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EU Habitats Directive: Annex IV Risk Assessment

Uisce Éireann South Cork Strategic Model

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1. Introduction

Uisce Éireann wish to conduct a strategic modelling study of water currents along a section of the South Cork coast. The study requires the deployment of static Acoustic Doppler Current Profilers (ADCPs) within the study area (see figure 1) to provide the required modelling data. Ancillary instruments, to collect salinity and temperature data, may also be contained within the trawl resistant frames in which the ADCPs will be deployed. The project also includes vessel based assessment of water currents and bathymetry using a combination of vessel mounted ADCPs, single-beam, multibeam and LiDAR surveys, and potentially, the deployment of tidal gauges.

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

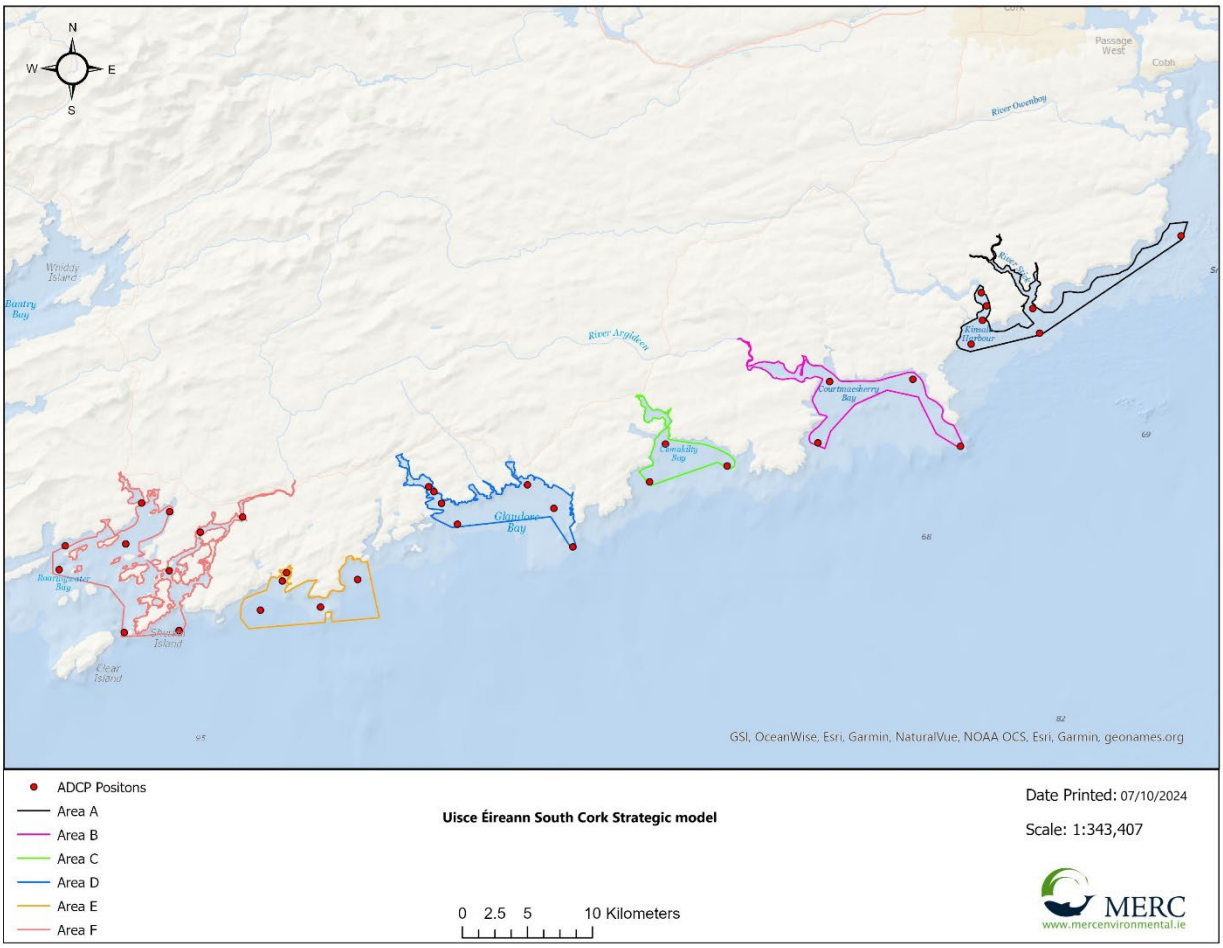

Figure 1.Overview of ADCP deployment and Licence areas

2. Scope of work

The project consists of the deployment of up to eighteen (18) fixed ADCPs along the South Cork coast, between Skull Harbour and Cork Harbour, at the locations given in Table 1 and shown in Figure 1 . Ancillary instruments, to collect salinity and temperature data, may also be contained within the trawl resistant frames in which the ADCPs will be deployed. The project also includes vessel based assessment of water currents and bathymetry using a combination of vessel mounted ADCPs (see Table 1 for locations), single-beam, multibeam and LiDAR surveys, and potentially, the deployment of tidal gauges.

A summary of the scope of works is given in Table 2 and described in further detail, where required, in section 2.1.

Table 1. Location of fixed and vessel mounted ADCPS

ADCP No	Easting (ITM)	Northing (ITM)		Location	Area
1	580526.46	553781.24	Fixed	Kinsale Harbour to Roberts Head & environs	A
2	553529.713	542567.687	Fixed	Courtmacsherry Bay	B
3	552605.014	537852.397	Fixed	Courtmacsherry Bay	B
4	545653.729	536097.718	Fixed	Clonakilty Bay	C
5	533776.235	529876.514	Fixed	Glandore Bay	D
6	532321.647	532818.174	Fixed	Glandore Bay	D
7	524913.436	531617.761	Fixed	Glandore Bay	D
8	523680.546	533218.372	Fixed	Glandore Bay	D
9	523101.954	534110.604	Fixed	Glandore Bay	D
10	522707.212	534483.721	Fixed	Glandore Bay	D
11	517245.65	527362.141	Fixed	Toe Head	E
12	514378.339	525245.141	Fixed	Toe Head	E
13	509771.192	525018.054	Fixed	Toe Head	E
14	499406.264	530092.214	Fixed	Roaringwater Bay	F
15	494301.78	528135.986	Fixed	Roaringwater Bay	F
16	499297.666	523309.45	Fixed	Roaringwater Bay	F
17	503503.033	523452.205	Fixed	Roaringwater Bay	F
18	502753.418	528044.046	Fixed	Roaringwater Bay	F
19	569122.122	548189.997	Vessel mounted	Kinsale Harbour to Roberts Head & environs	A
20	569668.264	546291.979	Vessel mounted	Kinsale Harbour to Roberts Head & environs	A
21	565177.395	549391.824	Vessel mounted	Kinsale Harbour to Roberts Head & environs	A
22	565588.355	548391.443	Vessel mounted	Kinsale Harbour to Roberts Head & environs	A
23	565277.422	547286.974	Vessel mounted	Kinsale Harbour to Roberts Head & environs	A
24	564382.479	545444.391	Vessel mounted	Kinsale Harbour to Roberts Head & environs	A
25	563571.318	537592.78	Vessel mounted	Courtmacsherry Bay	B
26	559915.911	542750.154	Vessel mounted	Courtmacsherry Bay	B
27	540889.776	537760.535	Vessel mounted	Clonakilty Bay	C
28	539673.084	534872.964	Vessel mounted	Clonakilty Bay	C
29	530283.049	534629.681	Vessel mounted	Glandore Bay	D
30	511766.556	527901.564	Vessel mounted	Toe Head	E
31	511433.994	527260.783	Vessel mounted	Toe Head	E

32	508395.589	532167.718	Vessel mounted	Roaringwater Bay	F
33	505145.03	531000.148	Vessel mounted	Roaringwater Bay	F
34	502782.965	532579.09	Vessel mounted	Roaringwater Bay	F
35	500643.109	533247.511	Vessel mounted	Roaringwater Bay	F
36	494748.26	529951.443	Vessel mounted	Roaringwater Bay	F

Table 2. Summary of scope of works

Element	Method	Frequency
Fixed ADCP	Fixed ADCP surveys will be conducted using a Nortek AWAC 600 Khz or 1 Mhz unit (or equivalent) deployed on seabed mounted frames. ADCP frames will be equipped with a recovery line attached to a small rigid buoy that is held in place by an acoustic release, which releases the buoy once triggered by a deck unit. Housed within the frame is the battery canister(s) for the ADCP along with lead ballast to prevent movement on the seabed in high energy tidal and wave environments. An acoustic pinger is mounted on the frame to aid in the recovery of the frame in the event of the acoustic release not firing.	32 days. A sampling rate of 1-minute average every 10 minutes for each ADCP sensor is required.
Vessel Based ADCP	The Vessel mounted ADCP (VMADCP) 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.
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
Conductivity, Temperature and depth (CTD) and Dissolved Oxygen (DO) Monitoring	Concurrently with the VMADCP surveys 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
Bathymetry	Surveying of intertidal areas may require a combination of methods including; Single beam & Multibeam Echosounders, LiDAR, GPS rover.	n/a
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
Vessel details	Details to be confirmed however vessel likely to be no larger than 16m length, 6m beam and 2m draught.	

2.1 Description of proposed surveys and deployment

2.1.1 ADCP description and deployment

An ADCP is a hydroacoustic current meter used to measure water current velocities over a depth range using the doppler effect of sound waves scattered back from particles within the water column. In the present case ADCPs operating in the range of 600 Khz or 1 Mhz will be used. The instrument emits "pings" of sound at a sampling rate of 1-minute average every 10 minutes.

The ADCP is contained within a trawl resistant bottom mount frame *circa* 1.8m x 1.3m x 0.6m with a weight of approximately 300kg. Figure 2 shows an image of a typical Frame within which the ADCP is contained. The frame is attached to a ground line, a clump weight and to an acoustic release system carrying a rope retrieval system. The frame also houses a recovery line attached to a small rigid buoy which is held in place by an acoustic release, which releases the buoy on command from a deck unit. Also housed within the frame is lead ballast to secure the frame to the seabed. Additional instrumentation to collect salinity and temperature data may also be contained within the frame. An acoustic pinger is also mounted on the frame to aid in the recovery of the frame in the event of the acoustic release not firing. The frame is deployed with a grapple hook and floating nylon line to serve as a backup means of recovery.

ADCP Deployment

The units will be deployed from the desk of a vessel onto the seabed where they will remain fully submerged throughout the tidal range**.** Deployment is carried out by lifting the ADCP from the deck of the vessel via a deck crane or A-frame and winch.

Operation

During operation the units will emit "pings" of sound in the range of 600 Khz or 1 Mhz at a sampling rate of 1-minute average every 10 minutes. The ADCP will be left *in-situ* for the sampling duration which will be no less than 32 days.

Recovery

Recover is facilitated by a hydrostatic release which, on command, sends a ranging ping to the release mechanism which if successful releases a buoy connected to a recovery line. The vessel can then simply move into position over the buoy and recover the ADCP into the boat via the crane. On occasion hydrostatic releases fail. To overcome this issue the ADCPs are also fitted with acoustic pingers which can be activated to aid the location of the ADCP and the acoustic release then attempted again. If the release still fails to work the recovery is then attempted by a grapple recovery. This involves trawling a line with a grapple attached across the seabed in the area where the deployment took place to snag the grapple line between the ADCP and grapple anchor.

2.1.2 Bathymetry assessment

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).

Single-beam sonar 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.

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.

2.1.3 Vessel

To facilitate the deployment and recovery of ADCP's, ancillary instrumentation and the collection of ancillary data (e.g. CTD and bathymetry data) a shallow draft vessel approximately 16m in length will be contracted. An appropriate vessel of this size capable of deployment of an ADCP would typically operate with an inboard diesel engine within a capacity of up to 400hp/300 kW.

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 (e.g. Irish Whale and Dolphin Group, ObSERVE project) 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, a number of cetacean species have been frequently recorded within the proposed six licence areas, or within close proximity (<1km of them). This includes Common dolphin (*Delphinus delphis*), Harbour porpoise (*Phocoena phocoena*), Bottlenose dolphin (*Tursiops truncates*), Minke whale (*Balaenoptera acutorostrata*), Humpback whale (*Megaptera novaeangliae*) and Fin whale (*Balaenoptera physalus*). Additional species such as Killer whale (*Orcinus orca*) and Rosso's dolphin (*Grampus griseus*) have also been recorded along this area of the coast.

4.2 Otter

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. With the exception of Area F (Roaringwater Bay and Islands SAC), see Figure 2, the proposed licence areas are not listed as otter commuting habitat (NPWS, 2019). However, given the recorded wide distribution of otters around the coast of Ireland, especially in areas where freshwater sources join the sea, it is considered there is potential for otters to be present within the additional areas covered by the additional five proposed licence sites.

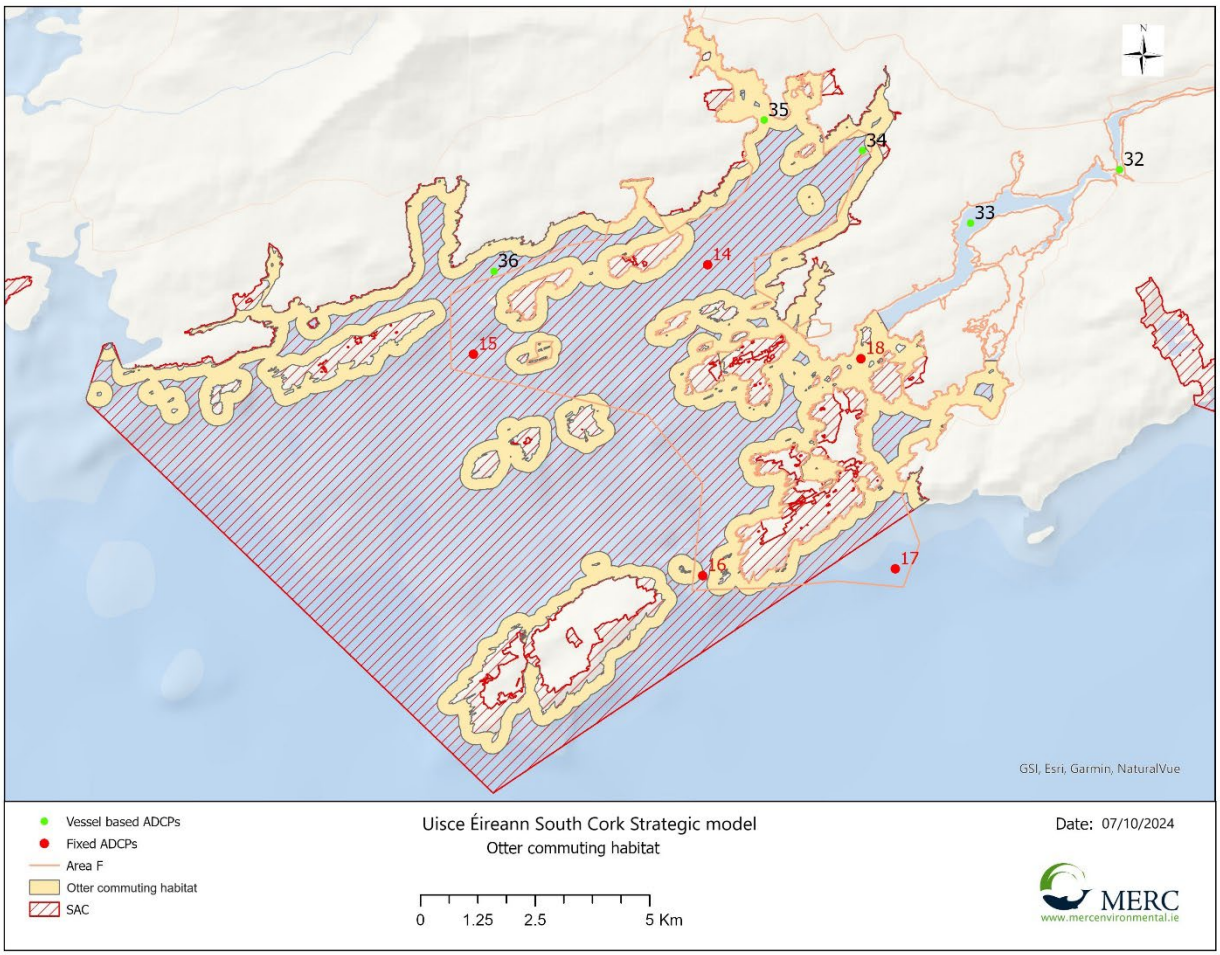

Figure 2. Otter commuting habitat

4.3 Reptiles (marine turtles)

Leathery Turtle (*Dermochelys coriacea*) are recorded occasionally from around the entire coast of Ireland. A total of 37 records for this species were found for the area within or adjacent to six proposed licence areas. However, it should be noted that this dataset has been collated from data collected over many decades and sightings of turtles in Irish waters are considered rare.

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*)

With the exception of Whiskered bat and Lesser horseshoe bat, records for all of the aforementioned species are available for the south coast of Ireland within the 100km grid squares that cover the coastline and their adjacent waters. While bats are typically 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

The effects of underwater noise on marine mammals can lead to disturbance, harm or injury depending on the type and frequency of the noise and distance of the receptor.

Noise resulting from the operation of acoustic equipment and vessel noise

Cetaceans rely on sound to navigate, to communicate with one another and to sense and interpret their surroundings. Behavioural responses of 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.

Vessels produce what is referred to as non-pulse (non-impulsive) sounds with acoustic characteristics represented by single or multiple discrete sound events within 24 hrs with a continuous sound event without a rapid pulse rise time.

Multibeam echosounders (MBES) of the type proposed for the present survey operate in the range of 200 kHz with sound source levels within the range of 210 – 235dB re 1µPa-m.

ADCPs, of the type proposed for the present project, will be operating in the range of 600 Khz or 1 Mhz.

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 2 details the various functional groups relative to hearing for the majority of marine mammals encountered in Irish waters.

Table 3.Marine mammal functional groups relative to hearing at different sound frequencies.

Cetaceans			**Pinnipeds in water** 75 Hz–75 kHz	**Pinnipeds in air** 75 Hz-30 kHz
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	All species	All species
Species- Ireland Humpback whale Blue whale Fin whale Sei whale Minke whale	**Species– Ireland** Sperm whale Killer whale Long-finned pilot whale Beaked whale species Dolphin species	**Species– Ireland** Pygmy sperm whale Harbour porpoise	**Species– Ireland** Grey seal Harbour seal	**Species– Ireland** Grey seal Harbour seal

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

Southall (2007) describes the sound pressure levels associated with the various functional groups as detailed in table 3.

Table 4. Sound pressure levels: 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

The proposed MBES is within the auditory range of a number of cetacean species. However, in the case of the proposed project, MBES will only be conducted in the intertidal area. In this case the fan of insonification will be very narrow and will dissipate within about 200m to levels below those documented to lead to TTS, or indeed behavioural changes within all marine mammal functional groups. Considering these factors and the lack of any significant use of the intertidal area by cetacean species impacts on cetaceans are considered highly unlikely. However, with due regard to the precautionary principle, and in line with NPWS (2014) recommendations for the operation of MBES in enclosed embayments, it is recommended that the measures detailed in section 7 are implemented to ensure negative impacts on cetaceans is mitigated.

While data on turtle sensitivity is low, turtles are considered to be low frequency receptors with peak sensitivity in the range of 300-400Hz and a useful hearing span of 60-100Hz (Ridgeway *et al*, 1969). The auditory threshold for otters (in air) is at 80 dB SPL with hearing ranging from around 200 Hz to 32 kHz, with lowest thresholds around 4 kHz (Voight *et al*. 2019). Therefore, hearing frequency in both species is outside of the range of the proposed MBES.

The proposed ADCPs will be operating in the range of 600 Khz or 1 Mhz and as such are outside of the recorded auditory range of Annex IV marine mammals. Therefore, no potential for impact is predicted from ADCP operation.

The noise level output from a vessel operating with an inboard diesel engine, of the size proposed, would be frequently encountered in this area, associated with other vessel traffic (fishing boats, passenger vessels and recreational craft). Therefore, noise related disturbance resulting from the proposed survey vessel will not occur at levels that could adversely affect the marine mammal use at the site.

Disturbance resulting from the presence of the survey vessel

The survey vessel will be operating across all areas of the site during deployment of ADCPs and bathymetric assessments. **Annex IV** Marine mammals using the area will be habituated to vessel traffic and the temporary presence of one additional vessel will not significantly contribute to vessel traffic in the area. It is therefore considered that it is very unlikely to have a significant impact on Annex IV species.

While bats may make use of adjacent areas no disturbance related impacts due the survey vessel operating in the area are possible. No suitable roosting areas occur in the marine survey areas.

6. Conclusion

It is concluded that the proposed project may give rise to minor behavioural changes in cetacean species, particularly harbour porpoise and Bottlenose dolphin, should they be present during surveys. Therefore, with due regard to the precautionary principle and in line with NPWS (2014) guidance for the operation of MBES, the measures to mitigate any adverse impacts on cetaceans as a result of noise detailed in section 7 are recommended.

No impact on any additional Annex IV species have been identified.

7. Recommended mitigation

The National Parks and Wildlife Service *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters* recommends a distance of 1000m radial distance for geophysical surveys including multibeam in water depths of <200m (NPWS 2014).

The measures outlined below are applicable to

(i) all seismic surveys (including the testing and full operational use of airguns, water guns, sparkers, boomers and vertical seismic profiling [VSP] or checkshot systems) in inshore and offshore Irish waters;

(iii) all multibeam, single beam, side-scan sonar and sub-bottom profiler (e.g., pinger or chirp system) surveys within bays, inlets or estuaries‡‡ and within 1,500m of the entrance of enclosed bays/inlets/estuaries;

(iii) or as advised by the relevant Regulatory Authority

<u>Multibeam, single beam, side-scan sonar surveys</u>

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.

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

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 above 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.

Breaks in sound output

10. 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.

11. For higher output survey operations which have the potential to produce injurious levels of underwater sound 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

12. Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory Authority.

Given that sections of the proposed surveys will be conducted adjacent to the shore, best practice is to ensure that no animals are entrapped between the survey and the shore, particularly in embayments where escape is difflcult. Survey lines should be soft-started on the shoreward end of a line and move towards open water (i.e. inshore-offshore transects and not parallel to the shore) to allow any animals present ample opportunity to leave the area.

8. References

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