# Risk Assessment for Annex IV Species for aquaculture and foreshore licence applications T32-1012 & T32-1013. Arklow, Co. Wicklow.

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| | Prepared by Environmental Facilitation Ltd on behalf of the Department of Agriculture, Food and the Marine.<br><br>Date: 24/07/2026 |

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# 1. Introduction

This Annex IV risk assessment has been prepared by Environmental Facilitation Ltd on behalf of the Department of Agriculture, Food and the Marine to comply with the provisions of Article 12 and 13 of Council Directive 92/43/EEC[1] (Habitats Directive) in relation to the protection afforded to Annex IV species from disturbance or harm. Specifically, this risk assessment appraises the aquaculture and foreshore licence applications T32-1012 & T32-1013 for the culture of Blue Mussel (*Mytilus edulis*[2]).

## 1.1. Legislative context

Council Directive 92/43/EEC[1] (Habitats Directive) identifies a suite of animal and plant species across Europe which are rare or are threatened with extinction and which require the application of special measures to ensure their long-term survival. Under Article 12 and 13 of the Habitats Directive, Member States must establish systems of strict protection for animal and plant species listed under Annex IV of the Directive. Article 12 and 13 of the Habitats Directive are transposed into Irish law by Regulations 51 and 52 of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended[3].

The strict protection measures mentioned above aim to bring these animal and plant species to a healthy population level (favourable conservation status) and keep them that way. This means their populations can maintain themselves on a long-term basis as a viable component of their natural habitat. It also means that the natural range of the species is neither being reduced, nor is likely to reduce in the future and that there is (and will be) sufficiently large habitat to maintain its populations in the long-term.

Annex IV species are afforded strict protection throughout their range, within and outside designated protected areas, and throughout all stages of their life cycle, wherever they occur including during periods of breeding, rearing, hibernation and migration. It is an offence to deliberately capture or kill, keep, transport or sell, injure or disturb a specimen in the wild, or to damage or destroy a breeding site or resting place of an Annex IV animal species. For plants it is an offence to deliberately pick, collect, cut, uproot or destroy any specimen of these species in the wild, or keep, transport, or sell any specimen of these species taken in the wild.

| **S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (inc. Amendment SI 293 of 2021[2])** |
|---|
| Protection of fauna referred to in the First Schedule<br><br>51. |

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20130701
[2] https://www.marinespecies.org/aphia.php?p=taxdetails&id=1804094
[3] https://www.npws.ie/legislation

(1) The Minister shall take the requisite measures to establish a system of strict protection for the fauna consisting of the species referred to in Part 1 of the First Schedule.

(2) Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a licence granted by the Minister under Regulation 54 or 54A, a person who in respect of the species referred to in Part 1 of the First Schedule—

a) deliberately captures or kills any specimen of these species in the wild,

b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,

c) deliberately takes or destroys eggs of those species from the wild,

d) damages or destroys a breeding site or resting place of such an animal, or

e) keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive,

shall be guilty of an offence.

(3) The prohibitions referred to in paragraph (2) shall apply to all stages of life of the biological cycle of fauna to which this Regulation applies.

(4) The Minister shall establish a system to monitor the incidental capture and killing of fauna consisting of the animal species referred to in Part 1 of the First Schedule and, having regard to the information gathered, he or she shall conduct further research or take such conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned.

Protection of flora referred to in the First Schedule

52.

(1) The Minister shall take the requisite measures to establish a system of strict protection for the flora consisting of the plant species referred to in Part 1 of the First Schedule.

(2) Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a licence granted by the Minister under Regulation 54 or 54A, a person who in respect of the plant species referred to in Part 1 of the First Schedule—

a) deliberately picks, collects, cuts, uproots or destroys any specimen of these species in the wild, or
b) keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 13(1)(b) of the Habitats Directive,

shall be guilty of an offence.

(3) The prohibitions referred to in paragraph (2) shall apply to all stages of the biological cycle of the flora to which this Regulation applies.

The following is a list of Annex IV species which occur in Ireland and its waters[4]

The animal species listed in Annex IV, which occur in Ireland, are:

- Otter
- all bat species
- all cetaceans (whales, dolphins and porpoises)
- Natterjack toad
- Leatherback (or leathery) turtle
- Loggerhead turtle
- Kemp's Ridley turtle
- Hawksbill turtle
- Green turtle
- Kerry slug

The plant species listed in Annex IV, which occur in Ireland, are:

- Slender Naiad
- Yellow Marsh Saxifrage
- Killarney Fern

As an Annex IV species may be found throughout the country, the protection of these species is not restricted in geographical terms and is not necessarily associated with areas subject to specific designations. Any works or projects must ensure compliance with the requirements of the Regulations, which means avoiding impacts to Annex IV species. To do this a project must determine the probability of the protected species being present in the area affected by the works, using existing information, and applying the precautionary principle. If it is highly unlikely that an Annex IV species could be present or affected by the works, then the works will be compliant with Regs 51 and 52[5].

[4] https://www.npws.ie/legislation
[5] https://www.npws.ie/sites/default/files/files/strict-protection-of-certain-animal-and-plant-species.pdf

If information shows that the Annex IV species is present, or may be present, then an investigation to establish presence is required. The Precautionary Principle must be applied in relation to this matter at this stage. If the investigation finds the species to not be present then the project may proceed. If an Annex IV species is found to be present, or there is a breeding or resting place to which the animals are likely to return, then the likely impacts of the project needs to be examined to see if those impacts can be avoided through the design of the works[4].

# 2. Outline of aquaculture activities

Arklow is a coastal Wicklow town located on the Irish Sea. T32-1012 is located ca. 3.0km from the shore, and T32-1013 is located ca. 7.4km from the shore (Figure 1).

The aquaculture and foreshore licence applications are for the culture of Blue Mussel (*Mytilus edulis*) by Emerald Mussels Limited. The source of stock is naturally occurring mussel seed on the longline system deployed in the water column. This aquaculture project is being conducted to produce both seed mussel and fully grown mussel for export and purification in Holland.

A brief description of the project along with local site characteristics is provided in Table 1.

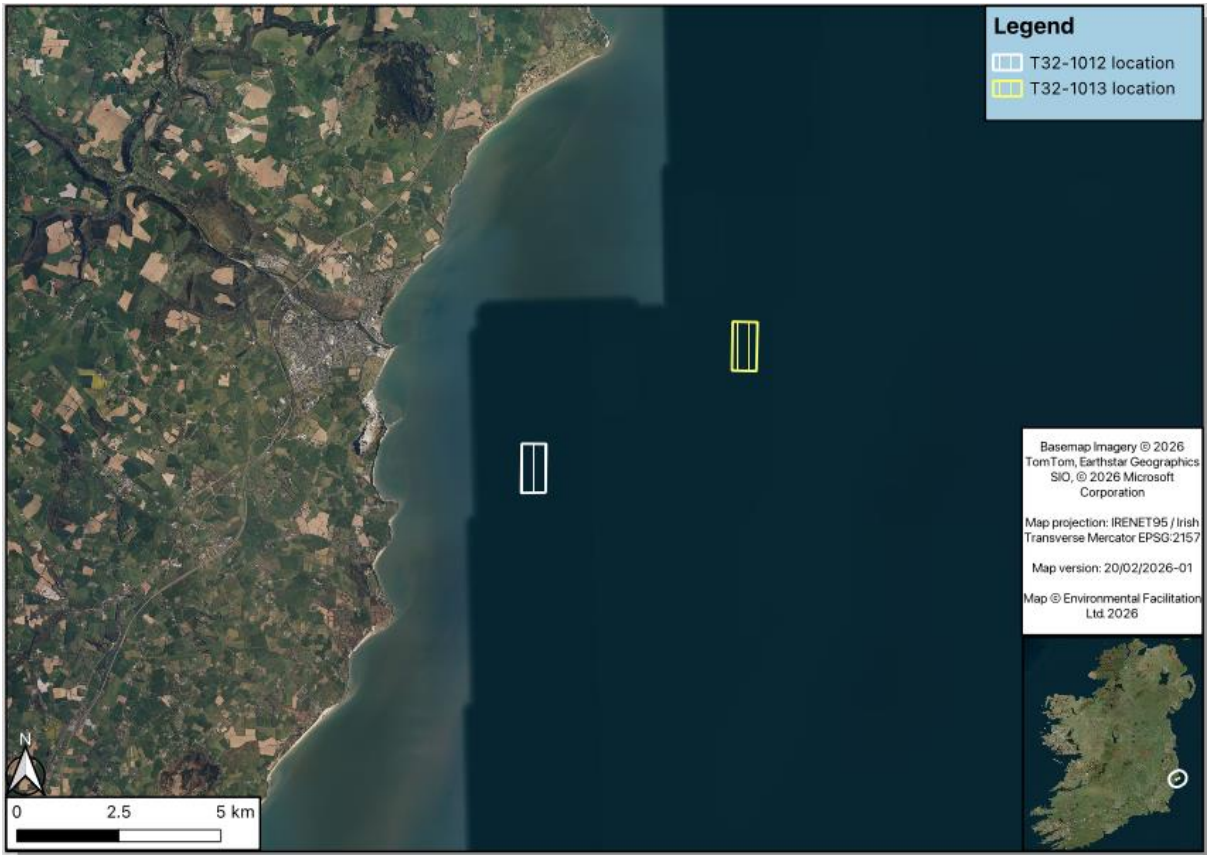


*Figure 1: Location of the aquaculture and foreshore licence application T32-1012 & T32-1013.*

*Table 1: A summary description of the project proposed under aquaculture and foreshore licence applications T32-1012 & T32-1013 for the culture of Blue Mussel (Mytilus edulis).*

**T32-1012**

| | | | | | |
|---|---|---|---|---|---|
| Size of site | 71.97 hectares | | | | |
| Location | Offshore from Arklow, Co. Wicklow | | | | |
| Approximate centroid (lat/long) – see Fig. 1 | 52.7657° N, 6.0872° W | | | | |
| Species cultivation proposed | Blue mussel (*Mytilus edulis*) | | | | |
| Method and proposed number of ropes | Rope culture – 64 lines | | | | |
| Source of stock | Naturally occurring spat | | | | |
| Annual production estimates | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| (tonnes) | 500 | 1000 | 1000 | 1000 | 1000 |

**T32-1013**

| | | | | | |
|---|---|---|---|---|---|
| Size of site | 72.63 hectares | | | | |
| Location | Offshore from Arklow, Co. Wicklow | | | | |
| Approximate centroid (lat/long) – see Fig. 1 | 52.7909° N, 6.0073° W | | | | |
| Species cultivation proposed | Blue mussel (*Mytilus edulis*) | | | | |
| Method and proposed number of ropes | Rope culture – 64 lines | | | | |
| Source of stock | Naturally occurring spat | | | | |
| Annual production estimates | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| (tonnes) | 500 | 1000 | 1000 | 1000 | 1000 |

Each application therefore provides for up to 64 longlines and an annual production of up to 1,000 tonnes from Year 2 onwards. Considered together, the two applications comprise up to 128 longlines within a combined licence area of 144.60 ha, with a combined annual production of up to 2,000 tonnes. These combined figures are used when considering the potential effects of the two projects together.

## 2.1. Local site characteristics

| | |
|---|---|
| Access points | Boat access to the aquaculture projects will be from South Quay at Arklow Pier (accessed via public road R772). |
| WFD EPA water body name and quality | The proposed aquaculture projects do not lie within a coastal waterbody.<br><br>The Southwestern Irish Sea - Brittas Bay (HA 10) is the closest coastal waterbody, in high ecological status, not at risk[6]. |

[6] https://www.catchments.ie/data/#/waterbody/IE_EA_140_0000?_k=oypyc5

| | |
|---|---|
| | However, its boundary ends less than two kilometres from the shore, and does not overlap with the projects. |
| Hydrological regime (exposure (wave) and tidal currents) | Modelled datasets for kinetic energy at the seabed due to waves[7] (see Figure 2 below) and currents[8], developed as part of the EUSeaMap project (Populus, J. *et al*, 2017), indicate that;<br><br>- Application T32-1012 is located within an area of relatively high kinetic energy at the seabed due to waves (202.59$Nm^{-2}s^{-1}$) and relatively high levels of kinetic energy at the seabed due to currents (290.97$Nm^{-2}$).<br>- Application T32-1013 is located within an area of relatively moderate kinetic energy at the seabed due to waves (129.54$Nm^{-2}s^{-1}$) and relatively high levels of kinetic energy at the seabed due to currents (267.75$Nm^{-2}$). |
| Water depth range | Application T32-1012 is situated in water depths ranging from ca. 17m down to ca. 22m (Source: depth contours within site plans submitted with licence application).<br><br>Application T32-1013 is situated in water depths ranging from ca. 24m down to ca. 27m (Source: depth contours within site plans submitted with licence application). |
| Adjacent marine habitats | For T32-1012, modelled seabed habitats (see Figure 3) are dominated by Circalittoral fine sand or circalittoral muddy sand (Populus, J. *et al*, 2017).<br><br>For T32-1013, modelled seabed habitats (see Figure 3) are dominated by deep circalittoral coarse sediment and deep circalittoral sand (Populus, J. *et al*, 2017). |

[7] https://emodnet.ec.europa.eu/geoviewer/

[8] https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.search#/metadata/d72bfeca-ceb5-4faa-b7b0-e95db8c6310b

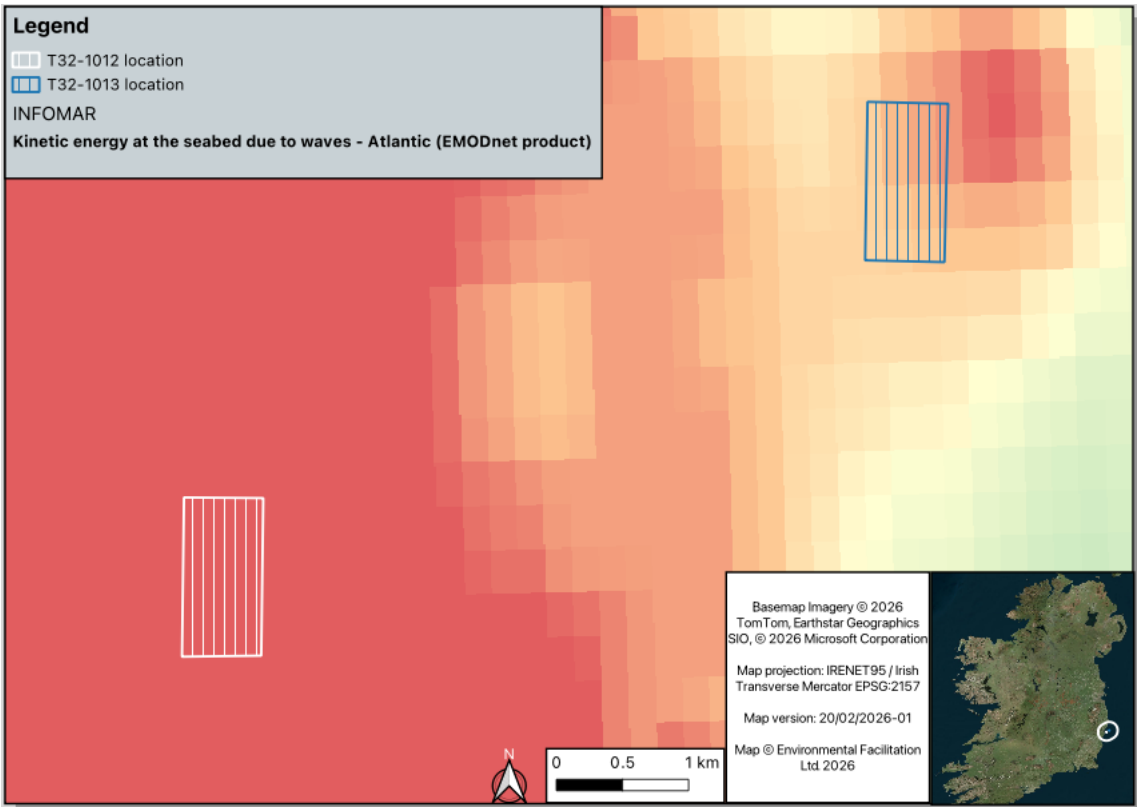


Figure 2: EUSeaMap modelled kinetic energy at the seabed due to waves overlapping with the projects (Populus, J. *et al*, 2017).

Figure 3: EMODNET EUSeaMap (2023) modelled seabed habitats in the vicinity of the projects. https://emodnet.ec.europa.eu/geoviewer/ (Populus, J. *et al*, 2017).

## 2.2. Existing aquaculture activities

There is currently one other existing aquaculture site licenced within ca. 2.4km from T32-1012, and one aquaculture site pending licence within ca. 6.6km from T32-1013 (See Table 2 and Figure 4 below).

Table 2: List of existing aquaculture sites licensed and pending license off the Wicklow coast.

| Licence No. | Species | Approximate distance from licence area |
|---|---|---|
| T32-027A (licensed) | Blue mussels (*Mytilus edulis*) | Ca. 2.4km SW of T32-1012 |
| T32-28 (pending license) | Winged kelp/Atlantic wakame (*Alaria esculenta*), kelp/mayweed (*Laminaria digitata*), dulse/dillisk (*Palmaria palmata*), sugar kelp (*Saccharina latissima*), sea spaghetti (*Himanthalia elongata*), nori (Porphyra), *Asparagopsis spp.* | Ca. 6.6km NW of T32-1013 |

*Figure 4: Existing aquaculture sites off the coast of Wicklow between ca. 2.4km and 6.6km from the projects.*

# 3. Relevant Annex IV species provisional risk assessment

The Habitats Directive identifies a number of plant and animal species across Europe, which are rare, or are threatened with extinction and which need special measures to be taken to ensure their long-term survival. All species listed under Annex IV with the potential to be impacted by the proposed aquaculture activities have been included within the following section, even if they have been separately assessed in the AA process.

Of the animal and plant species on Annex IV known to occur in Ireland, the following species were identified as relevant to the proposed aquaculture sites:

## 3.1. Otter

Ireland remains a European stronghold for the otter and the species is widespread in rivers, streams and along coastlines and lakeshores. Otters have two basic habitat requirements: adequate prey and safe refuges where they can rest and breed. Otters maintain territories along riverbanks, lake shores and coasts. Coastal territories require a freshwater source for the otter to wash, so will always include a stream or spring. In productive areas, such as coastlines, territories are in the range of 5-6 km. On the coast, otters forage within 80-100m of the coastline, typically in depths of <3m, but up to 10-12m. For foraging they prefer shallow, rocky environments with seaweed cover. Otters maintain numerous resting places, known as couches (above-ground, hidden in foliage) and holts (underground, among roots, rocks, or tunnels) within their territory. They breed all year, nesting in a well-hidden natal holt.

Otter is not a Qualifying Interest feature of the Kilpatrick Sandhills SAC (001742), Buckroney-Brittas Dunes and Fen SAC (000729), and Magherabeg Dunes SAC (001766), the three of which are within 15km of the aquaculture project, and distribution data from the National Biodiversity Data Centre (accessed on 23/02/2026) indicated records of Otter ca 6.8km west of the project (see Figure 5).

Noting the location of projects being outside normal otter foraging range, the lack of spatial overlap or likely interactions between the Annex IV species and the aquaculture activities means there will be no reasonably foreseeable risk to the number of individuals to breed successfully, nor to the survival of the population; the species natural range is secure and will not be reduced.

Conclusion: No risk to the species.

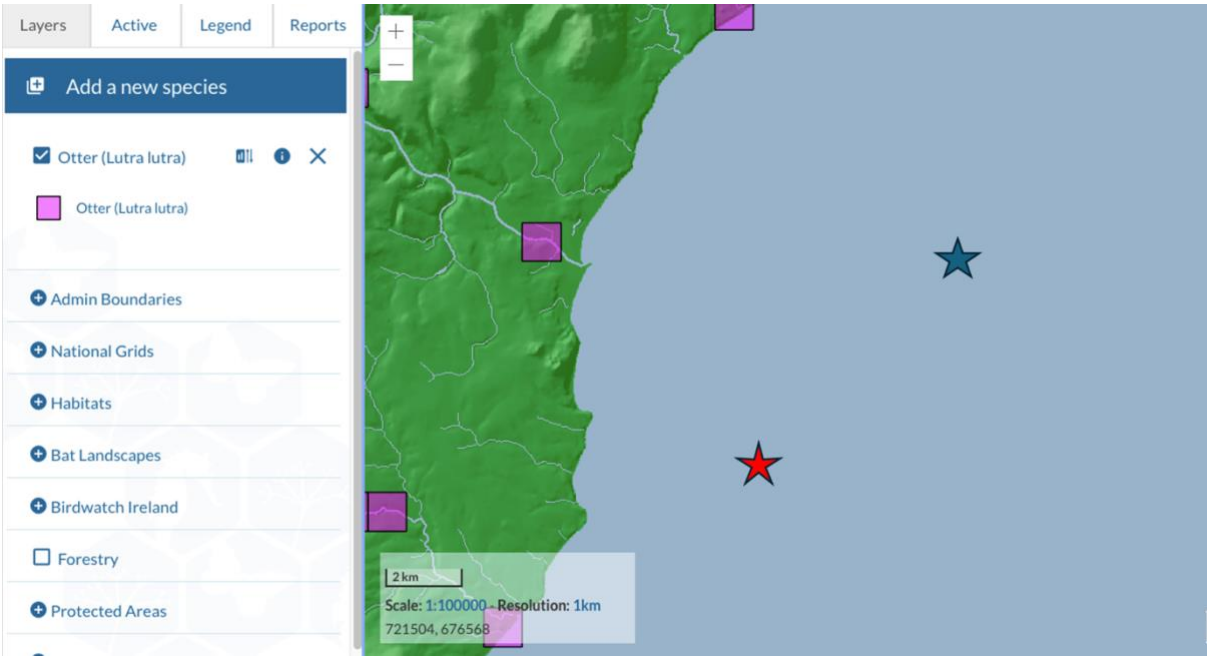


*Figure 5: Records of Otter (Lutra lutra) in the vicinity of T32-1012 & T32-1013 (red star shows approx. location of T32-1012, and blue star shows approx. location of T32-1013). The closest record is ca. 6.8km northwest on the mainland. Source(24/04/26)*

## 3.2. Bat species

Considering the location of the aquaculture activity, it will not impact trees, hedges, buildings, bridges, caves, souterrains, bats will not be affected by the proposed works.

Conclusion: No risks to species.

## 3.3. Dolphins, Whales and Porpoises

Data on the distribution of cetacean species from the National Biodiversity Data Centre (accessed on 23/02/2026) was used to help inform this Annex IV assessment; data was also visualized via Biodiversity Maps[9]. Data on all Annex IV cetacean species from within four 10km grid cells (T27, T37, T26, T36) encompassing all planned aquaculture activities (including proposed support vessel routes) under the aquaculture and foreshore licence applications T32-1012 & T32-1013. This data was compiled and is shown in Table 3 below. Example outputs from Biodiversity Maps showing sightings data in the vicinity of the proposed aquaculture activities are shown in Figures 6-8.

[9] https://maps.biodiversityireland.ie/

*Table 3: Counts of dolphins, whales and porpoises from four 10km grid cells (T27, T37, T26, T36) encompassing all planned aquaculture activities (including proposed support vessel routes) under the aquaculture and foreshore licence applications T32-1012 & T32-1013.*

| Species name | Record count | Date of last record | Title of dataset |
|---|---|---|---|
| Common Porpoise (*Phocoena phocoena*) | 62 | 26/12/2023 | IWDG Casual Cetacean Sightings |
| Common Dolphin (*Delphinus delphis*) | 22 | 07/12/2023 | IWDG Cetacean Strandings Database* |
| Dolphin species possibly Harbour Porpoise | 5 | 06/03/2023 | IWDG Casual Cetacean Sightings |
| Bottlenosed Dolphin (*Tursiops truncatus*) | 4 | 20/04/2021 | IWDG Casual Cetacean Sightings |
| Dolphin species | 3 | 12/12/2022 | IWDG Casual Cetacean Sightings |
| Risso's Dolphin (*Grampus griseus*) | 3 | 02/06/2020 | IWDG Casual Cetacean Sightings |
| Whale species | 3 | 20/02/2023 | IWDG Casual Cetacean Sightings |
| Cetacean species | 2 | 16/07/2022 | IWDG Cetacean Strandings Database* |
| Atlantic White-sided Dolphin (*Lagenorhynchus acutus*) | 1 | 20/04/1984 | IWDG Cetacean Strandings Database* |
| Blue Whale (*Balaenoptera musculus*) | 1 | 01/01/1900 | IWDG Cetacean Strandings Database* |
| Risso's Dolphin (*Grampus griseus*) | 1 | 17/09/2021 | IWDG Cetacean Strandings Database* |

* Strandings should not be considered as direct evidence of sp. using the local project area

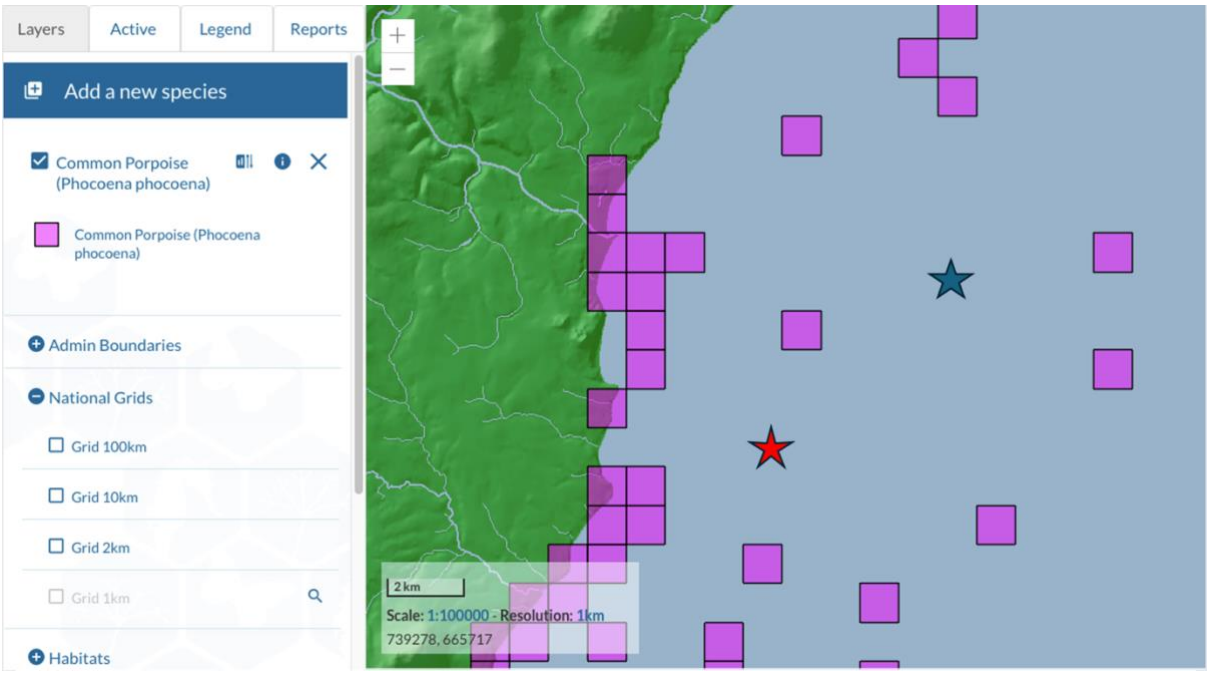


*Figure 6: Records of Common Porpoise (Phocoena phocoena) in the area surrounding the T32-1012 & T32-1013 (red star, T32-1012, blue star T32-1013). Source: https://maps.biodiversityireland.ie/(24/03/26)*

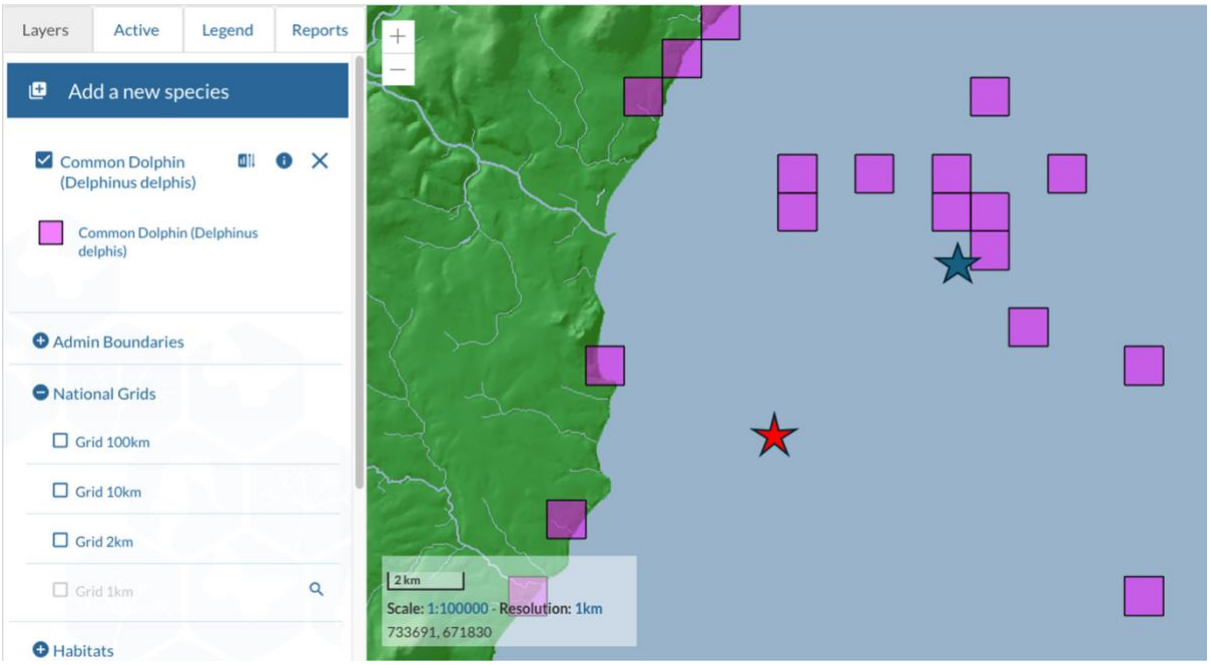


*Figure 7: Records of Common Dolphin (Delphinus delphis) in the area surrounding T32-1012 & T32-1013 (red star, T32-1012, blue star, T32-1013). Source: https://maps.biodiversityireland.ie/(24/03/26)*

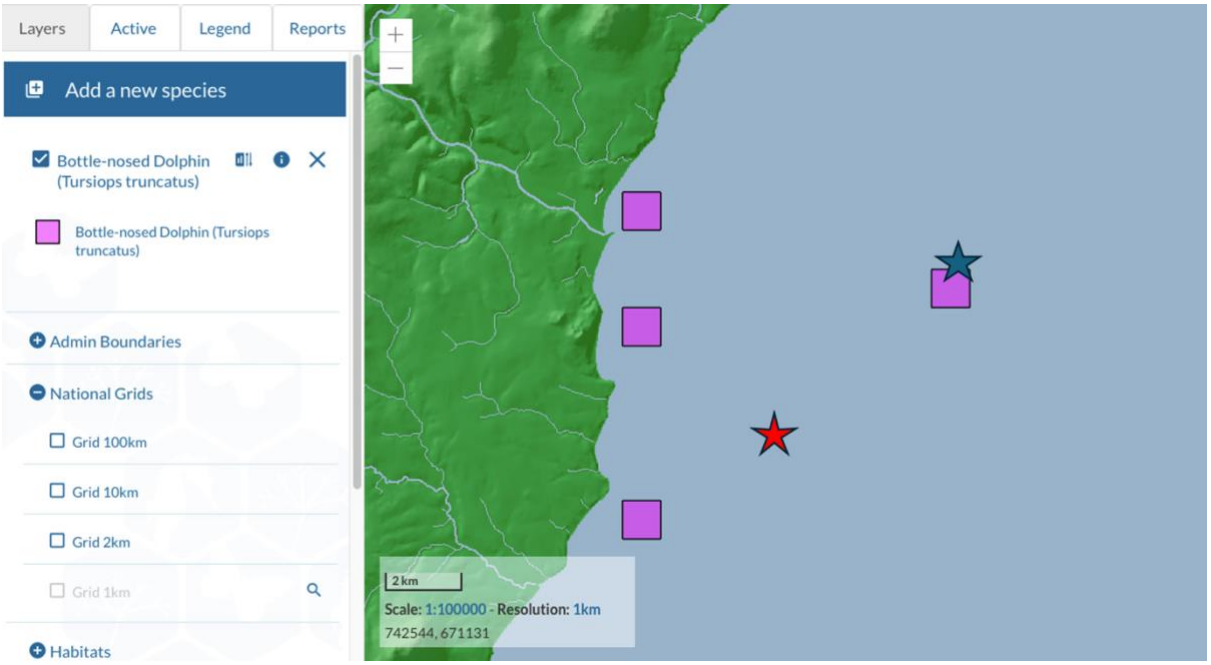


*Figure 8: Records of Bottlenosed Dolphin (Tursiops truncatus) in the area surrounding the T32-1012 & T32-1013 (red star, T32-1012, blue star, T32-1013). Source: https://maps.biodiversityireland.ie/(24/03/26)*

From the evidence reviewed, it is likely that there may be cetaceans (Annex IV species) particularly porpoise and dolphin present in the vicinity of the projects associated support vessel routes. Therefore, these species are considered in more detail in this risk assessment.

Conclusion: Further consideration to assess risk.

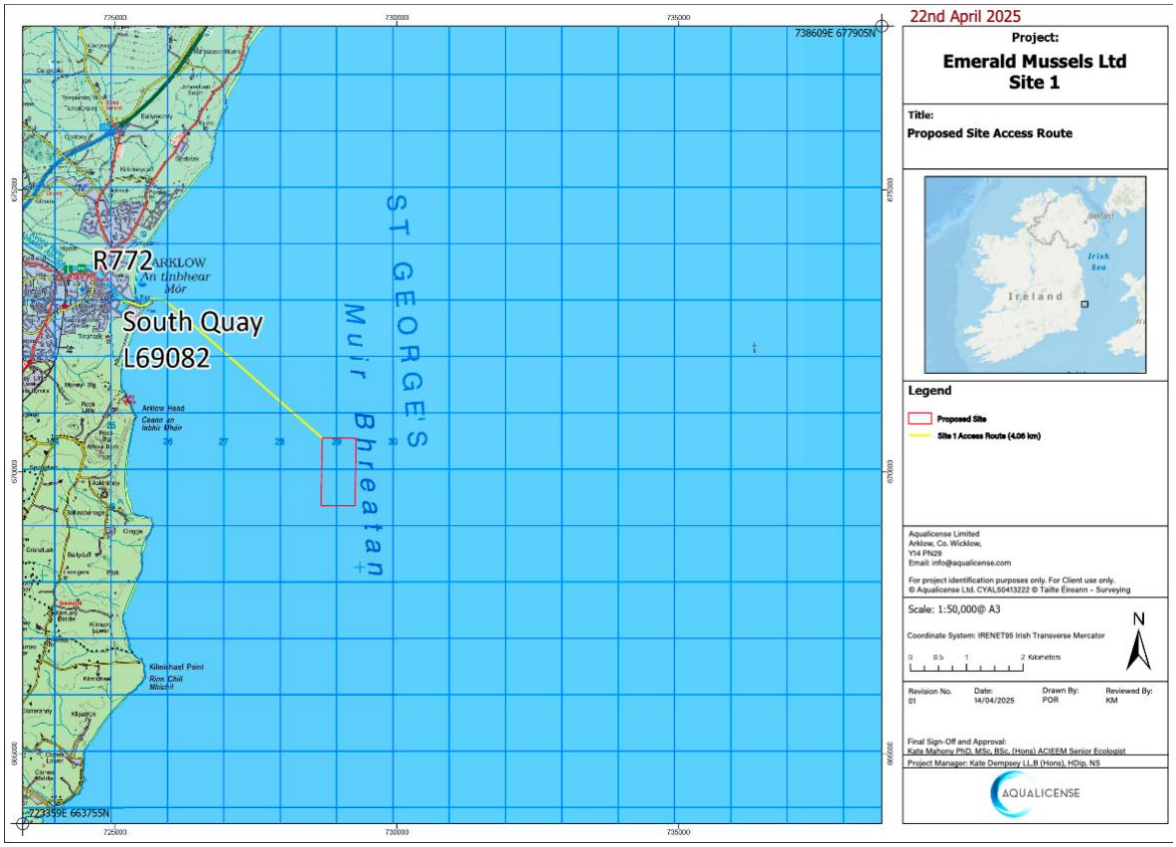


*Figure 9: Support vessel route provided with the application T32-1012.*

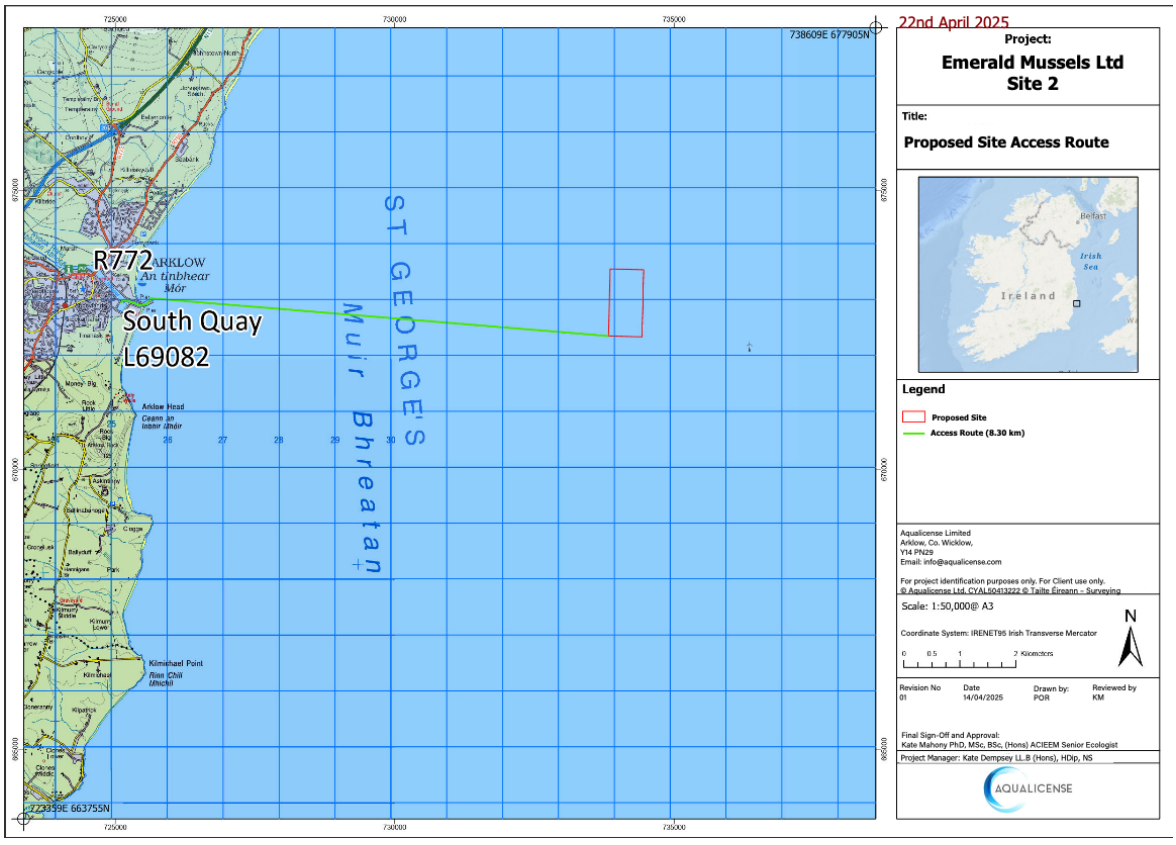


*Figure 10: Support vessel route provided with the application T32-1013.*

## 3.4. Natterjack Toad

The natural ranges for the Natterjack Toad are freshwater and terrestrial with populations generally restricted to sites in County Kerry (although records were also noted in County Wexford[10]). The planned aquaculture activities under the aquaculture and foreshore licence applications T32-1012 & T32-1013 are unsuitable for Natterjack toads.

Conclusion: No risks to species.

## 3.5. Marine Turtles

Five species of marine turtle have been recorded in Irish waters (Botterell *et al.* 2020): the Leatherback (or Leathery) turtle (*Dermochelys coriacea*), Loggerhead (*Caretta caretta*), Kemp's Ridley (*Lepidochelys kempii*), Hawksbill (*Eretmochelys imbricata*) and Green turtle (*Chelonia mydas*). Hawksbill and Green turtles are considered very rare.

The majority of records of hard-shell turtles observed were juveniles and occurred in the boreal winter months when the waters are coolest in the northeast Atlantic. They generally occurred on the western aspects of the UK and Ireland highlighting a pattern of decreasing records with increasing latitude, supporting previous suggestions that juvenile turtles arrive in these waters via the North Atlantic current systems (Botterell *et al.* 2020).

Leatherback (or Leathery) turtles (*Dermochelys coriacea*) are the largest sea turtle species living today and have many unique anatomical and physiological adaptations (Doyle, 2007). Leatherback turtles were most commonly recorded in the boreal summer months with the majority of strandings being adult sized, of which there has been a recent decrease in annual records (Botterell *et al.* 2020).

Data on the distribution of marine turtles from the National Biodiversity Data Centre (accessed on 23/02/2026) was used to help inform this Annex IV assessment; data was also visualized via Biodiversity Maps[11]. Data on all Annex IV marine turtle species from four 10km grid cells (T27, T37, T26, T36) encompassing all planned aquaculture activities (including proposed support vessel routes) under the aquaculture and foreshore licence applications T32-1012 & T32-1013. This data was compiled and is shown in Table 4 below. The closest turtle record, a Leatherback, was in the National Biodiversity Data Centre ca. 3km from the aquaculture and foreshore licence application T32-1013 (see Figure 11).

[10] https://maps.biodiversityireland.ie/Map
[11] https://maps.biodiversityireland.ie/

*Table 4: Counts of marine turtles from four 10km grid cells (T27, T37, T26, T36) encompassing around T32-1012 & T32-1013.*

| Species name | Record count | Date of last record | Title of dataset |
|---|---|---|---|
| Leatherback Turtle (Dermochelys coriacea) | 6 | 31/10/2024 | Explore Your Shore |

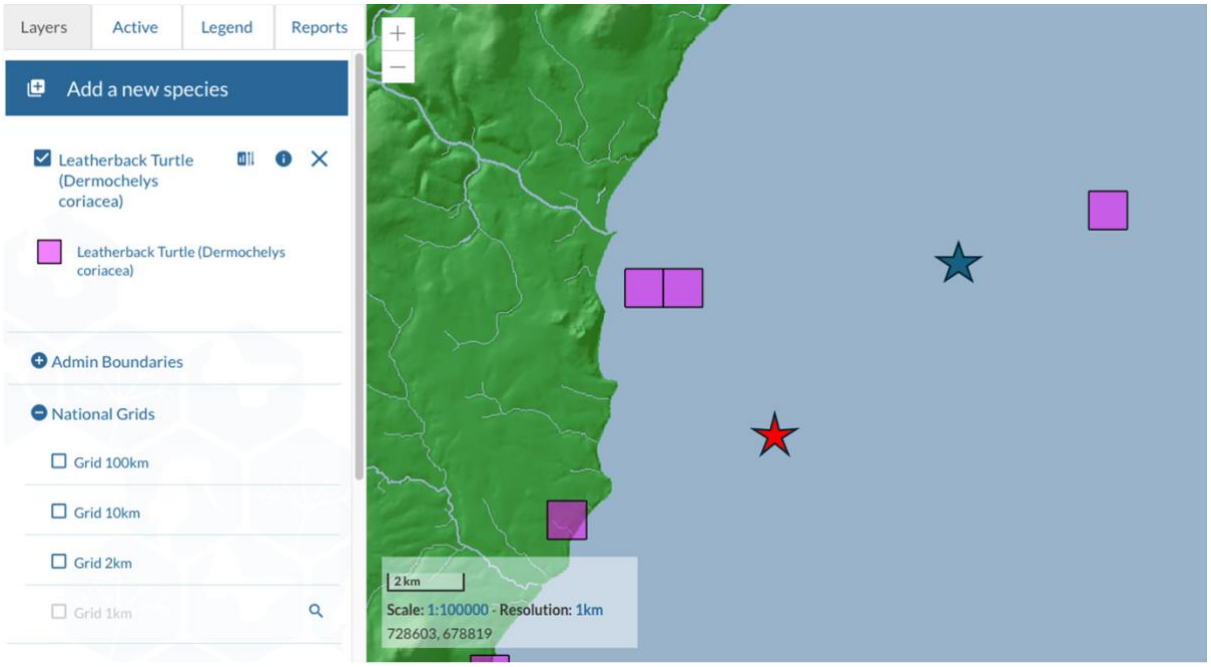


*Figure 11: Records of the Leatherback (or Leathery) turtle (Dermochelys coriacea) in the area surrounding T32-1012 & T32-1013 (red star shows approx. location of T32-1012, and blue star shows approx. location of T32-1013). The closest record (31/07/1998) is ca. 3km northwest of the project area. Source: https://maps.biodiversityireland.ie/(24/03/26)*

Loggerhead turtles are stranded regularly in Ireland with records reported once every few years (Doyle, 2007); they are rarely sighted alive in Irish waters. Loggerhead sightings recorded in the National Biodiversity Data Centre within the vicinity of the proposed aquaculture projects were not shown to have any records within 100km.

Botterell *et al* (2020) reported that records showed 143 marine turtles were indirectly captured as bycatch in fishing nets, ropes and lines (7.2% of total turtle records). This comprised six loggerhead turtles (2.5% of 240 conspecific records; all alive), two Kemp's ridley turtles (3.3% of 61 conspecific records; both alive) and 135 leatherback turtles (8% of 1683 conspecific records; 95 alive). Of the bycaught leatherback turtles, a substantial number were associated with ropes from lobster pots, crab pots and creels (49.6%, 67 of 135), and nets including trawls and drift nets (31.9%, 43 of 135). Botterell *et al* (2020) also reported that five

leatherback turtles (0.3% of conspecific records, one alive) had injuries consistent with collision with boats and their propellers.

From the evidence reviewed, there is the potential for marine turtles (Annex IV species) to be present in the vicinity of the projects, and their support vessel routes. The species are precautionarily considered in more detail in this risk assessment.

Conclusion: Further consideration to assess risk.

## 3.6. Kerry Slug

The Kerry Slug is a terrestrial and nocturnal (generally) mollusc, with a natural range restricted to sites in County Kerry and west Cork (and more recently in Galway, Limerick and Tipperary). Its preferred habitat is woodland, lichen covered rock outcrops and boulders. Therefore, this marine aquaculture site is not a suitable habitat for this species. There is no overlap between this marine aquaculture site and the slug's natural habitat and thus there is no risk to the number of individuals being able to breed successfully, nor to the survival of the population; the species natural range is secure and will not be reduced.

Conclusion: No risks to species.

## 3.7. Plants

The natural ranges for these Annex IV plant species (Killarney Fern, Slender Naiad, and Marsh Saxifrage) are terrestrial or aquatic freshwater and therefore it is highly unlikely that the proposed aquaculture activities will impact these species; there is no risk to these Annex IV species.

Conclusion: No risks to species.

## 3.8. Provisional Investigation Summary

The relevant Annex IV species which may either be present in the area, or potentially affected by this aquaculture project, and considered for further investigation, are:

- Whale, dolphin and porpoise species (and in particular, from the available occurrence records reviewed, Common Porpoise (*Phocoena phocoena*) and Common Dolphin (*Delphinus delphis*)
- Marine turtles

# 4. Further Assessment of Risk

To conclude that the projects present no reasonably foreseeable risk, the assessment must establish that they will not result in:

- of deliberate disturbance
- of damage or destruction of breeding sites or resting places
- to ecological functionality of breeding/resting sites.
- to the survival of the population
- to the species' natural range.

## 4.1. Dolphins, Whales and Porpoises

Data reviewed from the National Biodiversity Data Centre, Ireland shows that dolphins, whales and porpoises (particularly porpoise and dolphin) have been recorded in the vicinity of the project area and proposed support vessel routes. These are typically large mammals, that utilise a wide range of habitats in the marine environment. Whales tend to be migratory, following food, and are generally found in open ocean. Dolphins are found from shallow coastal waters to the deeper open ocean. They feed on a variety of fish and invertebrates, such as squid. Porpoises are also found from shallow coastal waters to the deeper open ocean and are generally shy and elusive and prefer to avoid contact with boats and humans.

### 4.1.1. Summary of Potential Impacts and Risk Assessment

The potential for impacts associated with the proposed projects on dolphins, whales and porpoises is related to:

*Noise disturbance:*

The level and persistence of any associated underwater noise from aquaculture activities may be minimal relative to other underwater noise sources, such as commercial vessels, but will vary according to farm features (e.g. type, size), habitat characteristics (e.g. location, depth, type of bottom sediments, shape of coastline) and compounding factors, such as the number of farms and/or other noise sources in nearby regions (Keeley *et al.,* 2009). The increase in marine traffic resulting from the proposed project is considered minimal, when considering existing fishing vessels and recreation vessels already utilising the marine space. Small support vessels would visit the sites infrequently and there is no regular maintenance required with the proposed aquaculture. Noise associated with small marine vessels is considered low, and noise from the site during operation is not considered to be significant as the sound pressure would be minimal, low and would rapidly attenuate. Negligible risks are concluded in any of the categories outlined in section 4 introduction for noise disturbance.

*Collisions or entanglement*

Mussel aquaculture systerms rely on the deployment of ropes for long periods of time in the water column, which may pose an entanglement risk to marine animals such as cetaceans. Young (2015) reported that in contrast to fishing gear, there were fewer entanglement cases

in mussel aquaculture gear although there has been little data collected on this issue to date. Following this review in 2015, a total of seven entanglement reports were collected related to mussel aquaculture, including four baleen whales and one harbour porpoise. A majority of cases involved mussel spat collecting ropes, which suggests this part of the gear may pose the greatest entanglement risk (Young, 2015). Lloyd (2003) reported that the risk of entanglement was probably greater with thinner or untensioned ropes, such as spat collecting ropes and lost ropes. As they don't echolocate (Tyack & Clark 2000), baleen whales (e.g. minke, northern right whale and humpback) are more prone to entanglement. Over 60% of northern right whales in the North Atlantic have entanglement scars, with at least two deaths during a three-year period attributed to entanglements (Hamilton *et al*. 1998).

Noting the shallow, coastal location of the project, large baleen whales are less likely to frequently utilise the shallow inshore habitat associated with the proposed sites compared to offshore waters. There is a very low likelihood of interaction between larger baleen whales and mussel culture cultivation lines with a low risk with regard to the smaller species.

Regarding dolphin and porpoise, there is a potential for interaction with the existing and proposed suspended culture aquaculture sites and activities. Considering the footprint of the aquaculture structures, the likelihood of interaction is low. In addition, the structures do not present a significant barrier to movement of these species due to their small size, and because of their echolocation capabilities, these structures should be easily detectable. Therefore, dolphins and porpoises are considered to be at lower risk of becoming entangled in lines (Lloyd, 2003).

The small number of vessels that will be required for the projects will not significantly increase vessel traffic in the area. These vessels will be travelling at slow speeds, in a predefined trajectory, allowing for animals to avoid vessels. The principal outstanding concern therefore relate to untensioned lines.

Therefore considering Dolphins, Whales and Porpoises the following conservation measures should be complied with: All backbone, mooring, cultivation and spat-collection ropes shall be installed and maintained under the tension specified for the approved system and shall be configured to avoid slack ropes, loops and unnecessary lengths of line in the water column. The operator shall inspect the infrastructure at defined intervals and promptly following severe weather. Damaged, detached, slack or storm-displaced ropes and associated equipment shall be repaired or removed as soon as conditions safely permit. Inspection, maintenance, loss and recovery records shall be retained and made available to the Department on request.

### *Obstruction and displacement*

The potential for the aquaculture infrastructure within the project area to cause obstruction to dolphins, whales and porpoises is considered very low. These mobile species can avoid and go around any obstructions without any significant disturbance. The combined scale of the projects is relatively limited and not significant when considered against the overall area and not likely to cause loss of habitat to these wide-ranging species. Negligible risks are concluded in any of the categories outlined in section 4 introduction.

### *Attraction*

Some cetacean species (predominantly dolphins and porpoises) may be attracted to structures similar to those used in aquaculture operations as the infrastructure can act as artificial reefs or fish aggregation devices, encouraging fish aggregations and thus predators (Callier *et al.,* 2017). However, with the noted footprint of the project sites, this effect would be limited to the immediate vicinity and would be temporary in nature, noting the relatively short growing cycle. There are no significant energy sources (e.g., light, noise etc.) likely to result from activities at the sites that pose a risk. Negligible risks are concluded in any of the categories outlined in section 4 introduction.

### *Water quality*

Research has shown that the large concentrations of mussels found in mussel farms can extract a significant proportion of phytoplankton, causing phytoplankton depletion (Broekhuizen *et al.* 2002). The magnitude and extent of depletion is poorly understood and may vary, depending on factors such as farm size, crop density, water depth, currents and season (Lloyd, 2003). Phytoplankton can be reduced by up to 60% within farm boundaries (Waite 1989), and a 50 ha farm may consume >20% of phytoplankton passing through it (Broekhuizen *et al.* 2002). These phytoplankton depletion halos are usually limited to within 80 m of farm (Grange & Cole 1997, in Lloyd, 2003), so may be fairly localised in their extent. Mussels and other associated fauna also release dissolved sources of nitrogen (e.g. ammonium) directly into the water column as metabolic waste products (Keeley *et al.,* 2009). Unlike for finfish culture, no veterinary products are used during the mussel cultivation process. In summary, water quality is not anticipated to be impacted in any way which could impact whales, dolphins or porpoises. Negligible risks are concluded in any of the categories outlined in section 4 introduction.

### *Commissioning and decommissioning*

The infrastructure involved with mussel cultivation is relatively adaptive, easily installed and removed. Therefore, commissioning and decommissioning of these structures are tasks that are not anticipated to have significant impacts on whales, dolphins or porpoises.

The potential for impact from the listed hazards is generally unlikely or of low intensity. While there may be some changes present in the environment, they are not likely to be significant.

While there may be sightings in the vicinity, likely interactions between the Annex IV species and the aquaculture activities means that there is no reasonably foreseeable risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced by the existing and proposed shellfish aquaculture operations. Negligible risks are concluded in any of the categories outlined in section 4 introduction.

## 4.2. Marine turtles

Data reviewed from the National Biodiversity Data Centre Ireland shows that low numbers of marine turtles were recorded in the vicinity of the project areas and proposed support vessel routes.

### 4.2.1. Summary of Potential Impacts and Risk Assessment

The potential for impacts associated with the proposed projects on marine turtles are related to:

*Collisions or entanglement*

Mussel aquaculture relies on the deployment of ropes for long periods of time in the water column, which may pose an entanglement risk to marine animals such as turtles. Young (2015) reported that in contrast to fishing gear, there were fewer entanglement cases in mussel aquaculture gear although there has been little data collected on this issue to date. Following this review in 2015, a total of seven entanglement reports (globally) were collected related to mussel aquaculture, including two leatherback turtles. A majority of cases involved mussel spat collecting ropes, which suggests this part of the gear may pose the greatest entanglement risk (Young, 2015).

While there is the potential risk around collisions with marine turtles on the sea surface, the small number of vessels that will be required for the projects will not significantly increase vessel traffic in the area. These vessels will be travelling at slow speeds, in a predefined trajectory, allowing sufficient time for animals to avoid vessels, or for them to be spotted and for avoiding action to be taken.

Available records indicate marine turtles are infrequently recorded in the area (e.g. a live sighting noted in 31/07/1998). With no additional concerns noted following further assessment, it was concluded that the risk of turtles becoming entangled in ropes or in collisions considered so low to be negligible. Negligible risks are therefore concluded in any of the categories outlined in section 4 introduction.

## 4.3. Mitigation measures

Considering Dolphins, Whales and Porpoises: All backbone, mooring, cultivation and spat-collection ropes shall be installed and maintained under the tension specified for the approved system and shall be configured to avoid slack ropes, loops and unnecessary lengths of line in the water column. The operator should inspect the infrastructure at defined intervals and promptly following severe weather. Damaged, detached, slack or storm-displaced ropes and associated equipment should always be repaired or removed as soon as conditions safely permit. Inspection, maintenance, loss and recovery records shall be retained and made available to the Department on request.

# 5. Conclusion

Following assessment of the aquaculture and foreshore licence applications T32-1012 & T32-1013, it is concluded that the proposed activities, having regard to the nature, scale and operation of the projects, are not reasonably foreseeable to result in:

- deliberate disturbance;
- damage or destruction of breeding sites or resting places;
- impacts to the ecological functionality of breeding or resting places;
- impacts to the survival of the population; or
- reduction in the species' natural range.

Final conclusion: Negligible risk to Annex IV species. This conclusion is not dependent on the application of mitigation.

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