MERC Consultants
environmental and conservation services

EU Habitats Directive: Annex IV Risk Assessment

Uisce Éireann Sligo and Donegal Strategic Model

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Contents

1. Introduction

Uisce Éireann wish to conduct a strategic modelling study of water currents within Donegal Bay, Sligo Bay, Killala Bay and their adjoining waters. A foreshore license application for this modelling was submitted in 2022 (Foreshore refence number: FS007553). The original licence application was for the deployment of static Acoustic Doppler Current Profilers (ADCPs) and associated ancillary instrumentation. Uisce Éireann now wish to expand the survey to include the gathering of bathymetric and tidal data.

The proposed programme of surveys includes vessel based assessment of bathymetry using a combination of single-beam, multibeam and LiDAR surveys, surface water sampling and the deployment of tidal gauges.

This report provides an assessment of the potential impact the proposed ADCP deployment might have on Habitats Directive (92/42/EEC) Annex IV species identified as having the potential to be present in the project area.

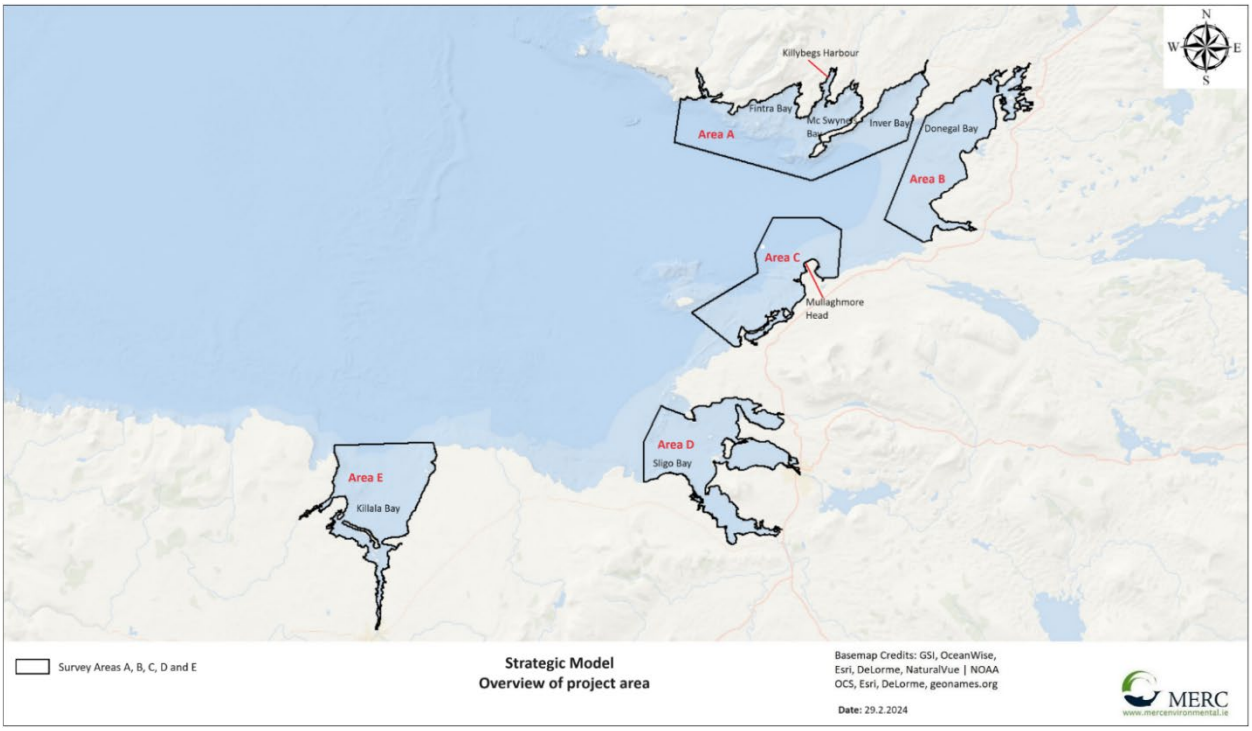

Figure 1. Overview of Licence areas.

2. Scope of work

A description of the proposed equipment to be used is given below and summarised in **Table 1**.

2.1 Multibeam echosounder

A multibeam echosounder (MBES) is a type of sonar frequently used to map bathymetry. It operates by emitting an acoustic wave in a fan shape beneath the point of its transceiver attached the hull of the vessel or more typically mounted on a tow-fish. The time it takes for the sound waves to bounce off the seabed and return to the transreceiver is used to calculate the water depth within the arc of the fan. A typical multibeam echo sounder operates at a sound pressure level of between 200-220 dB re 1µPa at 1m with a peak frequency between 300-500 kHz (300,000-500,000 Hz).

2.1 Single-beam sonar

Single-beam sonar (SBS) operates in a similar way to multibeam but with a narrower band width in the regions of a 2-15 degree beam. They are typically used in shallow waters for smaller areas where the time required to achieve 100% insonification with a multibeam sonar is considered unnecessary depending on the purpose the bathymetry is being gathered for.

2.3 Light Detection And Ranging (LiDAR)

Light Detection And Ranging (LiDAR) is useful for mapping bathymetry in very shallow water. It operates by emitting two laser light beams from a sensor onboard an aircraft. One beam hits the water surface and is reflected, while the second beam hits the seabed and is reflected back. The difference in time between the two beams returning allows the water depth to be calculated. LiDAR is very useful in areas too shallow for vessels to access such as the intertidal.

In the present case, bathymetric assessment of the intertidal area only is required, as information for the subtidal area is already available. LiDAR is likely to be the method used for this assessment, but the possibility of using a shallow draft vessel over the intertidal area on a high tide to conduct multibeam or single-beam surveys is also possible.

2.4 Vessel mounted Acoustic Doppler Current Profiler ADCP) surveys

An Acoustic Doppler Current Profiler (ADCP) is a hydroacoustic current meter that measures water current velocities over a depth range using the Doppler effect of sound waves scattered back from particles within the water column. A foreshore licence has already been obtained for the deployment of fixed ADCPs within trawl resistant frames at 26 discrete locations within the proposed project area. However, given the shallow depth and navigational issues additional vessel mounted ADCP surveys are proposed as part of the current programme of works. Vessel mounted (VM) ADCPs work on the same principle as the fixed ADCPs but obtain less data. VMADCP measurements would be taken every half-hour and averaged over 13 hours of a mean spring and mean neap tidal cycle.

It is proposed that VMADCP data gathering will take place in the following areas:

- Ballysadare Bay (VMADCP1 to VMADCP2)
- Garavogue Estuary channel between Rosses Point and Sligo Docks (VMADCP3 to VMADCP5)
- Inner Donegal Bay between Donegal Town and Donegal Harbour (VMADCP6 to VMADCP8)
- Inver Bay (VMADCP9 to VMADCP10)

- McSwynes Bay (VMADCP11)
- Killybegs Bay (VMADCP12 to VMADCP13)

2.5 Tidal gauges

Tidal gauges are used to gather precise tidal height data for discrete fixed points. The resulting data can then be extrapolated to a wider area. For the proposed projects it is proposed that the tidal gauge would be mounted on either a galvanized steel pole to the side of a suitable pier or other permanent fixed structure. Installation would take place on a very low tide so that the mountings can be attached as low as possible down the pier wall to ensure the sensor is below chart datum.

2.6 Ancillary data collection

Additional ancillary data may be collected. This may include the collection of water samples, and data on temperature & Conductivity/Salinity collected through the deployment of a small overboard CTD meter.

2.7 Vessel

To facilitate the multibeam and single beam surveys (should they be required) and the collection of ancillary data (e.g. CTD data, deployment of tidal gauges) a shallow draft vessel approximately 16m in length will be contracted. An appropriate vessel of this size would typically operate with an inboard diesel engine within a capacity of up to 400hp/300 kW.

Table 1. Summary of scope of works

Element	Method	Frequency	Location
Vessel based ADCP	The Vessel mounted ADCP surveys will be conducted using a TRDI WH Monitor 600kHz ADCP (or similar) to an aluminium pole that will be mounted to the side of the vessel ensuring the ADCP is deployed below the surface of the water. Measurements will be taken periodically at set stations as part of a transect with is repeatedly transversed over a tidal cycle, or taken continuously as the vessel remains on station over a tidal cycle.	13 hours of surveying on 1no spring and 1no neap tide. A sampling rate of a minimum of 1-minute average every 10 minutes for each ADCP sensor is required.	Within MUL Area; limited to marine navigable areas; indicative locations presented
Water Sampling	Water sampling will be undertaken concurrently with the VMADCP surveys. Periodically samples will be taken from the surface layer of the water column via bucket and telescopic arm, and collected and stored for subsequent analyses	Periodically over 13 hours of surveying on 1no spring and 1no neap tide	Within MUL Area; limited to marine navigable areas
CTD Monitoring	CTD and DO surveys will take place from the vessel. This will involve deploying a Sonde at set intervals for the duration of the tidal survey at each VMADCP location. The sonde will be lowered to just below the surface of the water from the vessel, the sonde will be allowed to settle at the surface of the water before being lowered to the seabed, where the instrument will be lifted from the seabed and allow the values returned to the hand-held device to settle. Once the values from the sonde have settled it will be slowly lifted back to the sea surface and back onboard the vessel.	Periodically over 13 hours of surveying on 1no spring and 1no neap tide	Within MUL Area; limited to marine navigable areas; indicative locations presented
Bathymetry	Surveying of intertidal areas may require a combination of methods including; Single beam & Multibeam Echosounders, LiDAR, GPS rover.	Once off.	Intertidal areas within MUL Area A, B, C, E
Tide Gauge	The inshore tide gauge should be mounted on either a galvanized steel pole to the side of a suitable pier or other permanent fixed structure. Installation should take place on a very low tide so that the mountings can be attached as low as possible down the pier wall to ensure the sensor is below chart datum	Installed for a minimum of 3 months, coinciding with all other sampling	Garavogue Estuary at Sligo Port or Sligo WwTP to assess propagation of tidal wave into estuary. ▪ Killybegs Harbour at Killybegs WwTP ▪ Donegal Town ▪ Killala Bay at Ballina WwTP
Vessel details	Details to be confirmed however vessel likely to be no larger than 16m length, 6m beam and 2m draught.		

3. 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.

4. Annex IV Species

4.1 Cetaceans

Under Article 12 of the Directive, all cetaceans should receive strict protection within the Exclusive Economic Zone. A total of 26 cetacean species have been recorded in Ireland. A marine Mammal Database compiled and managed by the National Biodiversity Data Centre has collated data from numerous sources on the distribution of cetaceans off the coast of Ireland. These data sources show that the area in and surrounding the proposed licence areas are used by a wide range of cetacean species. The density and distribution of which varies over time and season. The data shows that, while occasional sightings for a number of cetacean species have been recorded, the most abundant species making use of the area are Common dolphin (*Delphinus delphis*), Bottlenose Dolphin (*Tursiops truncatus*) and Common Porpoise (*Phocoena phocoena*).

4.2 Otter

Otters (*Lutra lutra*) are frequently recorded from coastal sites on the west of Ireland, although the licence areas are not listed as Otter commuting habitat (NPWS, 2019). However, it can be reasonably assumed that otter use the intertidal and marine habitats within the ZoI of the proposed project. Ireland continues to remain a stronghold for the European otter and the conservation status of the species is currently classed as "favourable" NPWS (2019).

4.3 Reptiles (marine turtles)

Leathery Turtle (*Dermochelys coriacea*) are recorded occasionally from around the entire coast of Ireland. Within the proposed licence area occasional records for this species are present.

4.4 Bats

All bat species in Ireland are listed in Annex IV of the EU Habitats Directive. These include:

- Common pipistrelle (*Pipistrellus pipistrellus*)
- Soprano pipistrelle (*Pipistrellus pygmaeus*)
- Nathusius' pipistrelle (*Pipistrellus nathusii*)
- Leisler's bat (*Nyctalus leisleri*)
- Brown long-eared bat (*Plecotus auritus*)
- Daubenton's bat (*Myotis daubentonii*)
- Whiskered bat (*Myotis mystacinus*)
- Natterer's bat (*Myotis nattereri*)
- Lesser horseshoe bat (*Rhinolophus hipposideros*)

While bats are classed as terrestrial mammals, some evidence suggests they may follow prey insects into coastal water depending on the prevailing weather conditions. Recent evidence also notes that bats can migrate considerable distances over open marine waters.

5. Risk assessment

A report containing information to support Screening for Appropriate Assessment (SISAA) has been provided as part of this application (MERC, 2024). Section 6.3.1.2 of this report clearly sets out the disturbance and noise criteria associated with the potential for impact on marine mammals and found the proposed project may have the potential to cause temporary behavioural changes to Bottlenose dolphin and Harbour porpoise should they be present during surveys. The SISAA concluded that, such behavioural changes were highly unlikely to lead to significant impacts to either species, due to the large area of alternative foraging habitat and the extremely shallow waters in which the survey will take place (intertidal, when covered at high water). However, the SISAA noted that with due regard to the precautionary principle temporary impacts on Bottlenose dolphin and Harbour porpoise were considered possible.

Otter hearing is not adapted to water and functional hearing in otters in water is poorly known. Voight *et al* 2019 reported that their hearing range in air is within the range of 200 Hz to 32 kHz, with lowest thresholds around 4 kHz. Stepien (2020) reported behaviour changes in *lutra lutra* underwater at frequencies of both 1Khz and 14KHz. Otter utilise the marine environment for foraging, generally remaining relatively close to sources of freshwater. In Ireland, the territory of female otters in mesotrophic rivers is approximately 7.5 ± 1.5km in length (Ó Néill *et al*. 2008, cited in Reid *et al*, 2013) and 6.5 ± 1.0km in coastal environments (de Jongh *et al*. 2010 cited in Reid *et al*, 2013). Therefore, based on the precautionary principle Otter are considered to utilise habitat with a linear length of 15km along the coastline. While temporary disturbance to otter may occur, should they be foraging in marine intertidal or subtidal habitats when surveys are being conducted, significant impacts are not considered possible due to the short duration (days) and wide availability of alternative suitable foraging habitat in the area. Furthermore, the project does not have the potential to impact otter holt or resting (couche) sites.

Relative to the scale and scope of the project and the low number of recorded marine reptiles (marine turtles) in the proposed project area, impacts on marine reptiles are not considered possible.

Due to the nature of the proposed project (vessel based surveys during daylight hours) the proposed underwater acoustic surveys or vessel presence does not have the potential to impact bats, their habitats or roost sites in any way.

6. Conclusion

Based on the scope of the surveys, it is considered that the potential for impacts on cetacean species is limited. However, behavioural responses to a range of cetaceans, should they be present within close proximity (<500m) of the proposed project area when acoustic surveys are being carried out is considered possible.

Article 12 of the EU Habitats Directive requires member states to take requisite measures to prohibit "deliberate disturbance of Annex IV species, particularly during the period of breeding, rearing, hibernation and migration". While the range of potential impact is extremely small, it is nonetheless considered that, based on the precautionary principle, mitigation to avoid disturbance to any cetacean species with the potential to be present in the area should be implemented. No impacts on any additional Annex IV species known to occur in Ireland are considered possible.

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. A 500m zone is considered appropriate as empirical evidence[1] by the authors of this report has demonstrated that seals do not abandon their haul out sites unless approached within less than 200m of the site.

[1] Surveys, conducted on behalf of Bord Iascaigh Mhara, of seal disturbance at haul out sites as a result of fishing activity (potting) at haul out sites in Roaringwater Bay in 2015.

Pre-Start Monitoring

3. 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.

4. 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.

5. 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.

6. 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

7. 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.

8. 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.

9. 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[2] 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.

[2] *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

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