Wicklow Harbour Maintenance & Disposal at Sea

Risk Assessment for Annex IV Species

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[1] Introduction

[1.1] Preamble

Ayesa, on behalf of Wicklow County Council (WCC), has been commissioned to prepare this Annex IV Species Risk Assessment in support of the maritime consenting process for the proposed Wicklow Harbour maintenance dredging, offshore disposal and supporting bathymetric surveying. The Project includes a single designated offshore disposal site located northeast of Wicklow Harbour.

This assessment has been prepared in accordance with the requirements of the EU Habitats Directive (92/43/EEC) and the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). It evaluates the potential for the proposed dredging and offshore disposal activities to result in disturbance, injury or mortality to species listed under Annex IV of the Directive, which are afforded strict protection throughout their natural range, both within and outside Natura 2000 sites.

This report supplements, but remains separate from, the Supporting Information for Screening for Appropriate Assessment prepared for the project under Article 6(3) of the Habitats Directive, which considers potential effects on designated European sites. The present document is specifically concerned with compliance under Article 12, relating to the strict protection of Annex IV species, irrespective of site designation.

[1.2] Project Overview

The Project involves the periodic removal of accumulated sediments from the inner and outer harbour basins to maintain safe navigational depths for commercial, fishing, Royal National Lifeboat Institution (RNLI), leisure and visiting vessels. Progressive sedimentation within Wicklow Harbour has resulted in the infilling of berthing, manoeuvring and approach areas. The proposed works will remove these deposits using four potential methods of dredging, including Trailer Suction Hopper Dredger (TSHD), Mechanical Dredging, Water Injection Dredging (WID) and plough dredging. The material proposed to be dredged via the first two methods will require disposal at the two proposed offshore disposal sites.

All dredging activity confined to the established harbour footprint and dredged material (via TSHD or barge only) is proposed to be transported by sea for disposal at a newly identified potential disposal site located northeast of Wicklow Harbour.

Pre-and-post bathymetric surveys will also be required.

[1.3] Project Location

The Study Area covers a total area of 0.406 km² and is comprised of (Image 1):

a) The proposed dredging area. The dredge area comprises an area of 0.056 km^2 within Wicklow Harbour, and

b) The identified potential disposal site northeast of Wicklow Harbour. The site is located 2.5km off the shoreline at Five Mile Point and comprises of an area of 0.35 km^2.

Wicklow Harbour is located on the east coast of Ireland within the administrative area of WCC, approximately 50 km south of Dublin. The harbour lies at the mouth of the River Leitrim and is bounded by the R750 coastal road to the west and the Irish Sea to the east. The harbour comprises an inner basin, outer basin and entrance channel, enclosed by the North and South Piers which provide shelter from prevailing easterly swells. The surrounding coastline consists predominantly of mixed sand and cobble substrates, with occasional rocky outcrops and intertidal areas exposed at low tide.

Wicklow Harbour functions as a multi-use facility, accommodating commercial vessels, fishing craft, leisure boats and the adjacent RNLI station. It is a heavily modified, operational marine environment that experiences regular vessel traffic and tidal exchange with the Irish Sea.

The dredging footprint is confined to the existing dredged harbour area, extending across the inner and outer harbour basins and the approach channel. All dredging activities will be undertaken within the established navigation limits, and no encroachment into adjacent seabed areas is proposed.

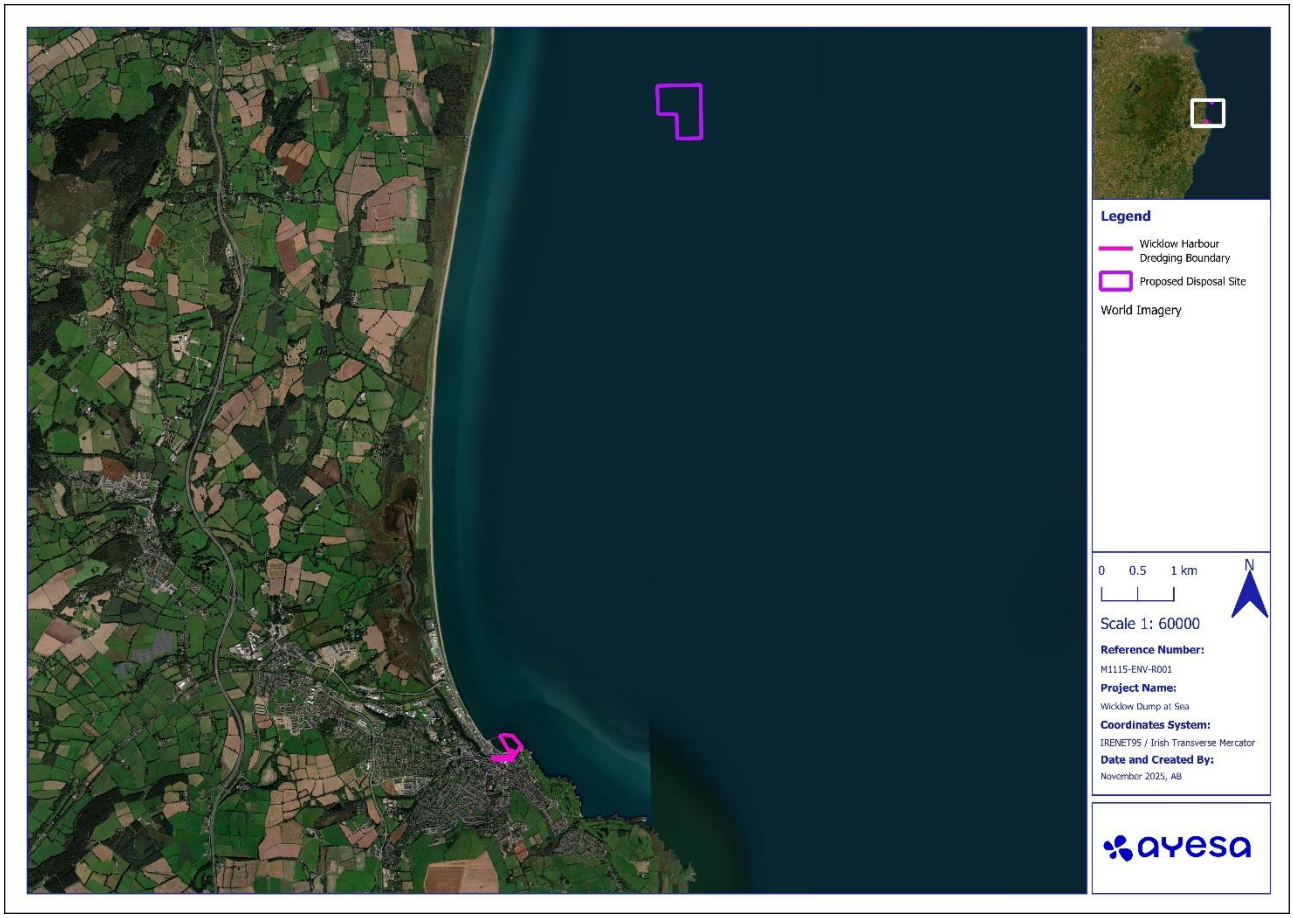

Image 1: Wicklow Dredge Area and Disposal Site Northeast of Wicklow Harbour

[1.4] Purpose of Report

The purpose of this report is to assess the potential for the proposed dredging works within Wicklow Harbour and the offshore disposal of dredged material at the disposal site northeast of Wicklow Harbour to result in disturbance, injury or mortality to species listed under Annex IV of the EU Habitats Directive (92/43/EEC). These species include harbour porpoise (*Phocoena phocoena*),

common dolphin (*Delphinus delphis*), minke whale (*Balaenoptera acutorostrata*), grey seal (*Halichoerus grypus*), harbour seal (*Phoca vitulina*) and otter (*Lutra lutra*).

This report specifically addresses compliance with Article 12 of the Habitats Directive, which requires Member States to ensure the strict protection of European Protected Species (EPS) throughout their natural range, irrespective of whether they occur within or outside designated Natura 2000 sites.

Accordingly, this Annex IV assessment has been prepared to:

- Identify Annex IV species that may occur within or near the dredging area and the two offshore disposal sites.
- Evaluate the potential for the proposed activities to cause disturbance, injury or destruction of breeding, resting or foraging areas used by these species.
- Set out the mitigation, monitoring and management measures required to ensure compliance with the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).
- Support the Dumping at Sea (DaS) Application and assist the Competent Authority in determining that the proposed works can proceed without contravening Article 12 of the Directive.

[1.5] Legislative Context

Under Articles 12 and 13 of the Habitats Directive (92/43/EEC), Member States are required to establish systems of strict protection for animal and plant species listed under Annex IV, which are of Community interest and in need of protection throughout their natural range.

Article 12 requires that Member States take appropriate measures to prohibit the deliberate capture, killing, disturbance, or destruction of breeding or resting sites of Annex IV species. Article 16 of the Directive provides for derogations from these prohibitions only under specific, strictly controlled circumstances.

These provisions are transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended. Regulations 51, 52, and 54 make it an offence to deliberately capture, injure, or disturb protected species, or to damage or destroy their breeding or resting places.

Annex IV species are afforded protection throughout their entire range, both within and outside Natura 2000 sites. It is therefore an offence to deliberately kill, injure, or disturb a specimen in the wild, or to damage or destroy a breeding site or resting place of such an animal.

In addition to the Habitats Directive and associated Irish legislation, Annex IV species - including cetaceans, otters, and seals - are also protected under several international conventions and national legal instruments. These provide a complementary framework ensuring the conservation and management of marine mammals in Irish waters.

Table 1 below summarises the key legislative and policy instruments relevant to the protection of Annex IV species in the study area.

Table 1: Summary of Legislation, Conventions, and Guidance Relevant to Annex IV Species Protection

Legislation / Convention	Annex IV Species Receptor(s)
Habitats Directive (European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora)	All cetaceans, grey and harbour seals, marine turtles, otter
European Communities (Birds and Natural Habitats) Regulations 2011 (as amended)	All cetaceans, grey and harbour seals, marine turtles, otter
Marine Strategy Framework Directive (2008/56/EC)	All cetaceans, grey and harbour seals, marine turtles
Wildlife Acts (1976–2018)	All cetaceans, grey and harbour seals, otter
OSPAR Convention (1998) – Convention for the Protection of the Marine Environment of the North-East Atlantic	Bowhead whale, northern right whale, blue whale, harbour porpoise
Convention on the Conservation of Migratory Species of Wild Animals (CMS / Bonn Convention, 1979)	All cetaceans, marine turtles
Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1979)	All cetaceans, grey and harbour seals, marine turtles, otter
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1973)	All cetaceans, marine turtles
DAHG (2014) Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters	Marine mammals (all cetaceans and seals)
NPWS (2007) Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters	Marine mammals (all cetaceans and seals)

[1.6] Relevant Annex IV Species

A number of Annex IV species listed under the EU Habitats Directive (92/43/EEC) are known to occur within Irish coastal and marine waters, including cetaceans (whales, dolphins, and porpoises), pinnipeds (seals), marine turtles, and otter. These species are afforded strict protection throughout their range, both within and outside designated Natura 2000 sites.

Irish coastal waters, including the western Irish Sea, support a diverse assemblage of cetacean species, with at least 25 species recorded in national waters (Berrow et al., 2010; IWDG, 2025). Of these, harbour porpoise, bottlenose dolphin (*Tursiops truncatus*), and common dolphin are the most frequently observed and are considered resident or regularly occurring along the east coast. Other species such as minke whale (*Balaenoptera acutorostrata*), Risso's dolphin (*Grampus griseus*), and white-beaked dolphin (*Lagenorhynchus albirostris*) are occasionally recorded further offshore.

The grey seal and harbour (common) seal are the two pinniped species regularly present in the Irish Sea. Breeding and haul-out sites are established along the eastern Irish coastline, including Dalkey Island and Wicklow Head (NPWS, 2013; IWDG, 2025). Individual seals are known to forage widely along the Wicklow coastline and may occasionally occur within or near the harbour entrance, particularly in tidal channels where fish may temporarily concentrate.

The otter is a semi-aquatic mammal commonly associated with riverine, estuarine, and coastal habitats. It is widespread in Ireland, with numerous records along the Wicklow coastline. Otters may utilise Wicklow Harbour intermittently for foraging, particularly near the outfall of the River Leitrim and along sheltered quays or breakwaters. The harbour environment is, however, highly modified

and subject to frequent disturbance from vessel traffic and port activity, providing limited opportunity for resting, breeding, or couching.

Marine turtles such as leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*) are infrequent visitors to the Irish Sea and are not expected to occur within the inshore waters of Wicklow Harbour or along the nearshore disposal routes.

Based on a review of existing records from the National Biodiversity Data Centre (NBDC), Irish Whale and Dolphin Group (IWDG), and NPWS online mapping, the following Annex IV species groups are considered relevant to this assessment:

- Otter
- Cetaceans - primarily harbour porpoise, common dolphin, and minke whale
- Pinnipeds - grey seal and harbour seal

[2] Outline of Scope of Works

[2.1] Description of Proposed Works

The Project involves the removal of accumulated sediments from the inner harbour basin, outer basin and entrance channel to maintain safe navigational depths for commercial, fishing, RNLI, leisure and visiting vessels operating from the harbour. Sediment deposition within the harbour occurs as a result of natural coastal processes and fluvial inputs, leading to progressive infilling of berths and approach channels. The proposed dredging works will restore operational depths to ensure the continued safe functioning of this active port facility.

Four potential methods of dredging are proposed to be utilised across the eight years, including Trailer Suction Hopper Dredger (TSHD), Mechanical Dredging, Water Injection Dredging (WID) and plough dredging. An indicative 2-week programme is anticipated for each dredge and offshore disposal occasion however this period may be longer based on the volume to be dredged and the plant available.

Offshore disposal will be carried out under a Dumping at Sea Permit (DaS) issued by the Environmental Protection Agency (EPA).

The total dredge volume requiring offshore disposal over the eight-year programme is estimated at 375,000 m³ in-situ volume (equivalent to 562,500 tonnes wet weight), comprising predominantly silts and fine sands. Dredging depths will typically be restored to a minimum of level –3.0 m Chart Datum, consistent with historical maintenance levels required for vessel access within the harbour.

The key activities associated with the project include:

- Pre-and-post dredging bathymetric surveys.
- Mobilisation of dredging plant and support vessels to Wicklow Harbour.
- Establishment of navigational safety controls and coordination with the Harbour Master and RNLI.
- Mechanical or hydraulic excavation of accumulated sediments using either TSHD, backhoe dredger, WID or ploughing.
- Transport and controlled bottom release of dredged material within the licensed boundaries of the disposal site.
- Demobilisation and reinstatement of working areas on completion of each dredging campaign.

Where required, dredging may be undertaken on a 24-hour basis to optimise tidal windows and minimise disruption to harbour users. The overall programme will extend across multiple dredge events over eight years, with the duration of each campaign determined by plant availability, weather and the volume of material to be removed.

Bathymetric surveys have been undertaken in Wicklow harbour for decades to monitor and assess navigation levels. This is the case for every port, harbour and marina in Ireland and internationally. For monitoring annually Wicklow harbour generally undertaken one bathymetric survey a year currently, which takes approximately three hours to complete. However, additional surveys may be required sporadically should concerns be raised about minor isolated areas or to identify debris. When undertaking a dredging campaign, it is a requirement of the EPA that surveys are undertaken

before and after dredging, both at the loading area and the disposal area. Period interim surveys during the dredging works to monitor progress, identify high spots and determine completion may also be required. Survey take place using a small vessel or an autonomous unmanned survey vessel. Generally, Wicklow Port uses a multi beam echosounder to attain complete coverage of the seabed levels within the harbour.

All works will be supervised by WCC and undertaken in full compliance with relevant maritime safety, environmental and licensing requirements.

[2.2] Disposal Operations

Material dredged by TSHD or backhoe dredger will be transported by sea and disposed of at a single designated offshore disposal site located northeast of Wicklow Harbour.

The offshore disposal site, if permitted, will operate under an EPA Dumping at Sea Permit, issued in accordance with the Dumping at Sea Act 1996 (as amended). Disposal will be undertaken by controlled bottom-release from the hopper dredger or transport barge, strictly within the licensed boundary coordinates specified in the permit.

Disposal operations may be carried out on a 24-hour basis, subject to safe navigation, weather conditions, and implementation of required mitigation measures for marine mammals and other protected species. Disposal activities will be planned to minimise sediment plume dispersion and avoid sensitive periods for marine fauna, where practicable.

No capping, levelling, or seabed preparation is required at the disposal site.

[2.3] Embedded Environmental Controls

The following environmental controls are incorporated into the project design and form part of standard working practice. These measures are embedded, not “additional mitigation”:

- Dredging is restricted to the existing harbour footprint – no capital dredging, seabed deepening, or expansion outside historic limits.
- Only Class 1 (uncontaminated) sediment is proposed for offshore disposal, in accordance with Marine Institute and EPA guidance.
- Offshore disposal will only occur within the licensed boundaries of the offshore disposal site.
- No surface discharge, side-casting, or overspill dumping – disposal is by controlled bottom release only.
- Use of appropriate dredging plant (TSHD, backhoe) to minimise seabed disturbance.
- All dredging and disposal vessels will operate under AIS tracking and maintain VHF contact with the Wicklow Harbour Master.
- Refuelling and waste handling carried out in accordance with MARPOL Annex I & V – no fuelling in open water unless fully controlled.
- Spill prevention measures and certified bunkering procedures in place for all vessels.
- Onboard containment available for all operational oils, lubricants, and waste materials.
- No interaction with intertidal or coastal habitats – all works occur sub tidally and offshore.

- Project design avoids overlap with designated SAC reef habitats.
- No dredging of contaminated sediments and no land-based handling or reprocessing proposed.
- Navigation safety maintained through Harbour Master coordination and Notices to Mariners.

These embedded measures are inherent to the works and apply irrespective of any additional mitigation for Annex IV species, Natura 2000 compliance, or licence conditions. All environmental controls will be implemented under the supervision of the appointed Dredge Supervisor and Harbour Master, with reporting in accordance with EPA DaS Permit requirements.

[3] Baseline Desktop Study

[3.1] Zone of Influence (ZoI)

This Annex IV Species Risk Assessment applies a **Source–Pathway–Receptor (SPR)** framework to identify and evaluate potential interactions between the proposed maintenance dredging and offshore disposal activities and relevant Annex IV species within and adjacent to Wicklow Harbour.

Under this approach, the zone of influence (ZoI) is defined as the spatial extent within which a given environmental change may lead to a measurable or perceptible effect on an ecological receptor. The ZoI is therefore effect-specific, varying according to the source characteristics, environmental pathways, and receptor sensitivities associated with each potential impact (CIEEM, 2019; OPW, 2019).

This methodology provides a more refined and realistic assessment than applying a single precautionary distance, ensuring that the scale of evaluation reflects the nature and reach of each impact mechanism. The following indicative ZoIs have been identified for the principal effect pathways relevant to the proposed works:

- **Underwater noise and vibration:** Determined by the acoustic source characteristics of dredging plant and vessel traffic, propagation loss in shallow coastal waters, and the hearing sensitivities of marine mammals. Expected range of influence: *up to several kilometres* from dredging and disposal sites, depending on ambient conditions.
- **Sediment disturbance and increased turbidity:** Limited to areas of local sediment resuspension within the dredging footprint and immediate harbour approaches. Expected range: *<1 km* beyond the active dredging area.
- **Vessel presence and movement:** Localised within the harbour and transit routes to the offshore disposal sites, with potential for short-term displacement of marine mammals. Expected range: *within 500 m* of active vessels.
- **Accidental spill or pollution event:** Contained by embedded controls and response procedures; no routine risk pathway identified.

Accordingly, the assessment of potential impacts presented in Section 5 considers each source–pathway–receptor linkage individually, with spatial and temporal scales defined by the characteristics of the effect rather than a fixed project-wide buffer. This approach ensures proportionality, scientific defensibility, and consistency with current Irish and EU ecological assessment practice.

[3.1.1] Overview

The ZoI for the Project has been defined using a SPR framework to reflect the spatial extent of each potential effect pathway relevant to Annex IV species.

Under this approach, the ZoI is not a single fixed radius, but varies according to the type and intensity of the activity, the environmental pathways through which effects may act, and the sensitivities of the receiving species. The assessment therefore considers the combined influence of the following two activity areas:

1. The dredging footprint within Wicklow Harbour,
2. The disposal site located northeast of Wicklow Harbour.

The ZoI incorporates pathways relevant to Annex IV species, namely:

- Underwater noise and vibration.
- Vessel presence and movement; and
- Temporary increases in suspended sediment resulting from dredging and disposal operations.

For each of these effect pathways, a precautionary ZoI has been defined based on available site-specific information, published literature, and guidance from NPWS (2014) and OPW (2019). This approach aligns with the methodology applied in the previous Annex IV Risk Assessment prepared by GDG (2024) and remains valid following inclusion of the additional disposal site.

The defined ZoIs for dredging and offshore disposal are spatially discrete and hydrodynamically unconnected. Therefore, no cumulative or synergistic effects between Wicklow Harbour and the offshore disposal sites are expected.

The resulting effect-specific ZoIs are described in the following sections, which outlines their derivation and relevance to the Annex IV receptor groups considered in this assessment.

[3.1.2] Dredging Zone of Influence – Wicklow Harbour

Underwater noise generated by all methods of proposed dredging is expected to be detectable within the immediate harbour environment but will attenuate rapidly due to confinement within the constructed pier walls and the shallow bathymetry of the dredge area.

- The injury / PTS (Permanent Threshold Shift) risk zone is estimated to extend <100 m from the active dredge head, based on standard source levels for TSHD operations in shallow water (NPWS, 2014; Southall et al., 2021).
- The behavioural response zone may extend up to approximately 5 km offshore, consistent with GDG (2024), although harbour porpoise density is expected to be low within the harbour limits due to existing vessel traffic and anthropogenic disturbance.

Suspended sediment plumes arising from dredging are predicted to remain confined to the harbour basin and entrance channel, with full dispersion anticipated within one to two tidal cycles. Given the hydrodynamic separation between the harbour and offshore disposal areas, no plume connectivity is expected between the dredging footprint and disposal site northeast of Wicklow Harbour.

[3.1.3] Disposal Zone of Influence – Disposal site northeast of Wicklow Harbour

The ZoI for the offshore disposal site northeast of Wicklow Harbour reflects the expected spatial extent of noise, vessel movement, and sediment dispersion associated with controlled bottom-release operations. Noise emissions arise solely from vessel propulsion and dynamic positioning during disposal activity. No seabed disturbance occurs beyond the settling of suspended material.

- **Auditory injury (PTS) risk zone** for marine mammals remains negligible (<100 m), consistent with shallow-water operational thresholds.
- The **behavioural response zone** for marine mammals is estimated to extend up to approximately 5 km, in line with GDG (2024) guidance for vessel-based disturbance.

- **Sediment release** is expected to form a near-bed plume that disperses laterally under strong tidal currents off Wicklow Head. Dispersion is rapid and spatially limited, with no predicted overlap of the plume with either the disposal site boundaries or the dredging footprint within Wicklow Harbour.

The inclusion of the offshore disposal site northeast of Wicklow Harbour does not expand the overall Zone of Influence beyond that already established for offshore disposal activities. ZoIs remain spatially discrete for each activity zone, with no hydrodynamic or acoustic connectivity between the dredging area and the offshore disposal site.

[3.2] Annex IV Marine Species within the ZoI

A review of existing datasets, including the Wicklow Harbour Annex IV Risk Assessment (GDG, 2024) and records from the Irish Whale and Dolphin Group (IWDG, 2025) and National Biodiversity Data Centre (NBDC, 2025), confirms the presence or potential occurrence of Annex IV marine species within and surrounding the Wicklow Harbour dredging footprint and the associated offshore disposal sites.

Species protected under Annex IV of the EU Habitats Directive (92/43/EEC) that may occur within the defined ZoIs include cetaceans, pinnipeds, and otter. No marine turtle species have been recorded within the study area or adjacent coastal waters.

[3.2.1] Cetaceans

IWDG records for the Wicklow coastal area indicate that several cetacean species utilise nearshore and offshore waters, with the following species most frequently recorded:

- **Harbour porpoise** – Recorded year-round and regularly observed along the Wicklow coastline; most likely Annex IV species within the immediate dredging ZoI.
- **Common dolphin** – Common offshore and occasionally recorded within nearshore waters, typically associated with transient pods.
- **Bottlenose dolphin** – Occasional visitor to nearshore waters, including within the wider Wicklow coastal zone.
- **Minke whale** – Recorded seasonally in offshore waters during summer months.

Other species such as Risso's dolphin, humpback whale, and fin whale occur further offshore in the western Irish Sea but are not expected within the Wicklow nearshore ZoI due to shallow bathymetry and high vessel activity levels.

[3.2.2] Pinnipeds

Two pinniped species listed under Annex II and IV are known from the wider Wicklow coastal region:

- Grey seal – Resident along the eastern Irish coast, with haul-out sites at Wicklow Head and Dalkey Island. May occasionally occur near the harbour entrance.
- Harbour (common) seal – Present in lower abundance, typically within sheltered coastal waters and estuaries.

Both species may forage opportunistically within the coastal ZoI but are not expected to haul out within Wicklow Harbour due to regular vessel movements.

[3.2.3] Otter

Otter, also listed under Annex IV, occurs widely along the County Wicklow coastline and may utilise river mouths, rocky shorelines, and intertidal habitats for foraging. The likelihood of otter occurrence at the offshore disposal sites is low, as the species is primarily associated with inshore and freshwater environments.

[3.3] Supporting Datasets

The Annex IV Species Risk Assessment has been informed by a review of existing published and online datasets relevant to cetaceans, pinnipeds, and otter within and surrounding the defined Zones of Influence for the proposed dredging and offshore disposal operations.

No new field surveys were commissioned for this assessment. Instead, up-to-date desktop datasets were used to establish species presence, seasonal occurrence, and sensitivity to identified source–pathway–receptor interactions.

The primary datasets reviewed include:

- Irish Whale and Dolphin Group (IWDG) Sightings Database (2025) – validated records of cetacean sightings within the Wicklow coastal sector and wider western Irish Sea.
- National Biodiversity Data Centre (NBDC) – Marine Mammal Records (2025) – national dataset of Annex IV species occurrences (including seals and otter), filtered spatially to capture the Wicklow Harbour dredging footprint and both offshore disposal sites.
- NPWS Online Map Viewer (2025) – spatial datasets for protected species distributions and conservation features within Natura 2000 sites.
- Wicklow Harbour Annex IV Risk Assessment (GDG, 2024) – reference source for baseline Annex IV species and previous effect-specific Zones of Influence.
- EPA Dumping at Sea Register – spatial extents and licensing history for the disposal sites, including disposal pathway boundaries.
- Marine Institute Sediment Classification Records – baseline sediment quality data confirming Class 1 (uncontaminated) dredge material from Wicklow Harbour, suitable for offshore disposal.

All datasets were reviewed in November 2025, ensuring the use of the most recent available data. No inconsistencies between datasets were identified, and all sources were considered sufficiently robust to inform the Annex IV species baseline, screening, and impact evaluation.

[3.4] Summary of Baseline Context

The baseline desktop review confirms that the defined effect-specific ZoIs for the proposed dredging and offshore disposal activities overlap with the known distribution ranges of several Annex IV species of marine mammals and otter recorded within the wider Wicklow coastal sector of the western Irish Sea.

Harbour porpoise and common dolphin represent the most frequently recorded cetacean species in nearshore waters. Occasional records of bottlenose dolphin and minke whale are also documented within the regional dataset.

Among pinnipeds, grey seal and harbour seal are known to forage along the Wicklow coastline, with established haul-outs located outside the immediate project area.

The otter occurs along the County Wicklow coastline and may utilise intertidal and riverine habitats near the harbour. However, it is not expected to occur within offshore waters at either disposal site due to the species' strong association with coastal and freshwater environments.

No marine turtle species have been recorded within any of the project-related ZoIs.

The baseline confirms that all Annex IV species potentially present within the study area are highly mobile and transitory in use, with no breeding, haul-out, or resting sites located within or adjacent to the dredging footprint or offshore disposal sites.

These findings establish the baseline for assessing the potential for disturbance, injury, or mortality to Annex IV species under Article 12 of the Habitats Directive, relative to the predicted source-pathway-receptor interactions defined for this project.

[3.4.1] Wicklow Harbour and disposal site northeast of Wicklow Harbour

The species recorded within the Grid Squares O30, O31, O40, O41 T38, T39 and T49, corresponding to the study area for the Wicklow Harbour dredging area and the disposal site northeast of Wicklow Harbour (Image 2), are presented in Appendix A.

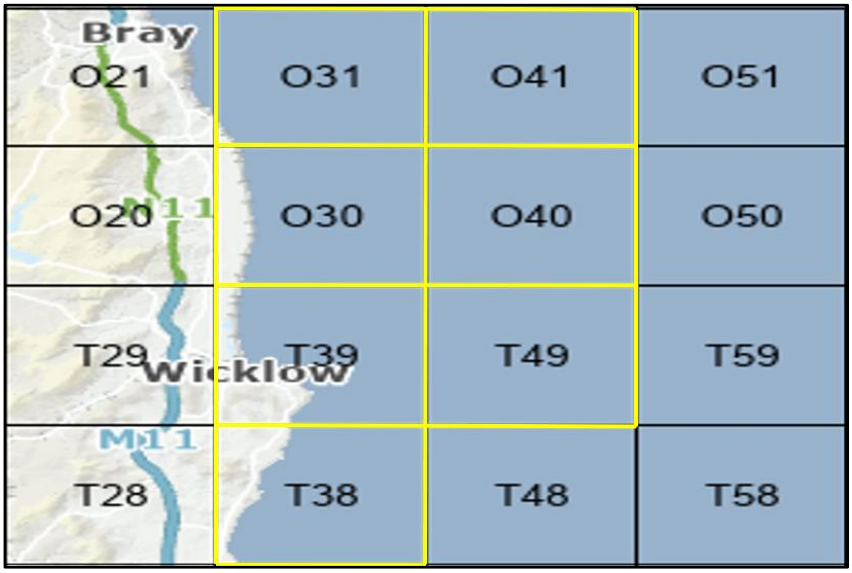

Image 2: 10 km grid squares highlighted in yellow in which marine mammal species data were collected from surrounding the Wicklow harbour dredge area and the disposal site northeast of Wicklow Harbour (Source:NBDC).

[4] Source of Impacts

Potential impacts on Annex IV species may arise from a range of activities associated with the proposed maintenance dredging works at Wicklow Harbour and the offshore disposal of dredged material.

- The primary sources of potential impact include:
- Sediment disturbance and increased turbidity during dredging operations.
- Underwater noise and vibration generated by dredging plant, hoppers, support and survey (bathymetry) vessels.
- Vessel movements and associated collision or disturbance risk during pre-and post-dredging bathymetric surveys, dredging and transport to the offshore disposal sites; and
- Potential accidental release of pollutants, such as hydrocarbons or suspended sediments.

Each identified source has been assessed within a SPR framework, considering the following parameters:

- **Source:** The activity or process generating potential disturbance.
- **Pathway:** The environmental medium or mechanism by which effects may be transmitted (e.g. water column, underwater noise, vessel movement); and
- **Receptor:** The Annex IV species likely to be exposed, based on distribution, behaviour, and habitat use.

For each pathway, the magnitude, duration, and spatial extent of the potential effect have been evaluated alongside the sensitivity and mobility of relevant Annex IV species.

The subsequent sections present the assessment of these interactions, organised by impact type.

[4.1] Underwater Noise and Vibration

[4.1.1] Source

Underwater noise and vibration are key potential stressors for marine fauna, particularly cetaceans and pinnipeds, which depend heavily on acoustic cues for communication, navigation, and foraging. Anthropogenic underwater sound can cause masking of communication signals, temporary behavioural shifts, or, at very high intensities, auditory injury. The degree of potential effect depends on factors such as frequency, intensity, duration, and repetition rate of the sound source, as well as receptor proximity and local propagation conditions (Southall et al., 2019).

During dredging operations, the primary sources of underwater noise include:

- Mechanical sound generated by trailing suction hopper dredger (TSHD) draghead contact with the seabed,
- Bucket impact if a backhoe dredger is employed,
- Mechanical sound and impact generated by WID and ploughing, if employed, and
- Vessel propulsion from support and survey vessels.

These sound sources typically generate intermittent low-frequency tones within the range of 50–1,000 Hz, overlapping with the hearing sensitivities of harbour porpoise, common dolphin, and grey seal (DAHG, 2014; Southall et al., 2021). Additional contributions arise from propeller cavitation and engine vibration of support vessels operating within Wicklow Harbour and the nearshore zone.

[4.1.2] Pathway

Noise propagation within the harbour environment is influenced by shallow bathymetry, sediment type, and the presence of harbour structures, which tend to reflect or attenuate sound energy and limit transmission beyond the immediate dredging area. The acoustic profile of dredging operations differs markedly from continuous high-energy sources (e.g. pile driving or seismic activity), being of lower amplitude, irregular pattern, and short duration. Sound emissions are therefore spatially and temporally variable and expected to dissipate rapidly with distance.

[4.1.3] Receptor

Behavioural responses of marine mammals to underwater noise vary by species, context, and received sound level.

- **Harbour porpoise** may exhibit short-term avoidance or displacement from active dredging areas.
- **Seals** are generally less sensitive to intermittent low-frequency noise and may show only temporary alert or dive responses.

Such behavioural reactions are typically temporary and reversible, not indicative of injury but representative of short-term disturbance.

[4.1.4] Vibration Transmission

Substrate-borne vibration from dredging plant may propagate locally through the seabed, depending on sediment type and compaction. However, vibration energy attenuates rapidly and is not expected to extend beyond the harbour limits or interact significantly with mobile marine fauna.

Overall, noise and vibration represent limited but detectable pathways for potential short-term behavioural disturbance to marine mammals using or passing through Wicklow Harbour and adjacent coastal waters.

[4.2] Vessel Movement and Collision Risk

[4.2.1] Source

The operation of dredging plant, hopper barges, and support vessels during the works represents a potential source of physical disturbance and collision risk for Annex IV marine mammals, particularly cetaceans and pinnipeds. Vessel strike is a recognised pressure on marine fauna, especially where vessel traffic overlaps with foraging or transit areas used by mobile species.

The primary vessel activities associated with the project include:

- Slow-speed manoeuvring of dredging plant within Wicklow Harbour.

- Transit of loaded and unloaded hopper barges between Wicklow Harbour and the offshore disposal site; and
- Occasional support vessel operations for crew transfer, bunkering, positioning, and survey activities (i.e., bathymetric survey).

[4.2.2] Pathway

Vessel movements generate potential impact pathways through:

- Increased vessel presence within nearshore waters where harbour porpoise and seals are known to occur.
- Temporary elevation of collision risk during barge transits between the harbour and offshore disposal grounds.
- Behavioural disturbance or avoidance responses by cetaceans to vessel approach or engine noise; and
- Short-term displacement of marine mammals from areas of active vessel operation.

Collision risk is generally low for this project, as all dredging and disposal vessels will operate at low transit speeds (<10 knots) and follow controlled navigation routes under Harbour Master supervision. Vessel activity is intermittent and localised, with limited cumulative traffic beyond baseline harbour use.

[4.2.3] Receptor

The marine mammal species most likely to be exposed are:

- **Harbour porpoise**, known to frequent nearshore waters north and south of Wicklow Harbour; and
- **Grey seal and harbour seal**, which occasionally forage within the coastal zone.

Given these species' behavioural adaptations to vessel presence and the restricted temporal and spatial scale of dredging operations, the potential for injury or mortality from vessel strike is considered negligible. However, short-term avoidance or displacement may occur during periods of concentrated vessel manoeuvring.

[4.3] Siltation and Turbidity

[4.3.1] Source

Dredging operations and associated in-water works will disturb seabed sediments within Wicklow Harbour, resuspending fine particulate material into the water column and temporarily increasing turbidity. Similarly, the disposal of dredged material at the offshore disposal sites will result in a temporary suspension of finer sediment fractions. The magnitude and extent of this effect will depend on sediment composition, prevailing tidal conditions, dredging and disposal methods, and campaign duration.

[4.3.2] Pathway

Once suspended, fine sediments are dispersed through the water column and may alter water clarity, light penetration, and localised sediment deposition patterns. These effects are typically temporary and spatially limited, but vary between the inner harbour and offshore environments:

- Within Wicklow Harbour, suspended material may remain in the water column until flushed during subsequent tidal exchange due to the confined basin morphology.
- At the offshore disposal sites, dispersion is more rapid because of higher hydrodynamic energy and open-coast conditions, leading to short-lived plumes that settle locally within the disposal ground.

Sediment deposition may locally modify seabed characteristics where finer particles settle over coarser substrates. Such effects are typically transient in high-energy environments like the western Irish Sea.

[4.3.3] Receptor

Suspended sediments and elevated turbidity do not pose a direct physiological risk to marine mammals, but may temporarily affect foraging efficiency by:

- Reducing prey visibility for echolocating species such as harbour porpoise and common dolphin.
- Altering benthic prey availability for seals due to short-term sediment deposition or displacement of benthic invertebrates; and
- Modifying fish distribution in response to turbidity gradients, influencing prey density.

In Wicklow Harbour, where suspended sediment is dominated by fine sands and silts, turbidity effects are expected to be short-term (<1–2 tidal cycles) and confined to the immediate dredging footprint. No connectivity exists between the sediment plumes of the dredging area and the offshore disposal sites.

At the disposal sites, the gravel and sand fractions are expected to settle from suspension, predominantly staying near the boundary of the disposal site. However, the silt fractions are expected to disperse more widely, but on a similarly short-term basis, given that the sites are both subject to strong current flows.

[4.3.4] Summary

Overall, siltation and turbidity effects represent a temporary and localised pathway by which dredging and disposal activities could indirectly influence marine mammals through short-lived alterations in prey availability or foraging visibility. These effects are not expected to result in physical harm or displacement beyond the immediate dredge and disposal areas.

[4.4] Hydrocarbon or Contaminant Spills

[4.4.1] Source

Potential accidental releases of hydrocarbons or other chemical contaminants during dredging or disposal operations represent a possible source of environmental degradation. Such releases may occur from:

- **Minor spills** during fuel storage or transfer,
- **Machinery leaks** or handling of hydraulic oils and lubricants, or
- **Surface residues** from vessel operations.

In addition, the disturbance of sediment-bound contaminants (e.g., trace metals or legacy hydrocarbons) may reintroduce pollutants that were previously deposited in the seabed. These substances can become temporarily bioavailable in the water column during resuspension events.

[4.4.2] Pathway

Contaminants can enter the marine environment via:

- **Surface sheens** and localised residues reducing water quality, altering surface tension, and affecting gas exchange at the water–air interface.
- **Suspension of fine sediments** containing bound trace metals (e.g., copper, lead, zinc, mercury), which may increase contaminant mobility.
- **Weathering and dispersion processes** (e.g., evaporation, emulsification, dilution), which determine contaminant persistence; and
- **Trophic transfer**, where bioavailable contaminants are taken up by plankton, filter feeders, or benthic invertebrates.

The risk of hydrocarbon release is inherently limited due to the use of modern dredging plant, adherence to MARPOL Annex I and V protocols, and strict refuelling and waste handling procedures.

The potential for resuspended contaminants is unlikely, given that sediment sampling in the dredge area (2021 and 2022) confirmed that the material is not contaminated and deemed appropriate for offshore disposal (Class 1 classified). Further testing is proposed in 2025. If conditions have changed and contaminants are present in the material proposed to be dredged, they are expected to dilute and resettle rapidly under moderate tidal exchange, with minimal potential for wide-scale dispersion beyond the immediate dredge or disposal areas.

[4.4.3] Receptor

Marine mammals and otters are indirectly sensitive to hydrocarbon and contaminant inputs through effects on prey abundance and water quality.

- Acute toxic effects from small-scale spills are unlikely due to rapid containment and natural attenuation.
- Chronic or sub-lethal impacts could theoretically occur if contaminants enter the food web; however, the limited scale and duration of dredging activity substantially reduce exposure risk.

- Annex IV species such as harbour porpoise, grey seal, and otter may only be indirectly affected through short-term reductions in prey quality or availability.

[4.4.4] Summary

Hydrocarbon or contaminant pathways are considered low risk due to the confined nature of Wicklow Harbour, robust operational controls, and the short-term, intermittent nature of dredging and associated activities. Contaminant mobilisation is not expected, but if it does occur, will likely be localised and transient, with no measurable risk of physiological harm or population-level effects on Annex IV species.

[5] Impact Assessment

In accordance with the Habitats Directive (European Council Directive 92/43/EEC) and the Marine Strategy Framework Directive (2008/56/EC), this section evaluates the potential for disturbance, injury, or mortality to occur to Annex IV species arising from the proposed Wicklow Harbour Maintenance Dredging and Offshore Disposal Project. The assessment follows a SPR approach, considering the causal mechanisms through which project activities may interact with sensitive receptors.

The principal sources of potential impact (as identified in Section 4) are:

- Sediment disturbance and turbidity resulting from dredging and disposal operations.
- Underwater noise and vibration generated by dredging equipment, support and survey vessels.
- Vessel movement and associated collision risk; and
- Accidental release of hydrocarbons or sediment-bound contaminants.

Each source is evaluated in relation to its intensity, duration, frequency, and spatial extent, together with the behavioural and ecological sensitivity of Annex IV receptors known or likely to occur in the project area (harbour porpoise, common dolphin, grey seal, harbour seal and otter). Rather than defining a single fixed ZoI, the assessment considers the specific influence zone for each impact pathway, based on the nature of the stressor and local environmental conditions (e.g. sound propagation, hydrodynamic dispersion, vessel activity envelope).

This chapter identifies the potential interaction pathways and their relative likelihood of occurrence to inform subsequent evaluation of mitigation and residual risk under Article 12 compliance. No conclusions on significance are assigned at this stage; these are addressed within the mitigation and conclusion sections of the report.

[5.1] Siltation and Turbidity

Wicklow Harbour is an active commercial and leisure port subject to regular vessel movements, tidal exchange, and natural sediment transport associated with coastal currents along the County Wicklow shoreline. The inner and outer harbour basins experience routine flushing due to semi-diurnal tidal flows, typical of exposed harbours along the western Irish Sea.

During dredging and immediately after disposal, temporary increases in turbidity and the localised suspension of fine sediments are expected to occur within the immediate area. These effects represent the primary pathway by which sediment disturbance may interact with the marine environment. Within the Harbour however, given the confined spatial extent of the dredge footprint, the low-energy nature of the dredging method, and the rapid tidal dispersion of suspended material, these effects are modelled to be short-lived and limited to the harbour basin and entrance channel. The WID hydrodynamic modelling results indicate that Suspended Sediment Concentration (SSC) reaches negligible levels after two days without dredging, measuring less than 0.00177 kg/m3 (1.77 mg /L) at the entrance of Wicklow Harbour, where the maximum SSC values were observed (GDG, 2024b). The dredging footprint will not extend beyond existing navigational areas, and no capital deepening is proposed.

A hydrodynamic assessment of the dumping operations found that the average total suspended sediment concentration beyond the immediate vicinity of the disposal site did not generally exceed 3mg/l. The average suspended sediment concentration quickly dispersed to less than 0.5mg/l approximately 10km to the north of the disposal site, and within 22km to the south. Five days after the final disposal event, the sediment plumes have fully dispersed into the background concentrations (Tetra Tech RPS, 2025).

The wider coastal environment is already subject to natural variability in turbidity arising from tidal currents, storm events, and regular vessel traffic. Any short-term increase in suspended solids resulting from the works is therefore expected to remain within the range of background variation characteristic of the Wicklow nearshore zone. The resuspended sediments will rapidly disperse and settle under tidal influence, with concentrations returning to baseline levels within one to two tidal cycles following each dredging episode.

No permanent alteration of seabed profile or sediment composition is anticipated. All dredged material will be loaded into a hopper barge and transported for offshore disposal at the licensed site(s), in full compliance with the DaS permit conditions, thereby preventing any re-suspension or deposition of material within the harbour area.

Given the limited duration of the dredging campaign, the high tidal dispersion capacity of the Irish Sea, and the rapid settlement of suspended material, indirect effects on Annex IV species such as harbour porpoise, common dolphin, and grey or harbour seal are expected to be minor, temporary, and localised. Such effects may occur through short-term reductions in prey visibility or availability, but no long-term effects on prey distribution or habitat suitability for marine mammals or other protected species are anticipated once the works have ceased.

Therefore, the potential for siltation and turbidity to result in adverse effects on Annex IV species is assessed as **low to negligible.**

[5.2] Hydrocarbon or Contaminant Spills

The primary potential source of hydrocarbon or contaminant release during the dredging and disposal activities is associated with the operation of dredging plant, hopper barges, and support vessels.

These risks are typical of marine construction and maintenance activities and relate mainly to fuel transfer, hydraulic system leaks, or accidental minor spills from machinery operating within the harbour or during transit to the offshore disposal sites.

All vessels engaged in the works will comply with standard marine safety and environmental management procedures, including MARPOL (1973/78) requirements and the OPW (2019) Environmental Guidance for Drainage Maintenance and Construction Activities.
These controls include implementation of pollution prevention measures such as:

- Availability of spill response kits on all vessels.
- Refuelling only at designated locations under controlled conditions; and
- Immediate containment and clean-up procedures in the event of accidental release.

Given these measures, the likelihood of any significant hydrocarbon release is considered very low. Any minor spill that might occur would be localised and short-lived, with rapid natural

dispersion facilitated by tidal flushing within Wicklow Harbour and open water mixing at the disposal sites. Environmental persistence is therefore expected to be minimal.

Potential effects on Annex IV species — including harbour porpoise, common dolphin, grey seal, harbour seal, and otter, are limited to potential short-term avoidance behaviour in the immediate vicinity of a spill event. No injury, mortality, or lasting disturbance is anticipated, as affected areas would rapidly recover through natural dispersion and dilution.

The potential for remobilisation of sediment-bound contaminants during dredging has also been considered. Existing sediment characterisation data confirm that Class 1 uncontaminated material predominates within the dredging footprint and that trace contaminant levels are within accepted marine environmental quality standards. Accordingly, the risk of contaminant release or exposure to marine mammals or otter is extremely low.

Therefore, the potential for hydrocarbon or contaminant release to result in adverse effects on Annex IV species is assessed as **low to negligible.**

Any interaction would be localised, temporary, and fully mitigated through the embedded pollution-prevention measures described above.

[5.3] Noise and Vibration Disturbance

The operation of dredging plant and support vessels within Wicklow Harbour will generate underwater noise and vibration, primarily from engine and propeller activity and the dredging equipment itself. Dredging will be undertaken using a Trailing Suction Hopper Dredger (TSHD) and/or backhoe dredger, both of which produce low-frequency, intermittent sounds associated with sediment removal and vessel propulsion.

Measured source levels for TSHD and backhoe dredging typically range between 160–180 dB re 1 µPa @ 1 m (Nedwell et al., 2008; DAHG, 2014), classifying such activity as a low-intensity, non-impulsive sound source under DAHG (2014) guidance. These levels are well below published onset thresholds for auditory injury in marine mammals, which occur at approximately 185 dB SEL_{cum} for harbour porpoise and 201 dB SEL_{cum} for seals (Southall et al., 2019; NMFS, 2018).

The semi-enclosed nature of Wicklow Harbour, combined with the deeper entrance channel, will facilitate attenuation and rapid dispersion of underwater sound. Sound propagation will also be reduced by reflections from harbour structures and shallow bathymetry. As a result, noise energy is expected to dissipate rapidly, and the risk of amplification or prolonged exposure is low. Any temporary behavioural reactions from harbour porpoise, common dolphin, or seals are therefore anticipated to be localised and short-term, limited to minor avoidance of the immediate dredging area.

Vibration transmitted through the seabed during dredging is expected to be highly localised, attenuating within a few metres of the draghead or bucket. Such vibration levels are unlikely to be perceptible to marine fauna beyond the active works footprint.

Noise and vibration effects will be temporary, occurring only during active dredging operations. Sound levels will revert to baseline conditions immediately after dredging ceases, consistent with those associated with normal harbour vessel activity.

Taking into account the low intensity, intermittent nature, and short duration of noise emissions, together with the embedded mitigation measures outlined in Section 6 (including daylight-only dredging, soft-start procedures, and marine mammal monitoring), the potential risk of disturbance to Annex IV species from underwater noise or vibration is assessed as **low to negligible.**

[5.4] Vessel Collision Risk

The dredging campaign will involve operation of the dredger within Wicklow Harbour, as well as regular transits of hopper barges between the harbour and the designated offshore disposal sites. Additional support vessels may also be used for positioning, bunkering, crew transfer, or environmental monitoring.

Vessel movements have the potential to interact with Annex IV marine mammals through:

- Increased vessel presence and associated disturbance.
- Temporary displacement of foraging or transiting animals; and
- Physical collision risk during vessel movements (i.e., dredging, support and survey vessels), barge transits or harbour manoeuvring.

All vessels associated with the works will operate at low speeds when manoeuvring within the harbour basin and entrance channel. Transits to the offshore disposal sites will occur along established navigation routes already in use by commercial shipping, fishing vessels, and recreational craft.

The risk of vessel collision is primarily influenced by vessel speed, predictability of movement, and animal behaviour. Harbour porpoise are the most frequently recorded Annex IV species within the Wicklow coastal zone; however, they typically avoid close vessel approach. Seals may surface within the harbour basin but are generally habituated to regular vessel activity. Consequently, the likelihood of a strike event is very low.

Given the low operating speeds, predictable vessel movements, and short-term duration of dredging and disposal operations, any behavioural response from Annex IV species is expected to be minor and temporary, limited to localised avoidance of active vessel pathways.

Embedded operational controls, including adherence to speed restrictions, avoidance of unpredictable manoeuvring, and watchkeeping by vessel crews, will further minimise the potential for interaction or collision.

Overall, the potential risk of collision or physical disturbance from vessel activity to Annex IV species is assessed as **low to negligible**.

[5.5] Summary of Potential Impacts

To reflect the differing environmental conditions and receptor sensitivities within the project footprints, potential effects on Annex IV species have been evaluated separately for the three primary activity areas, the Wicklow Harbour dredging zone and the disposal site northeast of Wicklow Harbour.

This approach recognises that each location presents distinct SPR linkages, hydrodynamic regimes, and ecological usage patterns. Table 2 and Table 3 summarise the potential interactions identified for each site, together with their corresponding overall risk ratings.

Table 2: Summary of Potential Impacts – Wicklow Harbour Area

Impact Source	Summary of Potential Effect and Overall Risk Rating
Siltation and Turbidity	Temporary resuspension of fine sediments within the dredging footprint. Elevated suspended solids confined to harbour basin and entrance channel; rapid dispersion within 1–2 tidal cycles. No direct risk to Annex IV species. **Risk: Low to Negligible.**
Underwater Noise and Vibration	Intermittent low-frequency noise from dredging plant and support vessels. Levels below auditory injury thresholds; may cause brief avoidance by harbour porpoise or seals within the harbour. **Risk: Low to Negligible.**
Vessel Movement and Collision Risk	Slow-speed manoeuvring and barge movements within confined harbour area. Predictable navigation under Harbour Master control. Potential for temporary behavioural avoidance only. **Risk: Low to Negligible.**
Hydrocarbon or Contaminant Spills	Small accidental release risk from refuelling or machinery leaks. Strict MARPOL and OPW (2019) pollution prevention controls in place. Rapid dilution under tidal flushing. **Risk: Negligible.**
Disturbance to Otter (*Lutra lutra*)	Harbour environment highly modified with limited habitat suitability, transient use possible along quay walls or entrance. No holts or resting sites present. **Risk: Negligible.**

Table 3: Summary of Potential Impacts – Disposal site northeast of Wicklow Harbour

Impact Source	Summary of Potential Effect and Overall Risk Rating
Sediment Deposition and Turbidity	Deposition of fine sediments during controlled release of dredged material. An assessment of the dumping operations by Tetra Tech (2025) found that the average total suspended sediment concentration beyond the immediate vicinity of the disposal site did not generally exceed 3mg/l. The average suspended sediment concentration quickly dispersed to less than 0.5mg/l approximately 10km to the north of the disposal site, and within 22km to the south. Five days after the final disposal event, the sediment plumes have fully dispersed into the background concentrations. **Risk: Negligible.**
Underwater Noise and Vibration	Noise emissions limited to hopper discharge and vessel operation; intermittent and short-lived. **Risk: Negligible.**
Vessel Movement and Collision Risk	Occasional barge transits between harbour and site; predictable and low speed. Potential for minor, short-term avoidance behaviour only. **Risk: Low to Negligible.**
Hydrocarbon or Contaminant Spills	Low likelihood of accidental release; vessels equipped with containment and clean-up capability. Rapid dispersion in offshore waters. **Risk: Negligible.**
Disturbance to Cetaceans	Harbour porpoise and common dolphin may pass through wider area; short-term avoidance only during active disposal. **Risk: Negligible.**
Disturbance to Pinnipeds	Occasional foraging by seals possible in wider coastal zone; no resting or breeding habitat within influence area. **Risk: Negligible.**

[5.5.1] Cetaceans

The harbour porpoise is the most frequently occurring cetacean species along the Wicklow coastline and within the western Irish Sea. Occasional sightings of common dolphin and bottlenose dolphin have also been recorded in coastal waters between Wicklow, although these species are typically

transient and less frequently observed nearshore. Minke whale is recorded occasionally further offshore but is not expected to occur within the dredging or disposal areas on a regular basis.

The proposed dredging and offshore disposal activities (and associated bathymetric surveying) will take place within an active working harbour and along established offshore navigation routes that already experience regular commercial vessel traffic, fishing activity, and associated underwater noise. Given the industrial nature of the harbour environment and the transient use of the wider area by cetaceans, the likelihood of these species entering the immediate dredging or disposal zones during operations is considered low.

Dredging operations will be temporary, intermittent, and short in duration, generating low-frequency underwater noise levels that are well below auditory injury thresholds for cetaceans (Southall et al., 2019). Any behavioural responses by harbour porpoise or other cetaceans are therefore expected to be limited to short-term displacement or avoidance within the immediate footprint of vessel or dredging activity. No injury, mortality, or long-term displacement is anticipated.

No significant changes in prey availability or habitat quality are expected as a result of short-term increases in suspended sediment during dredging or disposal. The works footprint does not overlap with known feeding or breeding habitats for Annex IV cetacean species.

Given the limited spatial extent, controlled nature, and short duration of activity, together with the embedded environmental controls described in Section 2.3, it is highly unlikely that the proposed dredging or offshore disposal operations will result in injury, mortality, or significant disturbance to any Annex IV cetacean species.

Accordingly, the potential risk of impact to cetaceans is assessed as **negligible**.

[5.5.2] Pinnipeds

Grey seal and harbour (common) seal are known to occur along the Wicklow coastline, where they regularly forage within nearshore waters and occasionally haul out on exposed coastal rocks or sandbanks. The nearest known non-breeding haul-out areas are located at Wicklow Head, approximately 6 km south of Wicklow Harbour, and Brittas Bay, further south along the coast. There are no known breeding or regular haul-out sites within or immediately adjacent to Wicklow Harbour or the offshore disposal sites.

Individual seals may opportunistically forage within the harbour entrance or adjacent coastal waters, particularly along tidal channels where fish may temporarily concentrate.
Such use is transient, and no regular resting or breeding behaviour has been recorded within the harbour or along the vessel routes to the disposal sites.

Seal species are tolerant of short-term environmental disturbance and are frequently recorded in estuarine and harbour environments where similar dredging and vessel activities occur.
The proposed dredging and disposal operations will be temporary, localised, and of short duration. Underwater noise generated by the dredger or disposal vessels will be low-frequency and intermittent, and is not expected to result in behavioural disturbance beyond the immediate works area.

There are no pupping, moulting, or haul-out sites within the Wicklow Harbour dredge footprint or at either offshore disposal site. The nearest areas used by seals for regular haul-out are located more than 5–10 km from the project area. It is therefore highly unlikely that the proposed works will cause disturbance, displacement, or barrier effects to resident or breeding seal populations.

Temporary and indirect effects—such as brief, localised changes in foraging efficiency due to minor sediment disturbance—are expected to be short-term, with normal conditions re-establishing rapidly once dredging ceases.

On this basis, it is concluded that the proposed dredging and offshore disposal operations (and associated bathymetric surveying) are unlikely to cause injury, mortality, or significant disturbance to grey or harbour seals.
No long-term alteration of foraging or haul-out behaviour is anticipated.

Accordingly, the overall potential risk of impact to pinnipeds is assessed as **low to negligible**.

[5.5.3] Otter (*Lutra lutra*)

The otter (*Lutra lutra*) is listed under Annex IV of the EU Habitats Directive (92/43/EEC) and occurs along freshwater, estuarine and coastal habitats throughout County Wicklow. Local records include sightings along the Vartry River, Leitrim River, and intertidal shorelines both north and south of Wicklow Harbour (NBDC, 2025).

The harbour environment at Wicklow is highly modified, characterised by hard quay walls, commercial berths, paved surfaces, and frequent vessel activity. These conditions provide limited opportunity for resting, foraging, or holt establishment. The nearest suitable otter habitat is associated with the Vartry River estuary and the rocky coastal fringes toward Wicklow Head, where natural shorelines and freshwater inputs offer suitable foraging habitat.

Otters are wide-ranging and may occasionally transit or forage within sheltered harbour areas, particularly at night when fish or crustaceans are available. While an individual otter could potentially pass through the harbour entrance or forage briefly along quay walls, regular use of the dredging footprint for breeding, resting, or holt use is considered highly unlikely. No suitable otter habitat occurs within the dredge area or offshore disposal site.

Potential effects from dredging and surveying activities are limited to temporary disturbance arising from vessel movements, lighting, or underwater noise. Any otter using nearby coastal waters would be expected to avoid the immediate works area during active dredging and return once activity ceases. There is no direct loss or degradation of breeding or resting habitat anticipated, as none is present within or adjacent to the works footprint.

Given the absence of holts, resting areas, or core foraging habitat within the project area and the transient nature of potential otter presence, the risk of disturbance or injury to otter is considered very low.

Accordingly, the potential impact of the proposed maintenance dredging and offshore disposal works (and associated bathymetric surveying) on otter (*Lutra lutra*) is assessed as **low to negligible**.

[6] Conclusion

Considering the nature, scale, and location of the proposed maintenance dredging, offshore disposal and associated bathymetric surveying, and based on the findings of this Annex IV Species Risk Assessment, it is concluded that the works are not expected to result in any injury, mortality, or significant disturbance to Annex IV species.

Dredging and surveying will be confined to the existing harbour basin and entrance channel, which are already subject to regular vessel traffic, tidal flushing, and elevated background noise. Offshore disposal and associated surveying will occur at a site located in open coastal waters already exposed to commercial shipping and fishing activity.

Potential effects from the works, including short-term increases in suspended sediment, low-level underwater noise, and temporary vessel movements, will be intermittent, localised, and of low intensity. No breeding, resting, or haul-out sites for cetaceans, pinnipeds, or otter occur within, or immediately adjacent to, the dredging footprint or either offshore disposal site.

Embedded environmental controls (Section [2.3]) and standard marine operational procedures will further minimise the risk of accidental pollution, sediment release, or vessel strike.

Accordingly, the Project is not expected to cause the deliberate capture, killing, injury, or significant disturbance of any Annex IV species, nor to result in the deterioration or destruction of any breeding or resting site protected under Article 12 of the Habitats Directive.

On this basis, the project is assessed as being fully compliant with Article 12 of the Habitats Directive (92/43/EEC), with the overall residual risk to Annex IV species considered **negligible**. As a result, no specific mitigation measures (i.e., dedicated marine mammal observations) are proposed in relation to Annex IV species, however general environmental best practise should be observed by the contractor to avoid disturbance.

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[8] Appendices

Appendix A: Annex IV Species Recorded within Grid Squares Relevant to the Wicklow Harbour, and the disposal site northeast of Wicklow Harbour

Table 4: Annex IV Species Recorded within Grid Square O30

Species	Group	Record Count	Last Record Date	Dataset Source	Protection / Status (as provided)
Bottle-nosed Dolphin (*Tursiops truncatus*)	Cetacean	21	30/07/2021	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Cetacean species	Cetacean	1	18/07/2021	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Dolphin (*Delphinus delphis*)	Cetacean	5	02/03/2023	IWDG Cetacean Strandings Database	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Porpoise (*Phocoena phocoena*)	Cetacean	67	01/12/2023	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention
Dolphin species possibly Harbour Porpoise	Cetacean	1	02/08/2020	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Grey Seal (*Halichoerus grypus*)	Pinniped	39	21/09/2023	Explore Your Shore	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Harbour Seal (*Phoca vitulina*)	Pinniped	2	27/05/2018	Mammals of Ireland 2016–2025	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Minke Whale (*Balaenoptera acutorostrata*)	Cetacean	1	01/07/2020	IWDG Casual	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex

				Cetacean Sightings	II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Risso's Dolphin (*Grampus griseus*)	Cetacean	1	19/06/2013	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Seals (Pinnipedia)	Pinniped	2	30/09/2020	Explore Your Shore	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
True Seals (Phocidae)	Pinniped	2	30/03/2025	Explore Your Shore	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Otter (*Lutra lutra*)	Semi-aquatic Mammal	40	29/01/2023	Mammals of Ireland 2016–2025	Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts

Table 5: Annex IV Species Recorded within Grid Square O31

Species	Group	Record Count	Last Record Date	Dataset Source	Protection / Status
Bottle-nosed Dolphin (*Tursiops truncatus*)	Cetacean	30	13/09/2014	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Dolphin (*Delphinus delphis*)	Cetacean	1	29/01/2023	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Porpoise (*Phocoena phocoena*)	Cetacean	45	03/10/2023	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention

Dolphin species (unidentified)	Cetacean	2	09/08/2023	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Dolphin species possibly Harbour Porpoise	Cetacean	1	27/09/2015	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Grey Seal (*Halichoerus grypus*)	Pinniped	5	21/09/2023	Explore Your Shore	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Minke Whale (*Balaenoptera acutorostrata*)	Cetacean	3	01/06/2020	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Seals (Pinnipedia)	Pinniped	2	25/02/2016	ObSERVE Aerial Surveys for Seabirds and Cetaceans in the Irish Atlantic Margin	Protected Species: EU Habitats Directive || Protect

Table 6: Annex IV Species Recorded within Grid Square O40

Species	Group	Record Count	Last Record Date	Dataset Source	Protection / Status
Common Porpoise (Phocoena phocoena)	5	25/02/2016	ObSERVE Aerial Surveys for Seabirds and Cetaceans in the Irish Atlantic Margin	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention	Common Porpoise (Phocoena phocoena)

Table 7: Annex IV Species Recorded within Grid Square T39

Species	Group	Record Count	Last Record Date	Dataset Source	Protection / Status

Bottle-nosed Dolphin (*Tursiops truncatus*)	Cetacean	11	22/05/2019	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Porpoise (*Phocoena phocoena*)	Cetacean	17	11/11/2023	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention
Dolphin species (unidentified)	Cetacean	1	10/09/2023	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Dolphin species possibly Harbour Porpoise	Cetacean	4	31/05/2021	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Grey Seal (*Halichoerus grypus*)	Pinniped	16	17/03/2022	Explore Your Shore	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Harbour Seal (*Phoca vitulina*)	Pinniped	1	15/05/2011	Atlas of Mammals in Ireland 2010–2015	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Minke Whale (*Balaenoptera acutorostrata*)	Cetacean	1	13/03/2010	IWDG Constant Effort Cetacean Sighting Scheme	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex

					IV || Protected Species: Wildlife Acts
Northern Bottlenose Whale (*Hyperoodon ampullatus*)	Cetacean	1	01/09/1888	IWDG Cetacean Strandings Database	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Seals (Pinnipedia)	Pinniped	1	25/02/2016	ObSERVE Aerial Surveys for Seabirds and Cetaceans in the Irish Atlantic Margin	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Ac

Table 8: Annex IV Species Recorded within Grid Square T38

Species	Group	Record Count	Last Record Date	Dataset Source	Protection / Status
Bottle-nosed Dolphin (*Tursiops truncatus*)	Cetacean	1	06/06/2010	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Cetacean species (unidentified)	Cetacean	2	08/07/2022	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Dolphin (*Delphinus delphis*)	Cetacean	2	24/04/2009	IWDG Cetacean Strandings Database	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Porpoise (*Phocoena phocoena*)	Cetacean	20	25/04/2023	IWDG Cetacean Strandings Database	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention
Dolphin species (unidentified)	Cetacean	1	11/07/2020	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Dolphin species possibly	Cetacean	1	19/06/2017	IWDG Casual	Protected Species: EU Habitats Directive || Protected Species: EU

Harbour Porpoise				Cetacean Sightings	Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Grey Seal (*Halichoerus grypus*)	Pinniped	5	21/09/2021	Explore Your Shore	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Striped Dolphin (*Stenella coeruleoalba*)	Cetacean	1	03/11/2014	IWDG Cetacean Strandings Database	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
True Seals (Phocidae)	Pinniped	1	13/09/2021	Explore Your Shore	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts

Table 9: Annex IV Species Recorded within Grid Square O41.

Species	Group	Record Count	Last Record Date	Dataset Source	Protection / Status
Marine mammal	Common Porpoise (Phocoena phocoena)	2	25/02/2016	ObSERVE Aerial Surveys for Seabirds and Cetaceans in the Irish Atlantic Margin	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention
Marine mammal	Minke Whale (Balaenoptera acutorostrata)	1	09/07/2015	ObSERVE Aerial Surveys for Seabirds and Cetaceans in the Irish Atlantic Margin	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Marine mammal	Risso's Dolphin (Grampus griseus)	1	03/06/2011	IWDG Casual Cetacean Sightings	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts

Table 10: Annex IV Species Recorded within Grid Square T49.

Species	Group	Record Count	Last Record Date	Dataset Source	Protection / Status

Marine mammal	Common Porpoise (Phocoena phocoena)	4	20/09/2003	IWDG Ferry Survey Sightings 2001-2015	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts || Threatened Species: OSPAR Convention
Marine mammal	Risso's Dolphin (Grampus griseus)	1	21/06/2003	IWDG Ferry Survey Sightings 2001-2015	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts