minimum 75 kilometres distance from the nearest point of land with potential otter habitat. This is well beyond the foraging range of otters .Accordingly, there is no potential for impacting otters and no further consideration is given to this species in the Annex IV risk assessment.

4.3 Bats

All bat species in Ireland are listed in Annex IV of the EU Habitats Directive. While bats are classed as terrestrial mammals, available evidence suggests they may follow prey insects into coastal waters, depending on the prevailing weather conditions. Recent evidence also notes that bats can migrate considerable distances over open marine waters (Bach *et al,* 2022). However, it is considered highly

unlikely they would make use of the proposed MUL area for foraging due to distance offshore and lack of suitable forage species. It is highly unlikely that any bat species would use the proposed areas of survey during any offshore migrations. As such, no further consideration is given to this group of species in the Annex IV risk assessment.

4.4 Reptiles (marine turtles)

Both Loggerhead turtle (*Caretta caretta*) and Leatherback turtle (*Dermochelys coriacea*) are recorded occasionally around the entire coast of Ireland. However, no records were available for the occurrence of this species within the MUL areas (NBDC, 2025). Due to the scale and scope of the project, it is considered highly unlikely that the surveys proposed would have the capacity to impact this species.

5. Risk assessment

5.1 Cetaceans

Underwater noise can lead to disturbance and/or injury to marine mammals ,depending on the type and frequency of the noise as well as the distance of the receptor from the source.

Cetacean sensory systems are adapted to life in the water. They rely on sound to navigate, to communicate with one another and to sense and interpret their surroundings. Behavioural responses of marine mammals, including cetaceans, to a sound are known to be strongly influenced by the context of the event and individual factors such as the animal's experience, motivation, conditioning and activity (Southall *et al*, 2007). Such features and variability may also require consideration in the case-specific assessment of impact on marine mammals from introduced sound sources (NPWS 2014). Sound waves dissipate through the water with distance from the source. While local oceanographic conditions affect the path of the sound and its transmission.

Depending on the exposure levels from underwater noise, auditory injury to marine mammals can occur. This may result in temporary loss in hearing sensitivity, known as **Temporary Threshold Shift (TTS)** or more permanent damage, known as **Permanent Threshold Shift (PTS)**. The potential for auditory injury is related to the noise frequency relative to the hearing bandwidth of the marine mammal and is also influenced by the duration of exposure. The level of impact on an individual is a function of the **Sound Exposure Level (SEL)** that an individual receives as a result of underwater noise.

Table 5 details the various functional groups relative to hearing for the majority of cetaceans encountered in Irish waters.

Table 5. Cetacean functional groups relative to hearing at different sound frequencies.

Low frequency 7 Hz-22 kHz	**Mid-frequency** 150 Hz-160 kHz	**High frequency** 200 Hz–180 kHz
Baleen whales	Most toothed whales, dolphins	Certain toothed whales, porpoise
Species- Ireland Humpback whale Blue whale	**Species– Ireland** Sperm whale Killer whale	**Species– Ireland** Pygmy sperm whale Harbour porpoise

Fin whale Sei whale Minke whale	Long-finned pilot whale Beaked whale species Dolphin species	

After: NPWS (2014). Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters.

Southall *et al* (2007) describes the sound pressure levels associated with the various functional groups as detailed in Table 5. This has been revised (Southall *et al,* 2019) to further refine functional hearing groups but similar injury criteria as relevant to the proposed project apply.

Table 6. Sound pressure levels associated with Temporary Threshold Shift (TTS) and Permanent Threshold Shift (PTS)

Functional group	**Injury Criteria (based on single pulse)**	
	TTS	**PTS**
Low frequency cetaceans	224dB re: 1µPa (peak)	230dB re: 1µPa (peak)
Mid frequency cetaceans	224dB re: 1µPa (peak)	230dB re: 1µPa (peak)
High frequency cetaceans	224dB re: 1µPa (peak)	230dB re: 1µPa (peak)
Pinnipeds (in water)	212dB re: 1µPa (peak)	218 dB re: 1µPa (peak)

6. Risk Assessment Conclusion

Based on the results of Marine Mammal Noise Exposure Criteria (Southall *et al*, 2019), and review of available distribution and density data for cetaceans in Irish and Scottish waters (SCANS-IV, ObSERVE II surveys, WGMME report) the proposed project has the potential to lead to behavioural responses and TTS to a range of cetaceans should they be present within the proposed project area while the sub bottom profiler/MBES is in use. Based on the review of the receiving environment (Section 4) cetacean species potentially impacted are as follows:

- Harbour porpoise (*Phocoena phocoena*)
- Bottlenose dolphin (*Tursiops truncates*)
- Common dolphin (*Delphinus delphis)*
- White-sided dolphin (Lagenorhynchus acutus)
- Risso's dolphin (Grampus griseus)
- Long-finned pilot whale (Globicephala melas)
- Cuvier's beaked whale (Ziphius cavirostris)
- Sperm whale (Physeter macrocephalus)
- Minke whale (Balaenoptera acutorostrata)
- Fin whale (*Balaenoptera physalus*)
- Humpback whale (*Megaptera novaeangliae*)
- Potentially other cetacean species known to occur in Irish waters

Article 12 of the EU Habitats Directive requires member states to take requisite measures to prohibit "deliberate disturbance of these [Annex IV] species, particularly during the period of breeding, rearing, hibernation and migration". While the range of potential impact is relatively small, estimated to be 2.9km maximum distance based on the analysis of similar instrumentation with the same sound pressure levels (Thomsen *et al* 2023), it is nonetheless considered that, based on the precautionary principle, mitigation to avoid disturbance to the aforementioned species should be implemented.

7. Proposed mitigation

NPWS (2014) provides guidance to manage the risk to marine mammals from man-made sound sources in Irish waters. This document provides guidance and mitigation measures to address key potential sources of anthropogenic sound that may impact negatively on marine mammals in Irish waters. The mitigation methods should follow the guidance prescribed by the National Parks and Wildlife Service. Specifically, in relation to Geophysical acoustic surveys, such as proposed in this project, the guidance set out in NPWS (2014), as stated below, should be fully implemented.

1. A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms (Appendix 6, NPWS, 2014).

2. Unless information specific to the location and/or plan/project is otherwise available to inform the mitigation process (e.g., specific sound propagation and/or attenuation data) and a distance

modification has been agreed with the Regulatory Authority, acoustic surveying using the above equipment shall not commence if marine mammals are detected within a 500m radial distance of the sound source intended for use, i.e., within the Monitored Zone.

Pre-Start Monitoring

1. Sound-producing activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.
2. An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.
3. In waters up to 200m deep, the MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.
4. This prescribed Pre-Start Monitoring shall subsequently be followed by a Ramp-Up Procedure which should include continued monitoring by the MMO.

Ramp-up Procedure

5. In commencing an acoustic survey operation using the proposed acoustic equipment, the following Ramp-up Procedure (i.e., "soft-start") must be used, including during any testing of acoustic sources, where the output peak sound pressure level from any source exceeds 170 dB re: 1µPa @1m:
   (a) Where it is possible according to the operational parameters of the equipment concerned, the device's acoustic energy output shall commence from a lower energy start-up (i.e., a peak sound pressure level not exceeding 170 dB re: 1µPa @1m) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20 minutes.
   (b) This controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.
   (c) Where the acoustic output measures outlined in steps (a) and (b) are not possible according to the operational parameters of any such equipment, the device shall be switched "on" and "off" in a consistent sequential manner over a period of 20 minutes prior to commencement of the full necessary output.
6. In all cases where a Ramp-Up Procedure is employed the delay between the end of ramp-up and the necessary full output must be minimised to prevent unnecessary high-level sound introduction into the environment.
7. Once the Ramp-Up Procedure commences, there is no requirement to halt or discontinue the procedure at night-time, nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 500m radial distance of the sound source, i.e., within the Monitored Zone.

Line Changes

10. Where the duration of a survey line or station change will be greater than 40 minutes the activity shall, on completion of the line/station being surveyed, either

(a) shut down and undertake full Pre-Start Monitoring, followed by a Ramp-Up Procedure for recommencement, or

(b) undergo a major reduction in seismic energy output to a lower energy state[1] where the output peak sound pressure level from any operating source is 165-170 dB re: 1µPa @1m, and then undertake a full Ramp-Up Procedure for recommencement.

11. Where the duration of a survey line or station change will be less than 40 minutes the activity may continue as normal (i.e., under full seismic output)

Breaks in sound output

12. If there is a break in sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down, survey line or station change) then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) must be undertaken.

13. For higher output survey operations which have the potential to produce injurious levels of underwater sound (see sections 2.4, 3.2) as informed by the associated risk assessment, there is likely to be a regulatory requirement to adopt a shorter 5–10-minute break limit after which period all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) shall recommence as for start-up.

Reporting

14. Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory Authority as outlined in Appendix 6 of NPWS (2014).

8. Assessment of residual risk

Provided the mitigation proposed in section 7 of this document is implemented in full, no residual risk is considered possible.

[1] *It is important that this significant reduction in sound output is to a minimum point (i.e., minimum peak sound pressure level) that in theory remains audible above most ambient sound and shipping noise and yet is also consistent with the Ramp-up Procedure.*

9. References

Bach, L., Brust, V., Göttsche, M., Hüppop, O., Lagerveld, S., Schmaljohann, H., Seebens-Hoyer, A., & Voigt, C. C. (2022). Offshore and coastline migration of radio-tagged Nathusius' pipistrelles (*Pipistrellus nathusii*) in the Baltic Sea region. Conservation Science and Practice, 4(7), e12783.)

Biodiversity Data Centre (2024) Maps. Available at: https://maps.biodiversityireland.ie/Map. Accessed 2.06.2025.

European Marine Observation and Data Network (EMODnet). Available at: https://emodnet.ec.europa.eu/en/seabed-habitats. Accessed 11.06.2025.

INFOMAR Seabed and sediment data. Available at: https://www.infomar.ie/maps/interactive-maps/seabed-and-sediment. Accessed 24/06/2025.

ObSERVE Aerial Surveys for Seabirds and Cetaceans in the Irish Atlantic Margin. Available at: https://maps.biodiversityireland.ie/Dataset/322. Accessed 26.06.2025

Southall, B., Finneran, J., Reichmuth, C., Nachtigall, P., Ketten, D., Bowles, A., Ellison. W., Nowacek, D., Tyack, P. (2019). Marine Mammal Noise Exposure Criteria. Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals. 45. 125-232. 10.1578/AM.45.2.2019.125.

Southall, B. L., Bowles, A. E., Ellison, W. T., Finneran, J. J., Gentry, R. L., Greene., C. R. Jr., Kastak, D., Ketten, D. R., Miller, J. H., Nachtigall, P. E., Richardson, W. J., Thomas, J. A., and Tyack, P. L. (2007). Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals33(4): 411-521.

NPWS (2014). Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters. Department of arts, Heritage and the Gaeltacht.

ICES. 2024. Working Group on Marine Mammal Ecology (WGMME). ICES Scientific Reports. 6:82. 239 pp. https://doi.org/10.17895/ices.pub.26997367