ANNEX IV SPECIES RISK ASSESSMENT ON THE RIVER BARROW, CO WEXFORD

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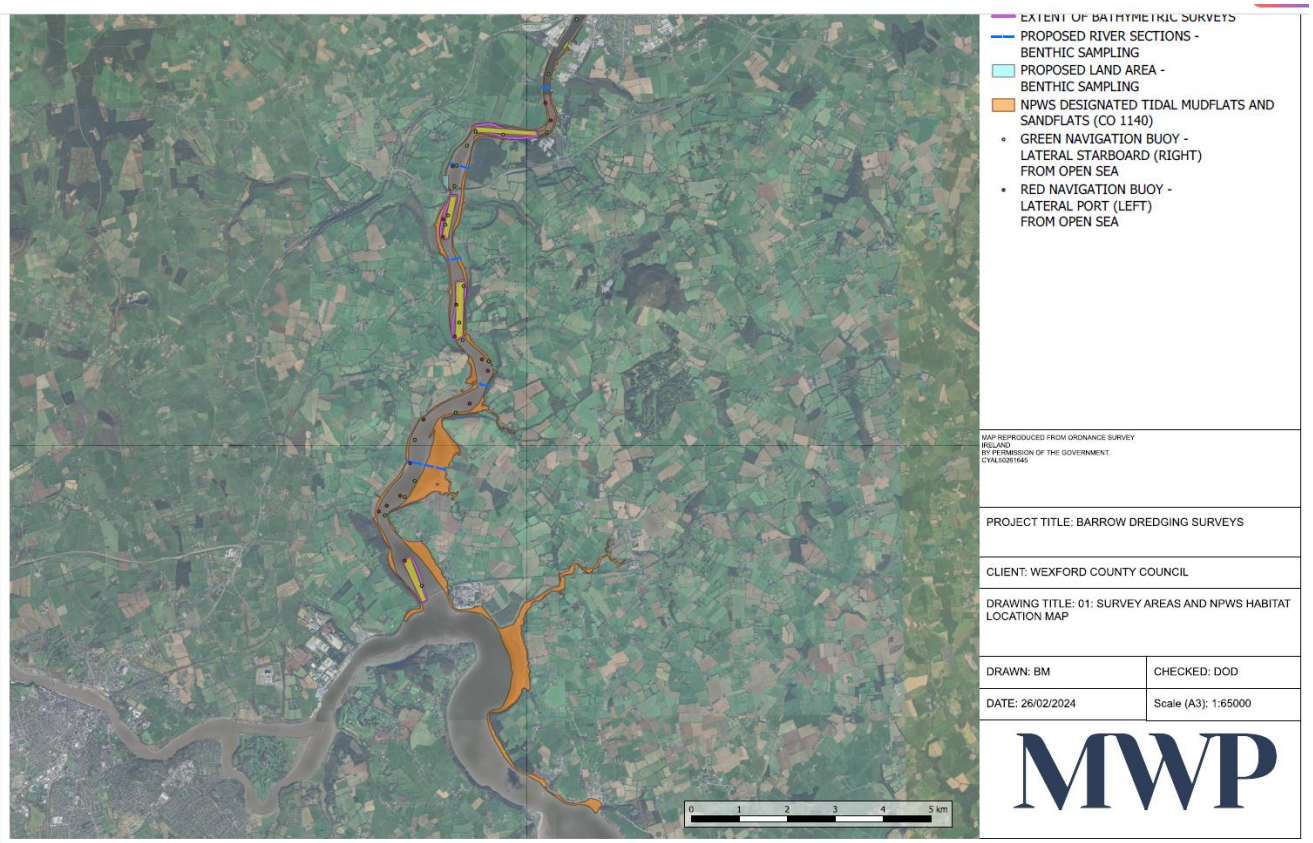
1 | INTRODUCTION

The Irish Whale and Dolphin Group (IWDG) was contracted by Malachy Walsh and Partners (MWP) to carry out an Annex IV Species Risk Assessment of the proposed surveys in relation to potential dredging works in the River Barrow estuary between New Ross Town Jetty downstream to the Barrow Bridge at the confluence with the River Suir. It is proposed to undertake a benthic ecological survey, an oceanographic survey and to take a number of riverbed samples for analysis to inform assessments in relation to potential future dredging work. Annex IV species include cetaceans, marine turtle, otter and bats.



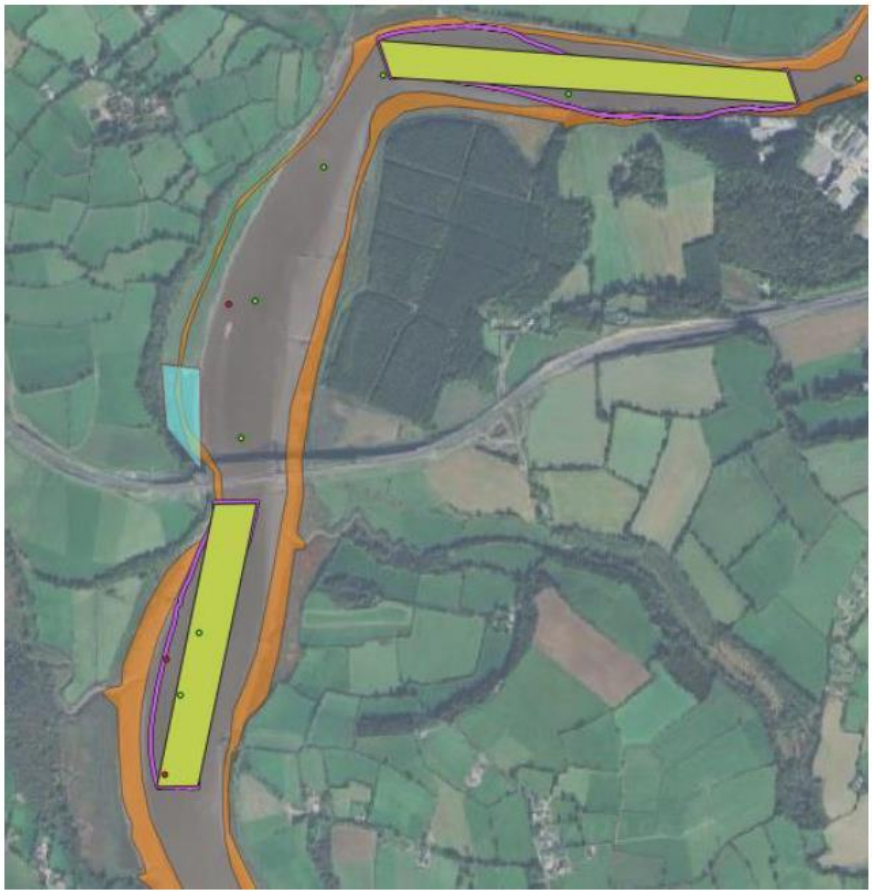


Figure 1: Location of works near to New Ross

Proposed works

The proposed survey works consist of:

a. Oceanographic surveys, including;

i) 10 sediment samples, collected vis hand deployed stainless steel Van Veen grab sampler from a small boat, conducted in line with a Marine Institute Sampling Plan .
ii) tidal monitoring at two locations (Cheekpoint Pier, and New Ross Town Pier) using a Valeport Tidemaster vented tide gauge, which are mounted above the highest water level.
iii) tidal currents at 3 locations (near Town Pier, within the Halfway dredge area, and just upstream of the Barrow Bridge) using a Nortek Eco sensor ADCP mounted on a small (1m2) metal frame on the seabed.
iv) water sampling at the three tidal current measurement locations as above, on mid flood and mid ebb on a spring and neap tide, using a Niskin water sampler
v) turbidity will be measured at the three tidal current measurement locations at hourly intervals over a 14 hour period on a spring and neap tide (within 14 days), using an Aqua TROLL 400 Multiparameter Probe
vi) Side scan sonar and magnetometer surveys, using a CMAX dual frequency side scan sonar, and a Geometries G882 single magnetometer, respectively, each towed from a vessel over the dredge areas

b. Benthic surveys; 26 seabed samples of subtidal and intertidal habitats, within the 6 potential dredge sites and also a land area of interest to be taken using a day grab deployed from survey vessels.

Receiving Environment

The receiving environment includes the area adjacent to the proposed site investigations and sampling stations. The receiving environment includes the benthos, the benthic, demersal and pelagic fish in the area, and the species listed on Annex IV including marine mammals, marine turtles, otter and bats.

2 | METHODS

This risk assessment was based on original data collected by the IWDG and a review of the available literature. The IWDG Sightings dataset, which is validated and updated daily was accessed and data from a 20 year period 2004 to 2023 was exported and mapped.

3 | LEGAL STATUS

Irish cetaceans (whales, dolphins and porpoises), pinnipeds, otter and Leatherback Turtle are all protected under national legislation and under a number of international directives and agreements which Ireland is signatory to. All cetaceans, as well as grey and harbour seals, are protected under the Wildlife Act (1976) and amendments (2000, 2005, 2010 and 2012). Under the act and its amendments, it is an offence to hunt, injure or wilfully interfere with, disturb or destroy the resting or breeding place of a protected species (except under license or permit). The act applies out to the 12 nml limit of Irish territorial waters.

All cetaceans, otter and Leatherback Turtle are protected under Annex IV of the EC Habitats Directive (92/43/EEC). The Directive lists Annex IV species of community interest 'in need of strict protection'. Pinnipeds are not listed on Annex IV but are listed on Annex II, which also includes the harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), leatherback turtle (*Dermochelys coriacea*) and otter (*Lutra lutra*) which are of community interest and whose conservation requires the designation of special areas of conservation.

Ireland is also signatory to conservation agreements such as the Bonn Convention on Migratory Species (1983), the OSPAR Convention for the Protection of the Marine Environment of the northeast Atlantic (1992) and the Berne Convention on Conservation of European Wildlife and Natural Habitats (1979).

Under the EU Marine Strategy Framework Directive with respect to maintaining good environmental status (GES), "*human activities should occur at levels that do not adversely affect the harbour porpoise community at the site*" and "*proposed activities or operations should not introduce man-made energy at levels that could result in a significant negative impact on individuals and/or the community of harbour porpoise within the site*". This refers to the "*aquatic habitats used by the species in addition to important natural behaviours during the species annual cycle*".

In 2007, the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht produced a '*Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters* (NPWS, 2007). These were subsequently reviewed and amended to produce '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*' (NPWS, 2014). The guidelines recommend that listed coastal and marine activities be subject to a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process.

Once the listed activity has been subject to a risk assessment, the regulator may decide to refuse consent, to grant consent with no requirement for mitigation, or to grant consent subject to specified mitigation measures.

4 | BASELINE ENVIRONMENT

4.1 | Ambient Noise Levels

Ambient, or background noise, is defined as any sound other than the sound being monitored (primary sound) and, in the marine environment, is a combination of naturally occurring biological and physical sound sources including sediment transfer, waves and rain and that of a biological origin including fish, crustaceans and from marine mammals. The impact of noise created by human activity is strongly influenced by background or ambient noise, the impact is less in a noisy environment compared to a quiet environment and it's the intensity and frequency of this increased noise compared to the ambient levels at a site, which defines its impact. As ambient noise levels increase, the ability to detect a biologically important sound decreases. The point at which a sound is no longer detectable over ambient noise is known as acoustic masking. The range at which an animal is able to detect these signals reduces with increasing levels of ambient noise (Richardson *et al.* 1995). This is important when considering the impact of sound sources on marine mammals by the proposed works.

Ambient noise levels worldwide have been on the rise in recent decades with developments in industry and, in particular, in commercial shipping. In the North Pacific, low frequency background noise has approximately doubled in each of the past four decades (Andrew *et al.* 2002), resulting in at least a 15- to 20-dB increase in ambient noise. In recent years, interest has grown in the effects of anthropogenic noise on marine life. There are no baseline line ambient noise measurements for this site or any adjacent sites.

4.2 | Marine Mammals

This risk assessment was based on original data collected by the IWDG and a review of the available literature. The IWDG Sightings dataset, which is validated and updated daily, was accessed (on 20 August 2024) and data over a 20 year period (2004 to 2023) was exported and mapped.

A review of validated cetacean (whale, dolphin and porpoise records) submitted to the IWDG accessed 37 records of cetaceans and (Table 1) and of these two were identified to species level. Of the four records upriver around New Ross (two were unidentified as dolphin species but possibly harbour porpoise) were most likely of harbour porpoise. Interestingly sighting records upriver were recorded in four separate years between the months of March and May. All 19 sighting records of common dolphins were in the main estuary off Cheekpoint but with 600-700m of the proposed dredge site to the north. Of these 19 records, 78.9% were during November to February suggesting sightings outside this period are rare.

Table 1. Cetacean sightings (including IWDG downgrades) recorded in the area of interest from 2004-2024

Species	No. sightings	No. individuals	% of records
Harbour porpoise	14	24	37.8

Common dolphin	19	754	54.1
Dolphin species	1	1	
Dolphin species possibly harbour porpoise	3	5	
Total	**37**	**783**	

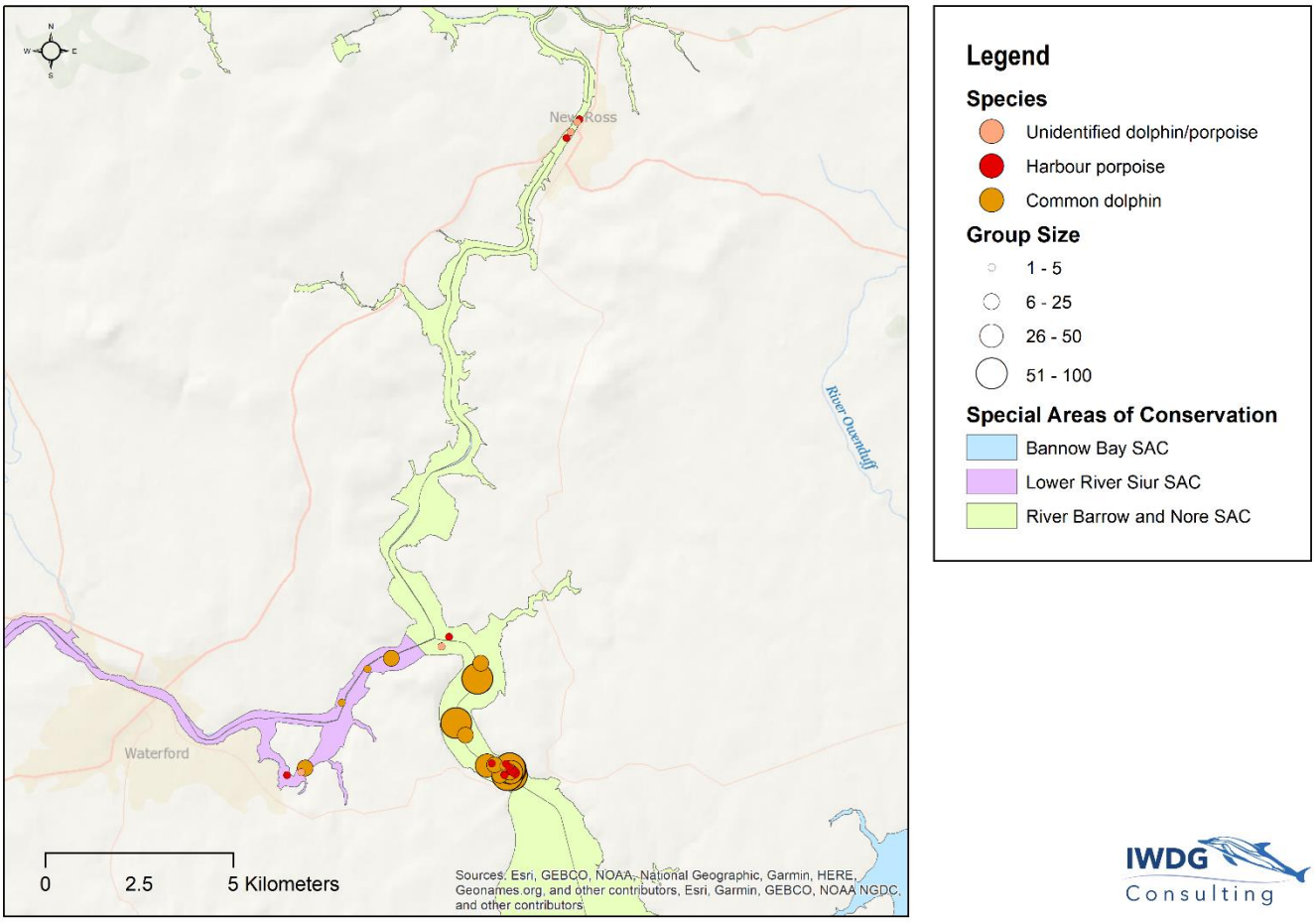


Figure 2: Sightings of Harbour Porpoise and Common dolphins.

Harbour porpoise (Phocoena phocoena)

Harbour porpoise are the most widespread and abundant cetacean in inshore Irish waters, with highest abundances in the Irish Sea (Berrow *et al.* 2010). Although coastal, sightings as far upriver as New Ross are unusual. As all sightings upriver occurred during spring its likely they were following prey upriver such as smelt which is one of the few rivers which still support breeding populations in Ireland (Quigley *et al.* 2004). Adult smelt migrate upstream from estuaries and into the lower reaches of large clean rivers between January and April. One sighting also occurred off Cheekpoint in Waterford Estuary (Fig 2).

Common dolphin (Delphinus delphis)

Common dolphins occur frequently and at high densities in the Celtic Sea especially during the autumn and winter (Wall *et al.* 2013). They are regularly encountered in the mouth of the Waterford Estuary with groups moving upriver chasing prey. The autumn and winter period coincides with the presence of pelagic schooling fish in the area especially sprat which are a preferred prey of common dolphins (Volkendandt *et al.* 2014). Common dolphins are gregarious and commonly occur in group sizes of tens of animals. They readily approach vessels and may bow ride for extended periods.

4.3 Other Annex IV species

Other Annex IV species of interest include marine turtles, otter and bats. Data from the National Biodiversity Data Centre was also accessed to help inform this Annex IV assessment.

4.3.1 Leatherback turtle (Dermochelys coriacea)

Leatherback turtles are the largest extant sea turtle and have many unique anatomical and physiological adaptations. These include the absence of a hard shell, possession of an extensive layer of peripheral blubber (Doyle 2007) and a rete-like arrangement of blood vessels at the proximal end of each fore flipper (counter-current heat exchangers) (Doyle 2007).

There are no records of marine turtles at or adjacent to the sites of interest (King and Berrow 2009).

4.3.2 Otter (Lutra lutra)

Records of otters along the River Barrow in the area of interest are infrequent (Fig 3a). Reid *et al.* (2013) categorised Co Wexford as having intermediate densities (0.10/0.15 females per km^2) compared to other parts of Ireland. Otters were present in all 10km^2 blocks in the area of interest between 2007-2011 (Fig 3b, Reid *et al.* 2013).

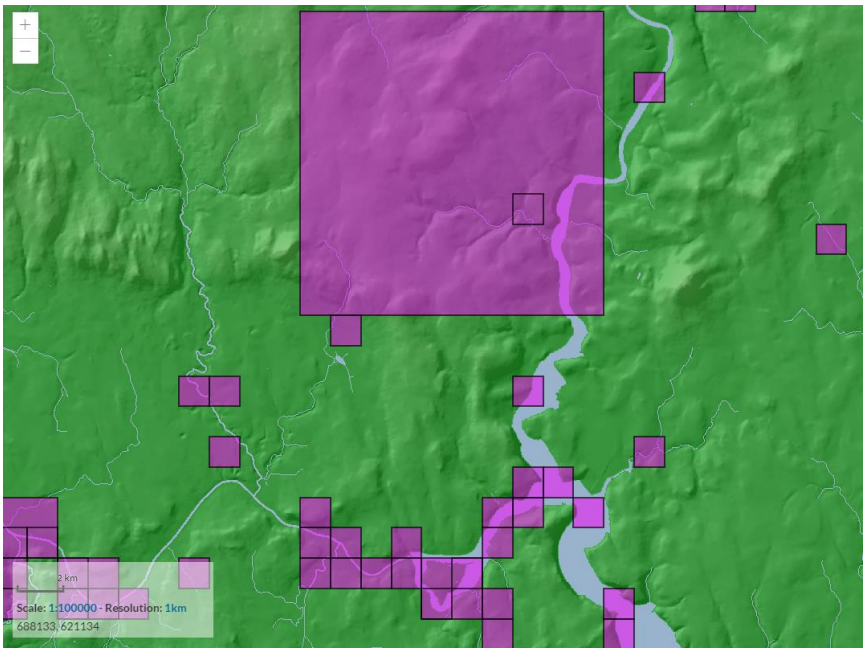


Figure 3a. Map of otter distribution on the River Barrow to Waterford Estuary (map courtesy of the National Biodiversity Data Centre).

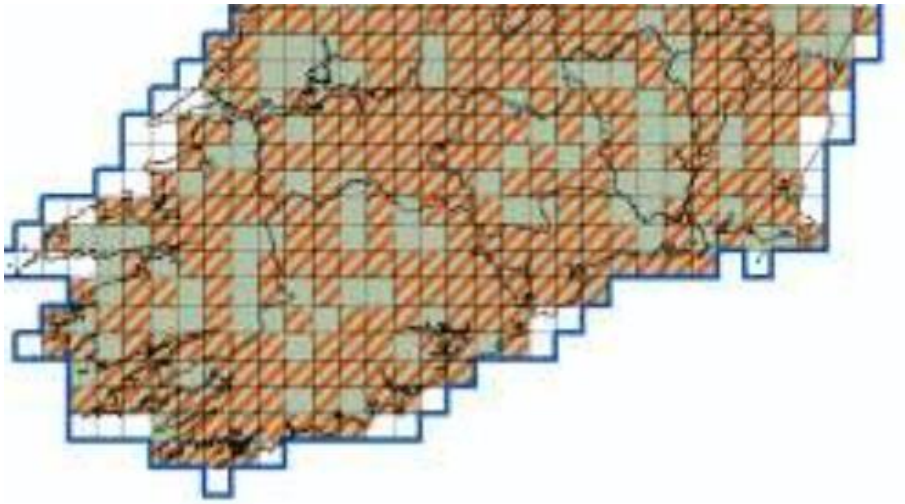


Figure 3b. Map of otter distribution along the south coast of Ireland (from Reid et al. 2013).

In Ireland, the territory of female otters is 6.5 ± 1.0km in coastal environments (de Jongh *et al.* 2010) and for males it may be a larger extent, where for both females and males a total width of coastal water body would be 80m (NPWS, *Lutra lutra* (1355) Conservation Status Assessment Report). Underwater, hearing sensitivity is significantly reduced compared to pinniped species, demonstrating that otter hearing is primarily adapted to receive airborne sounds (Ghoul *et a*l. 2014).

4.3.3 Bats

Bats are also protected under the EU Habitats Directive (92/43/EEC). The lesser horseshoe bat which is found in the Republic of Ireland only is listed in Annex II of the EU Habitats Directive, while all bat species are listed in Annex IV of the Directive. This Annex IV Species Risk Assessment has also considered the potential for any impacts from the proposed activities at the site on any of the ten species of bat that are confirmed as resident in Ireland (Kelleher and Marnell, 2006).

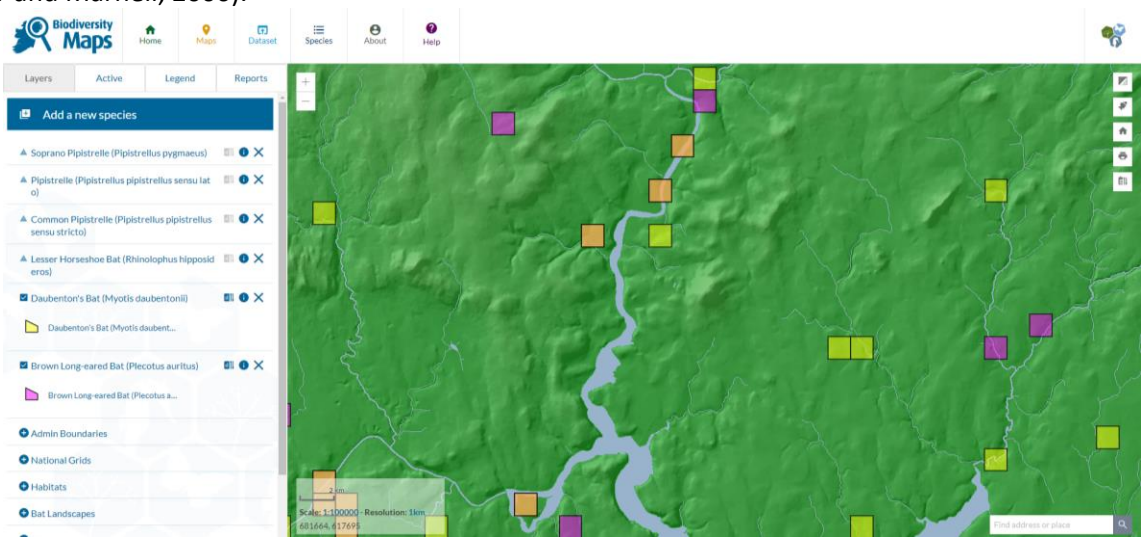


Figure 4a. Map of bat distribution on the River Barrow to Waterford Estuary (map courtesy of the National Biodiversity Data Centre).

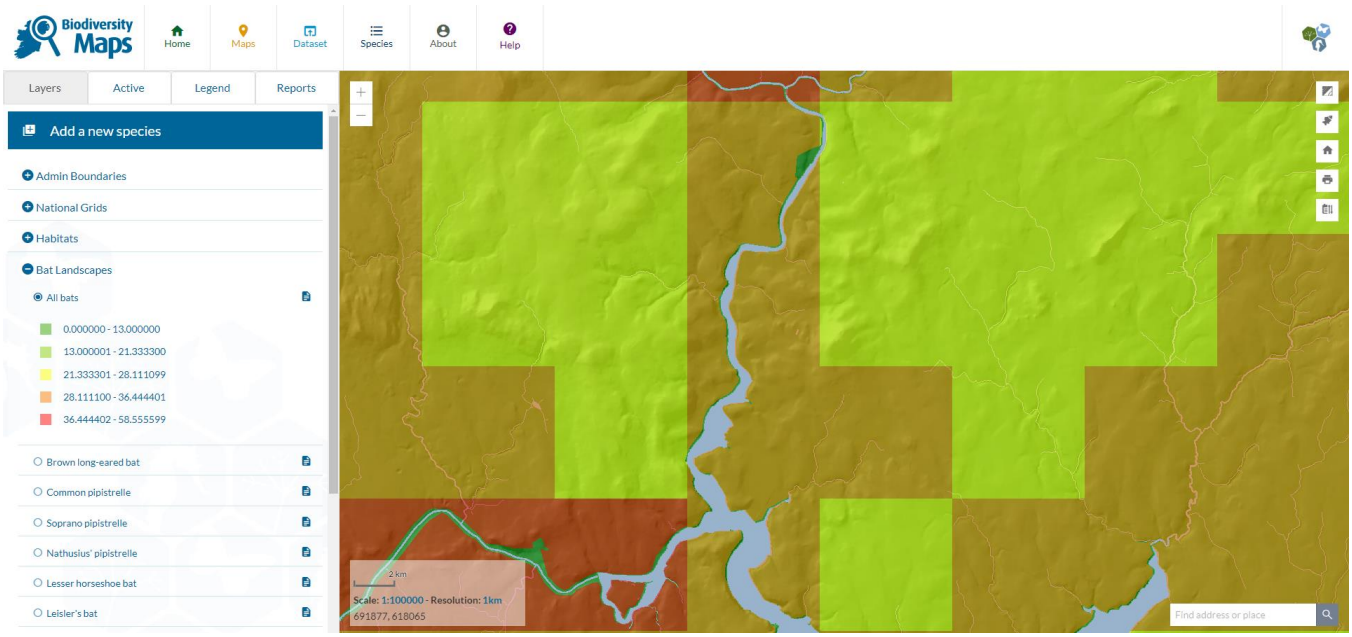


Figure 4b. Map of bat landscapes on the River Barrow to Waterford Estuary (map courtesy of the National Biodiversity Data Centre).

A review of existing bat records within a 10km radius of the study site (sourced from BCIreland's National Bat Records Database) showed that only a few Irish bat species have been recorded locally. Namely Common and Soprano Pipistrelles and Daubetons Bat (*Myotis daubentonii*) according to data supplied by the National Biodiversity Data Centre and none close to proposed survey sites (Fig 4a). Lundy et al. (2011) reported low densities of bats (13.000 - 21.333 'habitat suitability' index) as predicted by modeling of bat landscapes (Fig 4b).

5| IMPACT ASSESSMENT

The potential effects of the proposed marine activities on Annex IV species was addressed by assessing the likelihood that these species would be exposed, or interact, with marine activities. Impacts assessed include likelihood of occurrence, and disturbance especially from noise emitted during benthic and sediment sampling and geophysical surveys. Geophysical surveys have the potential to cause lower level disturbance, masking or behavioural impacts, for example (NPWS 2014) if sensitive species are in the area.

5.1 | Description of Activities

5.1.1 Sediment sampling

Sediment sampling will be conducted in line with a Marine Institute Sampling Plan. Ten samples are to be taken within the six potential dredge areas. All the samples will be analysed for suite of contaminants drawn up by the Marine Institute (MI), which checks suitability for disposal at sea. A further 10 samples will be taken at the same locations. Of these, samples from the two locations nearest New Ross (Town Quays and Marsh meadows) will also be analysed for what is termed the Rilta/WAC suite of criteria – for disposal of material to land and to classify the material for such disposal. The further 8 will be stored in case analysis is required.

The sediment sampling survey will be undertaken vis hand deployed stainless steel Van Veen grab sampler deployed from a small boat, the details of which are in the following section. At each of the 10 locations a few kg of material will be recovered to ensure sufficient material for analysis. It is anticipated that the 10 samples will be taken over a 3 to 6 hour period on one day.

5.1.2 Benthic Sampling

The benthic survey will be undertaken by means of taking grab sampling from subtidal and intertidal habitats at 26 locations, and the inspection of the estuary bed using video and stills imagery at some 30 locations.

i) 21 sub tidal samples will be taken, 3 at each of the six potential dredge sites and also within the "land" area north of Pink Rock.
ii) 5 intertidal samples will be taken at the potential dredge areas except the Town Quay
iii) A single 0.1m^2 grab sample to be collected at each of the subtidal sampling stations.
iv) An additional grab will be collected for Grainsize and Loss on Ignition.

All estuary bed sampling will be completed using a 0.1m^2 Day grab deployed from MERC's (the contractor) in-house survey platform. Intertidal areas will be accessed during suitable tidal conditions.

5.1.2 Geophysical activities

Side scan sonar and magnetometer surveys are to be undertaken within the potential dredge sites. They involve a boat pulling the sonar or magnetometer in a series of lines over the potential dredge areas. The line spacing is likely to be 10 to 20m or greater to ensure 100% coverage. The side scan and magnetometer surveys will each be undertaken over 2 to 3 days. Side scan sonar will be measured via a CMAX dual frequency side scan sonar (325/780kHz) and run at line spacings sufficient to allow 100% in sonification / imaging.

The pulses from the side scan sonar are outside hearing range of humans. The magnetometer survey will be undertaken with a Geometries G882 single magnetometer, an industry standard solution. The towfish will be towed as close to the riverbed as possible and at a grid spacing sufficient for archaeological detection (30m minimum). The magnetometer measures anomalies in the earth's magnetic field caused by metal objects in the river bed.

5.2 | Literature Review of Impacts and Mitigation

The NPWS '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters – January 2014*' recommends that listed coastal and marine activities, undergo a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process. It is required that such an assessment must competently identify the risks according to the available evidence and consider (i) direct, (ii) indirect and (iii) cumulative effects of anthropogenic sound (NPWS 2014).

5.2.1 Benthic and sediment sampling

Annex IV species in the area are repeatedly exposed to many vessels, small and large, thus the presence of an additional vessel during sampling for only a few days is unlikely to have any effect.

5.2.2 Geophysical including ADCPs

The NPWS '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters – January 2014*' recommends that listed coastal and marine activities, undergo a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process. It is required that such an assessment must competently identify the risks according to the available evidence and consider (i) direct, (ii) indirect and (iii) cumulative effects of anthropogenic sound (NPWS, 2014).

The potential effects of geophysical surveys on Annex IV species was addressed by assessing the likelihood that these species would be exposed, or interact, with marine activities. Impacts assessed include likelihood of occurrence, and disturbance especially from noise emitted during survey work and from the extra marine activity. Acoustic disturbance includes the ability of the individual to detect increased noise levels over ambient levels, masking, Temporary Threshold Shift (TTS) and Permanent Threshold Shift (PTS) and behavioural impacts, i.e. resulting in a behavioural change by individuals. The potential effects of indirect impacts on preferred prey are also considered.

Table 2. Summary of geophysical equipment and sound outputs (from BlueWise 2023).

Marine Acoustic Source	Transmission Frequency	Source Level (dB re 1 µPa @ 1 m)	Example System(s)	Planned in surveys described in FLU applications
AIRGUNS, MARINE VIBRATORS				
Single airgun	15-60 Hz	216–235	Sercel 105/105 in³ GI-Source gun; Teledyne Bolt airguns up to 250 in³	Maybe
Airgun arrays	15-60 Hz	228–259	Multiple GI-Source or other airguns	No
Marine vibrator	5-100 Hz	unknown	Vibroseis experimental source	No
HIGH-RESOLUTION GEOPHYSICAL (HRG) SOURCES				
Boomer (seismic)	300-3000 Hz	185-207	Applied Acoustics S-boom	Yes
Sparker (seismic)	300-1400 Hz	185-226	Applied Acoustics Delta Sparker, SIG ELC sparker	Yes
Bubble gun (seismic)	20-2000 Hz	194-220	HMS-620	No
SUBBOTTOM PROFILERS (SBP)				
Hull-mounted	3.5, 12 kHz	199-232	Knudsen 3260 (4 x 4 array)	Yes
Shallow-towed	0.5-24 kHz	146-180	Edgetech 512i, Edgetech 424	Yes
Parametric	1-115 kHz	206-247	TOPAS, Innomar systems	Yes
HYDROGRAPHY				
Multibeam echo-sounder (MBES)	12-600 kHz	175-245	Kongsberg EM122, EM302, EM710, Reson 7160, ME70	Yes
Sidescan sonar (SSS)	65-500 kHz	196-224	L3 Klein 5000, Edgetech 4200	Yes
BIOLOGICAL ACOUSTICS – FISH FINDING SONARS				
Split beam echo-sounder (sonar)	18-333 kHz	212-229	Simrad EK60/80	No
Industry fish finder	14-220 kHz	< 200-210	Simrad SC90, ST90, SN90, SX90	No
OCEANOGRAPHIC ACOUSTIC INSTRUMENTS				
ADCP	38 to >300 kHz	211-227	Teledyne RD Workhorse	Yes
Scientific sonar (split beam)	Up to 1000 kHz	210-220	Bio-sonics DT-X Extreme	No

Geophysical acoustic surveys in marine or coastal waters involve the systematic collection of information on the physical environment by means of sound signal production, reception, analysis and interpretation. Such techniques may be used, for example, to investigate bathymetry, to analyse the structure and composition of the seabed substrate, to explore extensively for and investigate subsurface geological structures or to survey specific targets (e.g., hydrocarbon reservoirs, wrecks, oceanographic features). Such methods commonly involve the use of ships or smaller vessels fitted with specialised equipment or from which such equipment can be deployed or towed. The level of environmental impact associated with this acoustic activity is variable depending on a number of factors including the type of the equipment being used, its sound signal and propagation characteristics, and the depth in which it is operating (NPWS 2014).

Geophysical and geotechnical equipment produce a wide range of frequencies and source levels. Bluewise (2023) reviewed the effects of acoustic surveys on fish and Anex IV species including marine mammal sand turtles. Sub-bottom profilers produced frequencies of 1-6 kHz at a source level of 200 dB re 1µPa @1m, while multibeam and side-scan sonar much higher frequencies of 200-230kHz at 218-229 dB re 1µPa @1m (Table 2). The model indicated that odontocetes were most likely to hear sounds from mid-frequency sources (fishery, communication, and hydrographic systems), mysticetes from low-frequency sources (sub-bottom profiler and airguns), and pinnipeds from both mid- and low-frequency sources. High-frequency sources (side-scan and multibeam) generated the lowest estimated sensation levels for all marine mammal species groups.

5.2.3 Indirect impacts on prey

Prey such as fish and crustaceans are very unlikely to be affected as the impacts will be extremely local and of short duration.

5.3 Risk Assessment

5.3.1 Acoustic disturbance

The potential for disturbance to Annex IV is greatest when elevated levels of underwater noise are considered. Marine mammals, especially cetaceans, have well developed acoustic capabilities and are sensitive to sound at much higher frequencies than humans (Richardson *et al.* 1995). They are less sensitive to the lower frequencies but there is still great uncertainty over the effects of sound pressure levels on marine mammals and thus the assessment of its impact. Sources of noise include that generated during sampling and geophysical surveys and any associated activity during marine operations. The nearest Special Area of Conservation which include Annex IV species (cetaceans) as qualifying interests is Hook Head SAC which nearest boundary lies nearly 20km to the southeast and the proposed marine activities will have no impact on the Conservation Objectives of this site.

Effects on marine mammals

Marine mammals are only likely to occur at the southern edge of the site during winter. Based on these findings it is concluded that the proposed works are very **unlikely** to have an impact on Annex IV species even without mitigation.

Otter and Marine Turtles

Marine turtles and otter are unlikely to occur at the site. Based on these findings it is concluded that the proposed works are very **unlikely** to have an impact on Annex IV species even without mitigation.

Bats

The area has low suitability for bats and no linear features which could function as significant commuting routes and/or feeding areas will be affected. Based on these findings in relation to bats as it is concluded that the proposed works will have **no impact** on the terrestrial Annex IV bat species.

5.3.3 Increased marine traffic

Additional survey vessels will operate in the area during the site investigations and sampling. This increase in vessel noise relative to the daily traffic accessing Waterford City is very low and is unlikely to cause any significant disturbance as commercial, recreational and fishing regularly ply these waters including upriver to New Ross. The presence of an additional small vessels and the associated noise produced, is very unlikely to have a significant impact on marine mammals. As the likelihood of any Annex IV species being in the vicinity of the sampling and survey sites is low, especially if carried out outside of the winter period, there is an very small risk of sound exposure and impact.

5.3.4 Indirect impacts on preferred prey

Indirect impacts may occur on marine mammals and otters if the distribution or abundance of their preferred prey is impacted the proposed marine activities. No adverse effects on fish species are expected from the geophysical surveys or benthic or sediment sampling.

5.3.5 Water quality

There will be no impact on water quality.

5.3.2 Potential disturbance to life-cycle

The proposed marine operations **will not cause** any adverse effects on Annex IV species in the area as the affected areas are small and the duration short-term and the likelihood of Annex IV species at the site is very low.

5.3.5 Cumulative Effects

Cumulative effects will be very limited as the duration of the proposed surveys and sampling is short with the overall field work period will be in the order of 16 days with in-water work during 4 of these daysand no other marine activities are planned in the immediate area to the best of our knowledge, leading to no cumulative effects.

6 | MITIGATION MEASURES

Marine Mammal Mitigation

No mitigation measures are required for benthic or sediment sampling given the unlikely event of a marine mammal occurring in the area and the lack of potential impacts.

6.1 Disturbance

Disturbance if it even occurred is extremely local and of no significance. If geophysical activities are planned for the winter months (November to February) then the use of an MMO could be considered although the likelihood of marine mammals being in the area is low.

6.2 Collision, injury and mortality

There is no risk of injury, mortality or collision.

6.3 Disruption of normal behaviour

Benthic and sediment sampling are very local and occur entirely upriver of Waterford Estuary. Sound exposure levels from geophysical or the ADCP are unlikely to be at levels that are able to cause disturbance to Annex IV species, including, masking or behavioural impacts, however if geophysical activities were planned for the winter months (November to February) then the use of an MMO could be considered although the likelihood of marine mammals being in the area is low. The presence of additional vessels for short periods and the associated noise produced, is very unlikely to have a significant impact on Annex IV species.

7 | NPWS ASSESSMENT

1. **Do individuals or populations of Annex IV species occur within the proposed area?**

   Marine mammal species listed on Annex IV although occurring in the wider area are rare and in terms of common dolphins just outside the site seasonal (winter) and do not occur close to the site of the proposed marine activities. This includes turtles, otter and bats. All marine mammals are also part of a larger population and are very mobile.

2. **Is the plan or project likely to result in death, injury or disturbance of individuals?**

   The project will not cause injury or death nor disturbance, as any impacts including noise associated with the project is very local and there is no evidence of any Annex IV species occurring close to the sites.

3. **Is it possible to estimate the number of individuals of each species that are likely to be affected?**

   No abundance estimates for marine mammals exposed to the proposed activity are available but the numbers in the upper Waterford Estuary are generally low and extremely rare and low at New Ross. Common dolphins occur during winter in small numbers in the outer estuary but not close enough to the site to be adversely affected. Otters are not frequent and densities are considered low in the wider area. Bat landscape mapping predicts low usage at the site. Marine turtles have not recorded in Waterford estuary over the past few years and are extremely unlikely to occur during the proposed marine activities.

4. **Will individuals be disturbed at a sensitive location or sensitive time during their life cycle?**

   The proposed works are scheduled to last for <1 month in total with no preferred season identified. Annex IV species occurring adjacent to sites of interest are sporadic and for common dolphins especially very seasonal. Other species such as harbour porpoise may occur upriver in the spring.

5. **Are the impacts likely to focus on a particular section of the species' population, e.g., adults vs. juveniles, males vs. females?**

There are no data to suggest that any particular gender or age group of Annex IV species predominates in the area suggesting marine operations are not likely to expose any particular age groups or gender.

6. **Will the plan or project cause displacement from key functional areas, e.g., for breeding, foraging, resting or migration?**

Few marine mammals occur at the site and there is no evidence the site is close to important foraging, nursery, resting or migration routes. No displacement will occur. Marine activities will not lead to any significant disturbance, especially if geophysical activities are restricted to outside the period November to February.

7. **How quickly is the affected population likely to recover once the plan or project has ceased?**

No long-term disturbance of Annex IV species in the area will occur.

8 | RESIDUAL IMPACTS

It is very unlikely that there will be any negative residual impacts from the proposed marine operations on Annex IV species in the area as impacts are small and very local.

9 | SUMMARY

Only common dolphins during the winter and the occasional harbour porpoise travelling upriver are the Annex IV species that may be exposed to the proposed marine activities. There is no evidence of marine turtles and densities of otters or bats are low.

No mitigation is required if geophysical works are carried outside the period November to February and no significant impacts to Annex IV species are expected.

10| REFERENCES

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