Risk Assessment for Annex IV Species

Aquaculture and foreshore licence application T32-028A, Arklow Bay, Co. Wicklow.

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	Prepared by Environmental Facilitation Ltd on behalf of the Department of Agriculture, Food and the Marine. Date: 09/07/2026

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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 new aquaculture and foreshore licence application T32-028A, for the culture of seaweed using longlines (hereafter referred to as the 'project').

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[2].

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 51. (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.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20130701
[2] https://www.npws.ie/legislation

(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[3]

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 project 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[4].

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 within relevant distances of concern, then the project may proceed without further consideration. If an Annex IV species is found to be present, or there is a breeding or resting place to which the animals are

[3] https://www.npws.ie/legislation

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

likely to return, then the likely impacts of the project need to be examined to see if those impacts can be avoided through the design of the works[4].

2. Outline of aquaculture activities

This project is located ca. 220m from the shore, off the Wicklow coastline and surrounded by open sea.

The species being cultivated are outlined in Table 1. Modelled seabed habitats from the EUSeaMap project underlying and surrounding the project area is illustrated in Figure 1.

Table 1: Details of proposed species being cultivated in T32-028A

Species proposed for cultivation	Irish Wakame (*Alaria esculenta*), Northern European kelp (Digitata) (*Laminaria digitata*), Dulse (*Palmaria palmata*), Sugar kelp (*Saccharina latissima*), Sea thong (*Himanthalia elongata*), Nori (*Porphyra umbilicalis*), Harpoon weed (*Asparagopsis armata*).				
Method	Longline cultivation - proposed total number of lines/ropes: 248, installed on a phased basis. The development will consist of 180.25 m long seaweed longlines constructed from 20mm nylon rope, fitted with A2 grey buoy units at 15 m intervals, or closer where production requirements dictate. A minimum spacing of 20 m will be maintained between individual lines and 89 m between each set of lines.				
Source of stock	Seaweed hatchery owned by the applicant company, or Tralee Bay Hatchery or Ocean Algae (an Irish based hatchery – as stated in the application).				
Annual Production Estimates	Year 1	Year 2	Year 3	Year 4	Year 5
(tonnes)	881	2391	2391	3901	3901

The project is not situated within a Classified Bivalve Mollusc (BLM) Production Area[5]. There is currently one existing aquaculture and foreshore site licenced, and two aquaculture and foreshore sites (with pending licences), within 15km of the project area, in the vicinity of Arklow Bay. These three aquaculture sites are listed in Table 2 and illustrated in Figure 2 below.

[5] https://www.sfpa.ie/What-We-Do/Molluscan-Shellfish/Classified-Areas

Figure 1 EMODNET EUSeaMap (2023) seabed habitat types in the vicinity of the aquaculture project. https://emodnet.ec.europa.eu/geoviewer/

Table 2: List of existing aquaculture sites licenced within a distance of consideration.

Licence No.	Species	Approximate distance from licence area T32-028A
T32-1012 (pending license)	Blue mussel – (*Mytilus edulis*)	Ca. 6.2km south
T32-1013 (pending license)	Blue mussel – (*Mytilus edulis*)	Ca. 6.6km southeast
T32-027A (licensed)	Blue mussel – (*Mytilus edulis*)	Ca. 8.2km south

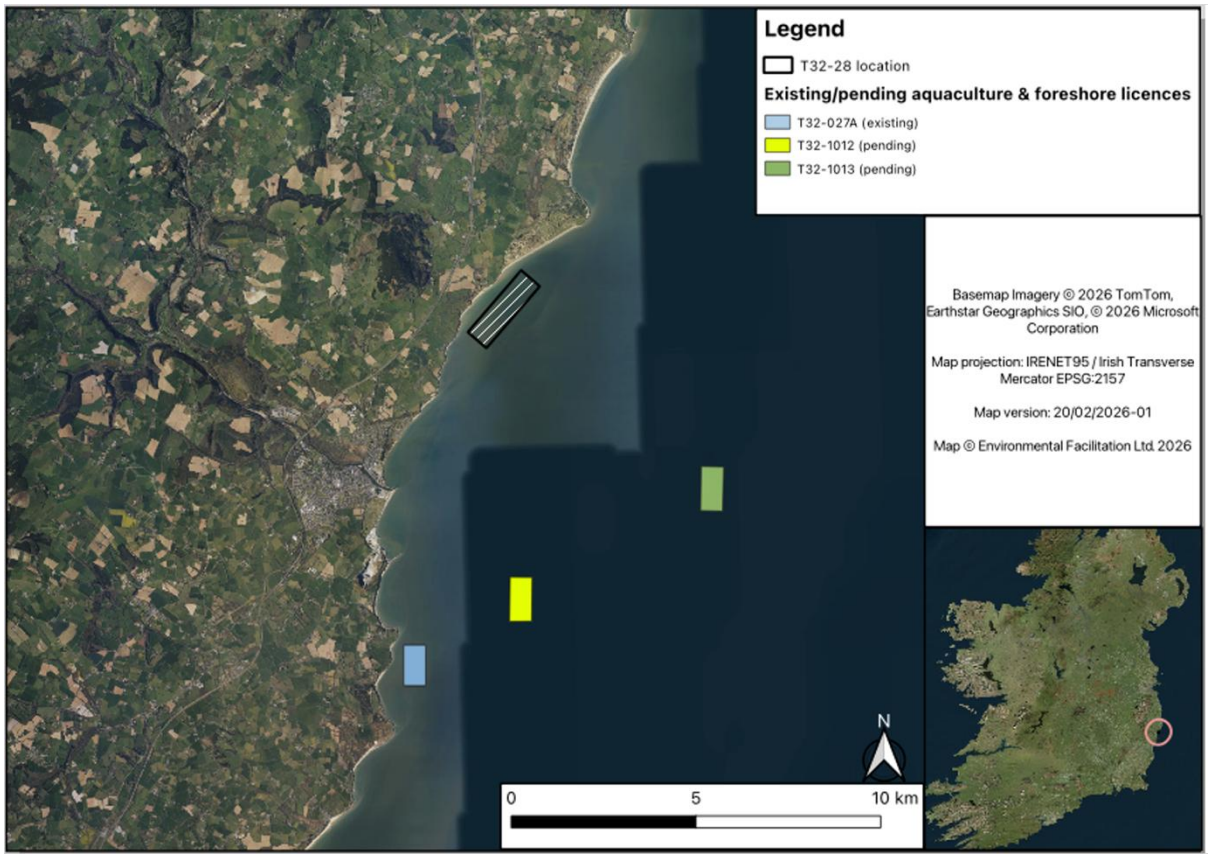

Figure 2: Existing/pending aquaculture projects within the vicinity of T32-028A (shown with black outline and white stripe fill).

Modelled datasets for kinetic energy at the seabed due to waves[6], developed as part of the EUSeaMap project (Populus *et al.,* 2017), indicate that the project is within an area of high kinetic energy at the seabed due to waves (236.19$Nm^{-2}s^{-1}$). The project area is subtidal with the seabed ranging from 14m to 20m[7] (EMODnet Map Viewer). Seabed habitats (see Figure 1) are dominated by circalittoral fine sand or circalittoral muddy sand, with some deep circalittoral sand, and circalittoral sandy mud, and deep circalittoral mud.

2.1. Extensive long line seaweed culture (various species)

In Ireland, seaweed cultivation is primarily an inshore activity involving the growth of seaweed in various configurations of growing systems. The system proposed in this project comprises horizontal, parallel growing structures maintained in the surface waters using buoys and moored to the seabed. The seaweed is typically grown on pre-seeded twine wrapped around individual growing lines. As stated in the application, the source of the seaweed plantlets seeded onto strings will be either the Seaweed Hatchery (established by the applicant company), the Tralee Bay Hatchery or Ocean Algae (all Irish based hatcheries).

A typical methodology outlined in detail in Vance *et al* (2023) is summarised here; deployment of the longlines with pre-seeded twine occurs in October, typically completed by two technical personnel.

[6] https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.search#/metadata/2a2659c4-ce1b-4feb-81cf-a2bcbc362a3f
[7] https://emodnet.ec.europa.eu/geoviewer/

The growing period runs from November through to March, where maintenance on the longlines may occur every month during this period. Harvesting takes place once per year in early Spring (between March–May, depending on weather conditions). The current practice is to cut the seaweed from the lines manually on a small (15m) boat, which takes 3 workers and 1 driver approximately 1 h per line.

3. Relevant Annex IV species

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 existing and 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 existing and 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 its territory. They breed all year, nesting in a well-hidden natal holt.
Whilst Otter is not a Qualifying Interest feature of the Buckroney-Brittas Dunes and Fen SAC located ca. 220m to the north west of the project, records of Otter were noted in the vicinity (see Figure 3), and as an Annex IV listed species, are considered further in this risk assessment.

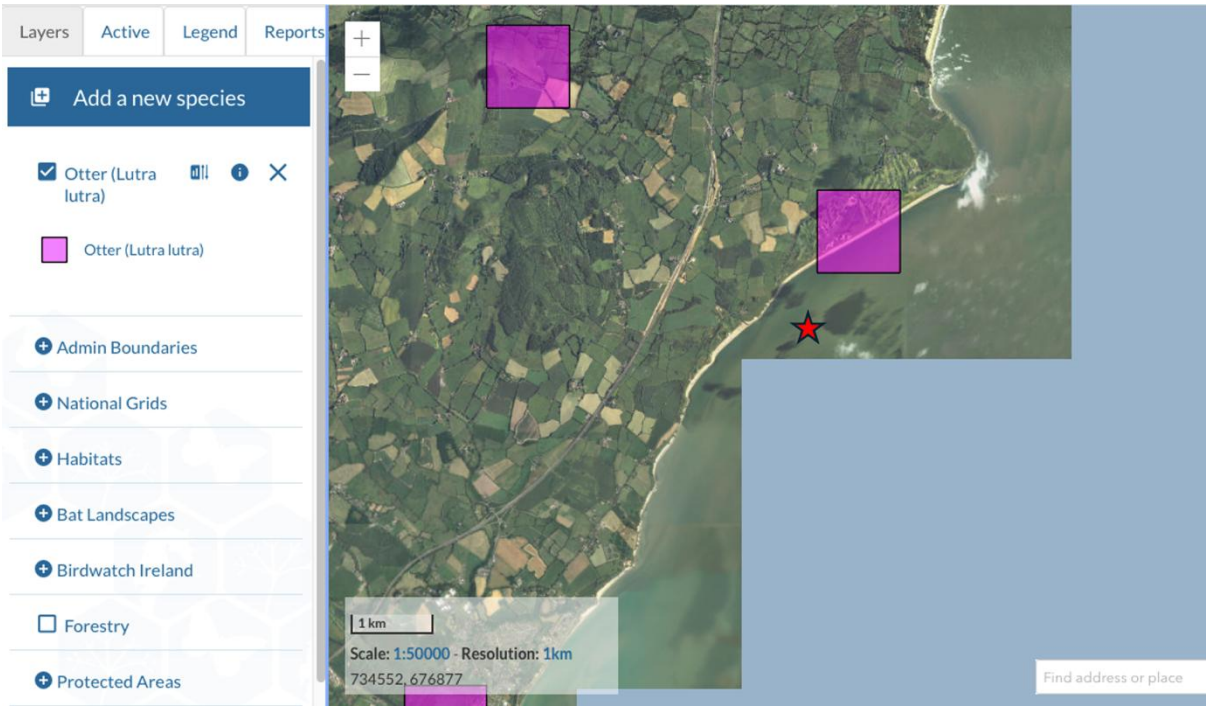

Figure 3: Records of Otter (*Lutra lutra*) <800m from the proposed aquaculture activities (red star shows approximate location of the project). Source: https://maps.biodiversityireland.ie/ accessed on 07/02/2026.

Conclusion: Further consideration to assess risk.

3.2. All bat species

Bat species distribution data from the National Biodiversity Data Centre (accessed on 07/02/2026) was used to help inform this Annex IV assessment and indicated that the project was situated ca. 2km from the nearest bat record.

Considering that these aquaculture activities are subtidal, will not impact trees, hedges, buildings, bridges, caves, souterrains or include changes in lighting, bats are unlikely to be affected by the proposed works. Noting the separation distance between the closest bat record and the project area, 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 risks to species

3.3. Dolphins, Whales and Porpoises

Data on the distribution of cetacean species from the National Biodiversity Data Centre (accessed on 07/02/2026) was used to help inform this Annex IV assessment; data was also visualized via Biodiversity Maps[8]. Data on all Annex IV cetacean species from within three 10km grid cells (T38, T37, T27) which encompassed all planned aquaculture activities under the licence application (T32-028A), including proposed support vessel transit routes, was compiled. This data is shown in Table 3 below.

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

Example outputs from Biodiversity Maps are shown for data of Common Porpoise (*Phocoena phocoena*) (see Figure 4) and Common Dolphin (*Delphinus delphis*) (see Figure 5) in the vicinity of the project.

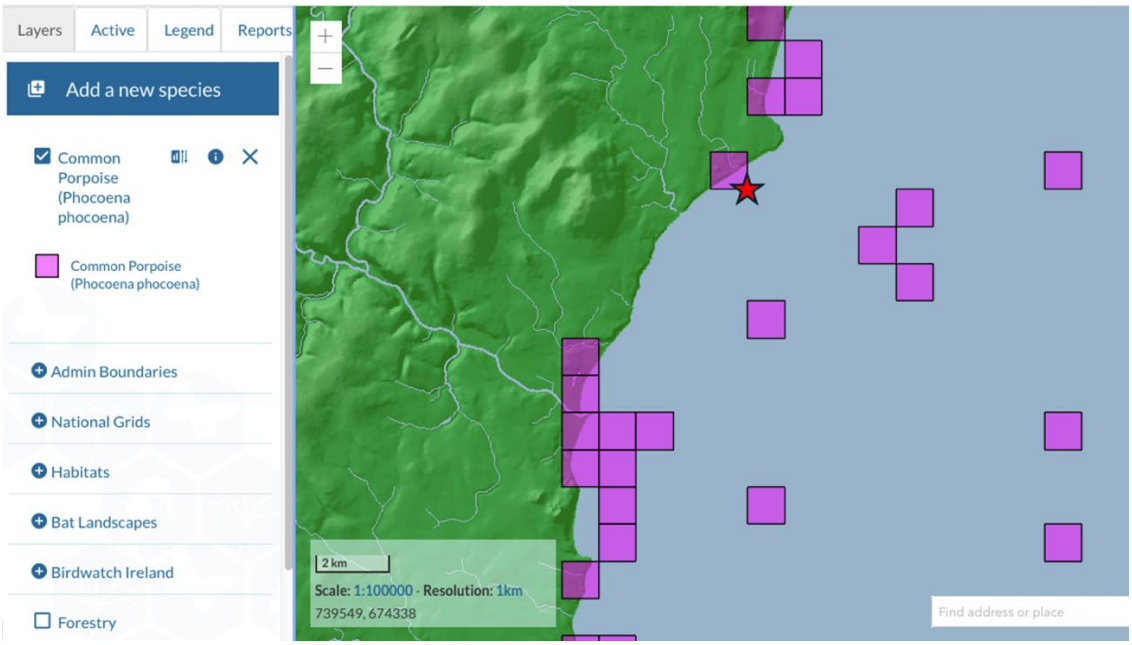

Figure 4: Data for Common Porpoise (*Phocoena phocoena*) in the vicinity of the proposed aquaculture activities (red star shows approx. project location). Source: https://maps.biodiversityireland.ie/

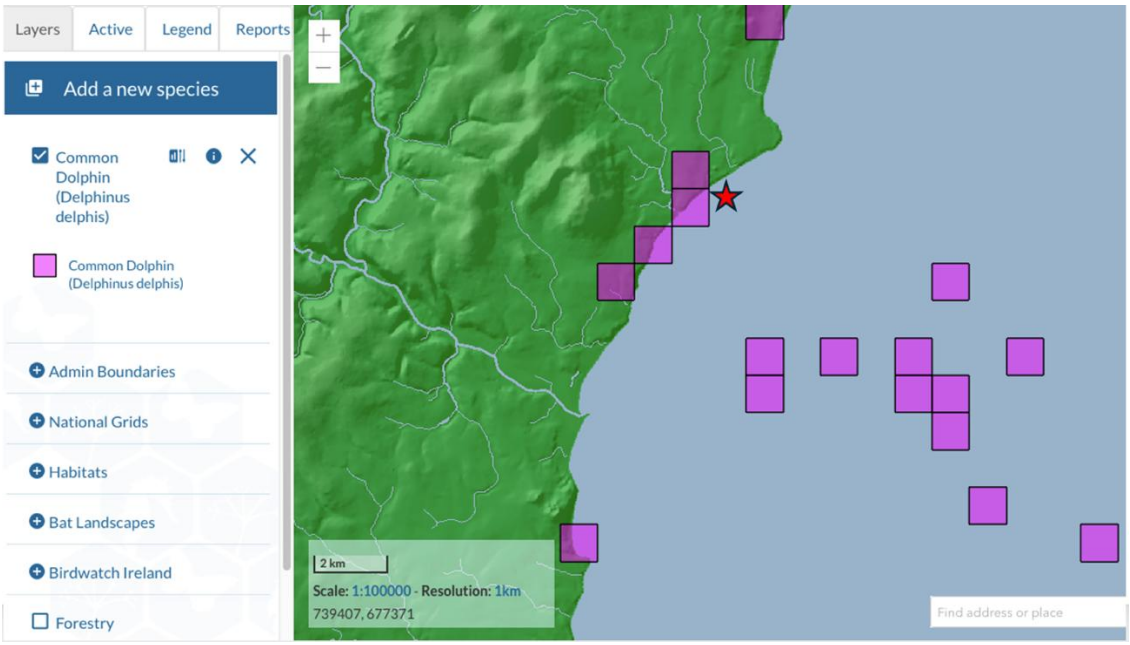

Figure 5: Data for Common Dolphin (*Delphinus delphis*) in the vicinity of the project (red star shows approx. project location). Source: https://maps.biodiversityireland.ie/

Table 3: Counts of dolphins, whales and porpoises from the three 10km grid cells (T38, T37, T27) encompassing all planned activities for the project (including proposed support vessel routes) .

Species name	**Record count**	**Date of last record**	**Originating dataset title**
Common Porpoise (*Phocoena phocoena*)	41	26/12/2023	IWDG Casual Cetacean Sightings
Common Dolphin (*Delphinus delphis*)	19	07/12/2023	IWDG Cetacean Strandings Database
Risso's Dolphin (*Grampus griseus*)	4	17/09/2021	IWDG Cetacean Strandings Database
Bottle-nosed Dolphin (*Tursiops truncatus*)	4	20/04/2021	IWDG Casual Cetacean Sightings
Cetacean species	3	08/07/2022	IWDG Casual Cetacean Sightings
Dolphin species	2	11/07/2020	IWDG Casual Cetacean Sightings
Dolphin species possibly Harbour Porpoise	2	19/06/2017	IWDG Casual Cetacean Sightings
Striped Dolphin (*Stenella coeruleoalba*)	1	03/11/2014	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

From the evidence reviewed, it is likely that there may be dolphins, whales or porpoises (Annex IV species) present in the vicinity of the project, and their associated support vessel routes. Therefore, these species are considered in more detail in this risk assessment.

Conclusion: Further consideration to assess risk.

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[9]). Natterjacks are nocturnal, hiding during the day under logs and stones. Over winter, natterjacks hibernate in burrows that they dig themselves in sandy soils, or in piles of rocks or dry-stone walls. The toad breeds in shallow ponds and forages in the areas surrounding the ponds.

The planned aquaculture activities under the licence application (T32-028A) are in habitat unsuitable for Natterjack toads. There is no overlap between these marine aquaculture sites and the toad'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.

3.5. 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, with two Green turtle records noted from the National Biodiversity Data Centre (accessed 18th March 2026), and a Hawksbill turtle caught in herring nets off Cork harbour in 1983 (O'Riordan *et al*, 1984).

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 North-east 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 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).

Loggerhead turtles are stranded regularly in Ireland with records reported once every few years (Doyle 2007); they are rarely sighted alive in Irish waters.

The Kemp's Ridley turtle (*Lepidochelys kempii*) is the smallest sea turtle species and is the most critically endangered sea turtle species in the world, with nearly all nesting by this species along shores of the western Gulf of Mexico (Shaver *et al*, 2020).

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.

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

Leatherback (or Leathery) turtles (*Dermochelys coriacea*) are the largest sea turtle species living today with unique anatomical and physiological adaptations (Doyle, 2007). A number of Leatherback sightings were recorded in the National Biodiversity Data Centre within the vicinity of the proposed aquaculture projects, outlined in Table 4 and shown in Figure 6.

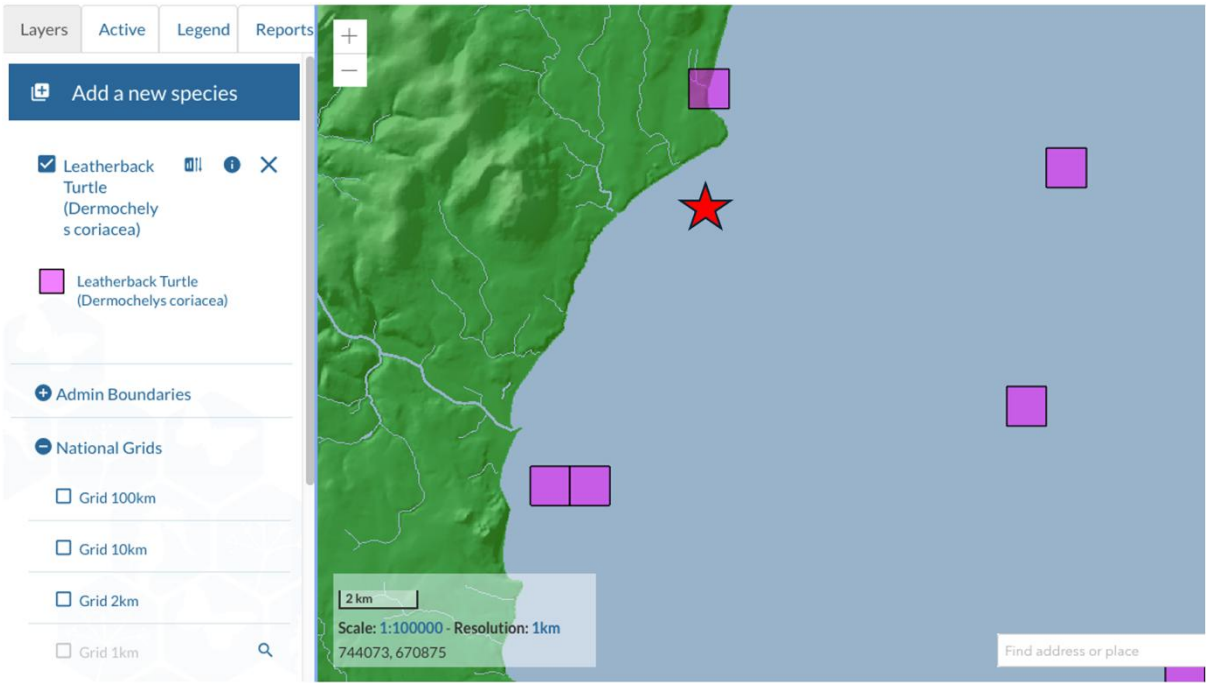

Figure 6: Records of the Leatherback (or Leathery) turtle (*Dermochelys coriacea*) in the vicinity of the project (red star shows the approx. location of the project), from the National Biodiversity Data Centre (accessed on 09/02/2026).

Table 4: Counts of turtles from the three 10km grid cells (T38, T37, T27).

Species name	Record count	Date of last record	Title of dataset
Leatherback Turtle (Dermochelys coriacea)	4	09/08/2020	Explore Your Shore
Yellow-bellied Slider (Trachemys scripta scripta)	1	22/04/2025	National Invasive Species Database
Turtle (Cheloniidae)	1	31/08/1982	Irish Marine Turtle Records

Data reviewed from the National Biodiversity Data Centre, Ireland shows that low numbers of marine turtles were recorded in the vicinity of the project area and proposed support vessel routes. There was an absence of evidence globally that seaweed cultivation of the type proposed presents a significant risk to marine turtles.

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 project will not significantly increase vessel traffic in the area.

Conclusion: Negligible risk to species.

3.6. The 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, these marine aquaculture sites are not a suitable habitat for this species. There is no overlap between these marine aquaculture sites 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

Killarney Fern and Marsh Saxifrage are associated with terrestrial and wetland habitats, while Slender Naiad is a submerged freshwater plant occurring in lakes. None of these species occurs in the marine environment in which the proposed aquaculture activities will take place. There is therefore no pathway by which the proposed activities could affect these Annex IV plant species, and the activities pose no risk to them.

Conclusion: No risks to species.

3.8. Provisional assessment

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

- Otter
- Whale, dolphin and porpoise species (and in particular, from the available occurrence records reviewed, Bottle-nosed Dolphin (*Tursiops truncatus*), Common Dolphin (*Delphinus delphis*), Common Porpoise (*Phocoena phocoena*)

4. Further assessment of Risk

4.1. Otter

Whilst Otter is not a Qualifying Interest feature of the Buckroney-Brittas Dunes and Fen SAC which lies ~210m from the project, records of Otter were noted within 800m of the project area. Otters are opportunistic predators whose diet consists primarily of fish, but also includes amphibians, small avian species, eggs, mollusks, crustaceans, and other invertebrates. The nature of this extensive aquaculture means it is not likely to have an effect on the number or availability of prey for the otter.

While the general habitat in the area is likely to support otters, the project area is located in the subtidal zone, at least 210m away from the shore (at its closest point). While potentially in a commuting area, otters prefer shallow, rocky environments with seaweed cover for foraging, and the project area is located where it's unlikely to interfere with couches and holts within its territory. Commuting route buffers are illustrative only of potential areas traversed by the species and do not indicate key habitat used.

To be able to conclude that there no risks to the species, we should be able to confidently state that there are no risks:

- 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.

4.1.1. Summary of Potential Impacts and Risk Assessment

The potential for impacts associated with the proposed project on otter are related to:

Obstruction (open water)
The longlines and activities associated with this form of seaweed farming involve ropes suspended from a float rope, hanging in the water column. Otters generally forage within 80-100m of the coastline, and in shallower waters. The longline structures will be beyond 100m from shore and are not likely to interfere with the natural behaviour of the otter.

Entanglement
Seaweed production activities are generally classed as highly unlikely to pose any risk to otter populations through entrapment or direct physical injury and no extenuating factors from this project suggest the potential for harm. No risks are concluded in any of the categories outlined in section 4.1.

Displacement
Otters are a highly adaptable mobile species, however the number of couching sites and holts or the distribution of otter is not anticipated to be directly affected by this aquaculture activity. No additional information following additional inspection of available data and the surrounding seascape suggest additional concerns. No risks are therefore concluded in any of the categories outlined in section 4.1.

Disturbance

Disturbance associated with vessel traffic could potentially affect otter at these sites. However, the level of disturbance is likely to be very low, given that the likely encounter rates will be low, dictated primarily by tidal state and in daylight hours. Operational activity within daylight hours only is highly likely to be part of operational controls but a disturbance risk would be posed should it deviate. Given that otter foraging is primarily crepuscular, interaction with personnel involved in the aquaculture project is also likely to be minimal. The potential for impact from the listed hazards is generally unlikely or of low intensity. The lack of significant spatial overlap or likely interactions between the Annex IV species and the aquaculture activities means 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. No risks are therefore concluded in any of the categories outlined in section 4.1.

4.2. Dolphins, Whales and Porpoises

Data reviewed from the National Biodiversity Data Centre, Ireland shows that dolphins, whales and porpoises 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.

4.2.1. Summary of Potential Impacts and Risk Assessment

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

Noise disturbance:

The level and persistence of any associated underwater noises with seaweed farming 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 craft would be used on an infrequent basis from a support basis, and there is no regular feeding or maintenance required with the proposed aquaculture species. 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. No risks are therefore concluded in any of the categories outlined in section 4.1.

Collisions or entanglement

Seaweed 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 cetaceans.

The small number of vessels that will be required for the project 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. No risks are therefore concluded in any of the categories outlined in section 4.1.

Obstruction and displacement

The potential for the aquaculture infrastructure within the project area to cause obstruction to dolphins, whales and porpoises is considered low. These mobile species can avoid and go around any obstructions without any significant disturbance. The size of the project is relatively limited and not significant when considered in the wider context, and not likely to cause loss of habitat to these wide-ranging species. No risks are therefore concluded in any of the categories outlined in section 4.1.

Attraction

Some cetacean species (predominantly dolphins and porpoises) may be attracted to structures similar to those used in aquaculture operations; the infrastructure can act as artificial reefs or fish aggregation devices, encouraging fish aggregations and thus predators (Callier *et al*, 2017). However, with the small footprint of the project, this effect would be limited to the immediate vicinity of the area and would be temporary in nature. There are no significant energy sources (e.g., light, noise etc.) likely to result from activities at the sites that pose a risk. No risks are therefore concluded in any of the categories outlined in section 4.1.

Water quality

The cultivation of seaweed has been shown to have a number of positive effects on water quality as well as carbon management (Spillas *et* al, 2023). Unlike for finfish culture, no veterinary products are used during the seaweed cultivation process. In summary, water quality is not anticipated to be impacted in any way which could impact whales, dolphins or porpoises. No risks are therefore concluded in any of the categories outlined in section 4.1.

Commissioning and decommissioning

The infrastructure involved with seaweed cultivation is relatively small, with a small footprint, 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 isolated sightings in the vicinity, the lack of spatial overlap or 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 proposed seaweed aquaculture operation. No risks are therefore concluded in any of the categories outlined in section 4.1.

4.3. Mitigation Measures

Otters and cetaceans are unlikely to interact with the described project. Therefore, considering the information above, no conservation measures for encounters are considered necessary for these projects. Standard boat navigation operational procedure require awareness for potential occurrence of cetaceans at (or near) the sea surface, and the potential risk of collision during support vessel operations with vessels maintaining visual awareness for these Annex IV species during operations; taking appropriate action if species are observed in (or near) the vessel's course.

5. Conclusions

Following a risk assessment of the licence application for an aquaculture and foreshore licence (under licence application T32-028A) for an intertidal aquaculture project, it is concluded that the described activities pose no reasonably foreseeable risk:

- 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.

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

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