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Survey Report – Dunmanus Bay, Co Cork

AP6/2018

(Application site T05/590)

Client name	Aquaculture Licence Appeals Board
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1.Introduction

At the request of ALAB and in order to inform the process of evaluation of Appeal against the Ministers decision to grant permission for use of a site for suspended mussel production in Dunmanus Bay Co. Cork, MERC conducted detailed video surveys of areas of the subtidal foreshore. The objectives of the surveys were to collect and record spatially encoded (geo-referenced) video data that contributed to knowledge of the ecological features within an area along the southern shore adjacent to the application site T05/590.

Data collected as part of the licensing process and provided by the applicant confirmed the presence of maerl communities in shallow waters adjacent to the shore (Aquafact, 2021). The data were collected during a series of drop down video transects (n=18) conducted at depths between 5 meters and 30 meters. The surveyed area included locations directly beneath the proposed suspended culture site as well as at locations located outside of the proposed site boundary, to the east, west, north and south.

A range of subtidal habitats and associated biota and marine communities were recorded, the distribution being determined principally by the depth of water wherein they were located. Habitats/communities recorded included:

- Bio-turbated muddy sands (in deeper waters)
- Coarse to medium sands with algal turfs
- Bedrock and boulders with laminarians and epiphytic red algae
- Maerl communities

The video transects did not include the shallowest sections of the surrounding areas, adjacent to the intertidal foreshore.

1.1 Purpose of this report

This report has been prepared in order to provide the Aquaculture Licence Appeals Board with further data pertaining to the location and distribution of sensitive marine communities located in the area adjacent to the proposed aquaculture site T5/590. Specifically, MERC were asked to conduct further video surveys of the area of shallow subtidal seabed to the south and southeast of the proposed aquaculture site T5/590.

1.2 Desk review

The previous video survey referred to above did not collect video data or where sampling points provided insufficient spatial coverage of the seabed. Information provided by stakeholders during the license application process suggested that there were discreet seagrass *Zostera marina* meadows (beds) in this area, as well as maerl beds, the latter's presence adjacent to the coast having been confirmed during the previous video survey.

In order to assist in the preparation for additional video surveys and to inform the survey strategy, MERC undertook a desk review exercise in order to identify, locate and collate existing data in relation to Dunmanus Bay which had potential to be useful in the context of understanding the location and spatial distribution of seabed habitats and marine communities within the bay generally as well as in the area west of Drishane Point. The marine waters of Dunmanus Bay are not the subject of any specific (legislative or otherwise) nature conservation designations (it not being a Special Area of Conservation, Special Protection Area, Marine Protected Area or RAMSAR wetland site). As a consequence, relatively

few studies of marine ecology and seabed environs have been conducted over the year within this bay with the result that few data are available to inform the survey strategy.

Notwithstanding this, MERC conducted a desk review, using online search techniques to identify and locate relevant data from the following potential sources:

- *Aerial imagery (Bingmaps, Ordnance Survey of Ireland)*
- *Published literature*
- *Grey literature*
- *Infomar datasets*

Submissions by a number of stakeholders and/or appellants (AP6/2018) were also reviewed. Other than accessing detailed aerial imagery, no additional data that would be useful to the present study was recovered from the online searches conducted. Despite this, some in-house knowledge and/or involvement with previous studies undertaken in the area adjacent to T5/590 allowed MERC to access two studies that contained some useful data in relation to the seabed communities of Dunmanus Bay. Both studies undertook biological survey work within or in close proximity to T5/590 application site.

A study undertaken by Aquatic Services Unit, UCC used RoxAnn (an acoustic ground discrimination system -AGDS) to carry out an assessment of maerl deposits within selected sites in Ireland during 1995 (UCC, 1995). The area of Dunmanus Bay southwest of Drishane Point was surveyed using AGDS. The survey covered a spatial area of 3km by 0.6 km in water depths ranging from 5 to 25m. The study failed to indicate the presence of any maerl within the survey area. Based on a review of the survey transects however, it would appear that the survey transects generally avoided the shallow areas of the foreshore and therefore likely did not overlap with the small discreet locations of maerl beds confirmed within the area by the more recent Aquafact video survey. More generally, the survey confirmed the presence of mainly muddy sands in the subtidal foreshore area beneath and adjacent to the proposed site (see Figure 1.1).

A further study undertaken during 1995/1996 investigated the phenomenon of 'ghost netting' whereby a simulated lost fishing gear experiment placed static gill nets within Dunmanus Bay, at locations west of Drishane Point for a period of 6 months. Regular visits to the 'lost' fishing gear were conducted using SCUBA in order to enumerate and identify mortality of fish and bird species over the course of the study period. The study contains some useful data in relation to the subtidal seabed habitat and community in the area. While not the focus of the study, the data recorded the species present on the seabed as well as the seabed habitat, which is dominated my muddy sands and sandy muds. The marine epi-faunal community was characterised by a mix of sessile and burrowing organisms including seapens *Virgularia mirabilis*, fireworks anemones *Pachycerianthus multiplicatus* (a rare species in Ireland), *Cerianthus lloydii*, *Cerianthus pedunculatus*, *Anthopleura ballii* (all burrowing anemones), the brittlestars *Acrocnida brachiata* and *Amphiura filiformis*. More mobile fauna included the scallop *Pecten maximus*, swimming crabs *Liocarcinus depurator* and *Liocarcinus puber* as well as hermit crabs *Pagurus bernhardus*. Occasional rock outcrops were covered with a veneer of silt, but were characterised by a diverse range of sessile invertebrates including the anemone *Isozoanthus sulcatus*, Epizoanthus couchi, *Anemonia viridis*. Hydroids *Nemertesia antennina* and *Halecium halecium* were also recorded along with the crinoid *Antedon bifida*. The sponges *Haliclona oculata*, *Stelligera rigida* and *Rapaellia ramosa* were recorded on rocky substarta. Dublin bay prawn *Nephrops norvegicus* and Mud runner crab *Goneplax rhomboides* were recorded as being present in mud burrows in deeper waters.

Overall the data indicate a relatively diverse seabed fauna, quite typical of inshore sedimentary habitats and showing no discernible or obvious evidence of disturbance or direct impact.

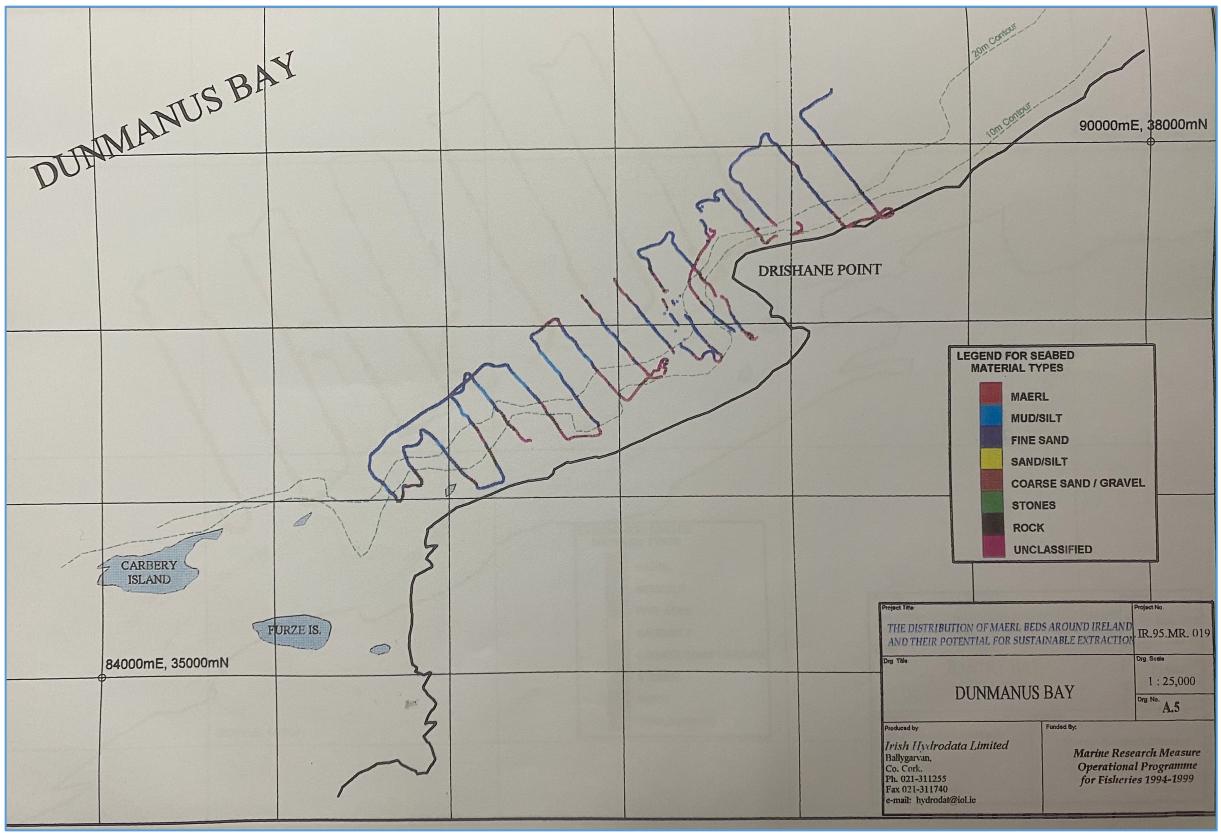

Figure 1.1 Transect data from 1995 survey of maerl beds in Ireland using RoxAnn. Source: UCC, 1995.

The conclusion of the desk review was that there was significant anecdotal information in addition to recorded data that indicated the presence of both maerl (*Lithothamnion* sp.) as well as seagrass *Z. marina* in areas close to the intertidal foreshore (shallow subtidal) to the west of Drishane point, while the deeper sediments are host to a range of burrowing, sessile and mobile fauna, including at least one rare species as well as a generally sensitive seabed community.

2. Methodology

In order to collect further data in relation to the seabed communities of the area within the application site T5/590, as well as adjacent foreshore areas, MERC undertook drop down/drift video surveys on 29.4.2022. The survey focused on collecting spatially encoded high resolution video data that could be analysed in order to confirm aspects of seabed ecology, particularly in relation to the presence of sensitive communities and /or rare species (occurrence and distribution) in the subtidal foreshore west of Drishane Point.

Surveys were conducted from MERC's own 8m Dept of Transport licensed survey platform "Reefrunner". The survey date was selected based on predicted favourable wind, wave conditions and tidal conditions, in order to maximise opportunities of safely accessing the shallow subtidal areas while also ensuing reasonable underwater visibility and stable conditions for camera deployment and data collection. By conducting the surveys during the latter part of April, seagrass communities, which are characterised by significant winter die back, were expected to have entered the spring growth phase also and therefore allow for a better assessment of extent and distribution.

The survey team included 2 experienced senior marine ecologists with detailed and extensive knowledge of Irish marine flora and fauna. Ecologists were assisted by an experienced vessel operator with detailed knowledge of Dunmanus Bay, while the team also comprised a camera technician. The survey platform mobilised from Castletownbere, located in Bantry Bay.

Surveys were conducted using an onboard state-of the-art 4k underwater video system that utilizes a 4K camera system by Cathx Ocean (model M12-300). This camera was used to collect video data that was overlaid with RemoteGeo spatial encoding. This system utilizes artificial lighting to illuminate the seabed and record data using a camera sensor area that is typically twenty times larger than conventional subsea HD cameras, which in turn is coupled to fast dual-ARM processor. The M12's high sensitivity combined with low exposures and progressive scan imaging produces image quality previously unobtainable. RemoteGeo spatial encoding allows ArcGIS mapping to be overlaid on the live video feed. This allows subtidal ecological features and characteristics to be matched to exact locations and enables precise repeated transects to be run over time. The system is the most advanced form of dropdown video currently available for the survey of marine habitats.

All video data were retrieved from onboard hard drive storage and backed up to MERC's digital data archive. Thereafter, video transects were reviewed sequentially by MERC ecologists and the field notes recorded during surveys for each video transect were supplemented with more detailed notes confirming details such as species present, abundance, distribution. Data were reviewed in ArcGIS in order to verify the location of transect lines in relation to the foreshore and application site. Data were tabulated for ease of presentation.

3. Results

In total, 21 camera deployments were made during the survey. Video recordings were completed for 13 of these where conditions allowed for collection of useful data, being data where species composition indicated subtidal communities were present. No recordings were made where communities observed indicated presence of exclusively intertidal habitat.

Video data were of a high quality and were all successfully spatially encoded, meaning that the location of features recorded on underwater video could be determined accurately, while also creating spatially verifiable datasets and records.

Results are presented in the following figures and tables:

Table 3.1 presents relevant ecological data by video transect for the present survey.

Figure 3.1 presents the location of video transect recordings for the present survey.
Figure 3.2 presents the location of video transect recordings for the present survey in the context of site T5/590.
Figure 3.3 presents the distance to aquaculture site T05/590 from video transects
Figure 3.4 presents the location of video transects conducted by Aquafact, while indicating characterizing communities for transects for T4,T8,T10 and T17

Table 3.1 Summary of video transect data, subtidal video surveys 29.4.2022

Video Recording No.	Maximum depth (M)	Habitat description	Dominant species	Sensitive species
1	4.5	Coarse sediment (sand, broken shell) with occasional boulders dominated by red macroalgae and *Laminaria saccharina*	*Polides rotundus, Corallina officinalis, Laminaria saccharina, Laminaria digitata, Halidrys siliquosa and Sargassum muticum. Ulva occasional.*	No
2	5.6	Coarse sediment (Sand, broken shell) with patches of *Zostera marina* (Rare to Occasional) among areas dominated by red macroalgae and *Halidrys siliquosa and Sargassum muticum*	*Zostera marina, filamentous red algae, Polides rotundus, Corallina officinalis, Laminaria digitata, Sargassum muticum and Halidrys siliquosa.Ulva* occasional.	Yes. *Zostera marina* present
3	4.8	Coarse sediment (gravel, sand, broken shell) with occassional boulders. Dominated by *Laminara digitata*, and macro algae with Corallina officinalis.	*Laminara digitata*, *Corallina officinalis*, *Ulva* sp.	No
4	3.3	Coarse sediment (gravel, sand, broken shell) with macro algae and filamentous red algae and scattered fragements of living maerl. Maerl nodules becoming larger and more frequent as transect progresses east. Frequent covering of Ulva. *Zostera marina* (Frequent).	*Sargassum muticum*, *Lithothamnion* sp., *Ulva* sp. *Zostera marina, Laminaria digitata, Chorda filum, Anemonia viridis.*	Yes. *Zostera marina* and live maerl fragements present
5	4.2	Coarse sediment (gravel, sand, broken shell) with macro algae and filamentous red algae and scattered fragments of living maerl. Maerl nodules becoming larger and more frequent as transect progresses east. Frequent covering of Ulva.	Filamentous red algae, *Ulva* sp., *Lithothamnion* sp. *Sargassum muticum* present.	Yes, live maerl fragments present
6	5.1	Maerl bed (95% live maerl) at most westerly end of transect. Merging into coarse sediment with marcro-algal habitat with fragements of living maerl.	Maerl *Lithothamnion* sp., *Corallina officinalis, Laminaria saccharina, Laminaria digitata, Ulva* sp. *Sargassum muticum* present.	Yes, areas of living maerl present.

Video Recording No.		Habitat description	Dominant species	Sensitive species
7	2.8	Coarse sediment (gravel, sand, broken shell) with macro algae and filamentous red algae and occasional scattered fragments of living maerl with abundant *Corallina officinalis*.	Maerl fragments *Lithothamnion* sp., *Corallina officinalis, Ulva* sp., *Laminaria saccharina, Laminaria digitata, Ulva* sp. *Sargassum muticum* present. Occasional individuals of *Zostera marina* present	Occasional, live maerl fragments and individuals of *Zostera marina* present
8	4.6	Coarse sediment (Sand, broken shell) with *Zostera marina* (**O**ccasional to **F**requent) among areas dominated by red macroalgae	Filamentous red algae, *Ulva* sp. *Sargassum muticum* present.	Yes. *Zostera marina* present
8B	4.7	Coarse sediment (Sand, broken shell) with *Zostera marina* (**O**ccasional to **F**requent) among areas dominated by red macroalgae	Filamentous red algae, *Ulva* sp. *Sargassum muticum* present.	Yes. *Zostera marina* present
9	3.4	Cobble, merging into coarse sediment with areas of macro algae	*Laminaria digitata, Ulva sp.* Filamentous red algae*, Sargassum muticum* present.	No
10	4.4	Coarse sediment	No conspicuous species present	No
11	4.2	Coarse sediment with broken shell and areas of coble and macro algae	*Laminaria digitata, Ulva sp.* Filamentous red algae.	No
12	27.2	Muddy sediment with dense brittle star bed and extensive burrows (possibly *Nephrops* burrows). Additional tubes of burrowing fauna visible.	Brittlestar, likely *Amphiura filiformis, and/or Acrocnida brachiata*	Yes, subtidal habitat confirmed host to sensitive subtidal communities i.e. *Virgularia mirabilis* community and other burrowing megafauna species

13	26.5	Muddy sediment, occasional rock outcropping, brittle star beds and extensive burrows (possibly *Nephrops norvegicus* and /or *Goneplax rhomboides* burrows). Additional burrowing fauna visible.	NA	Yes, subtidal habitat confirmed host to sensitive subtidal communities i.e. *Virgularia mirabilis* community and other burrowing megafauna species

Figure 3.1 MERC survey – location of video recording transects 29.4.2022
Green transects = seagrass *Zostera marina* recorded Pink transect = recording of live maerl

Figure 3.2 MERC survey - location of video transects / proposed aquaculture site T05/590
Green transects = seagrass *Zostera marina* recorded Pink transect = recording of live maerl

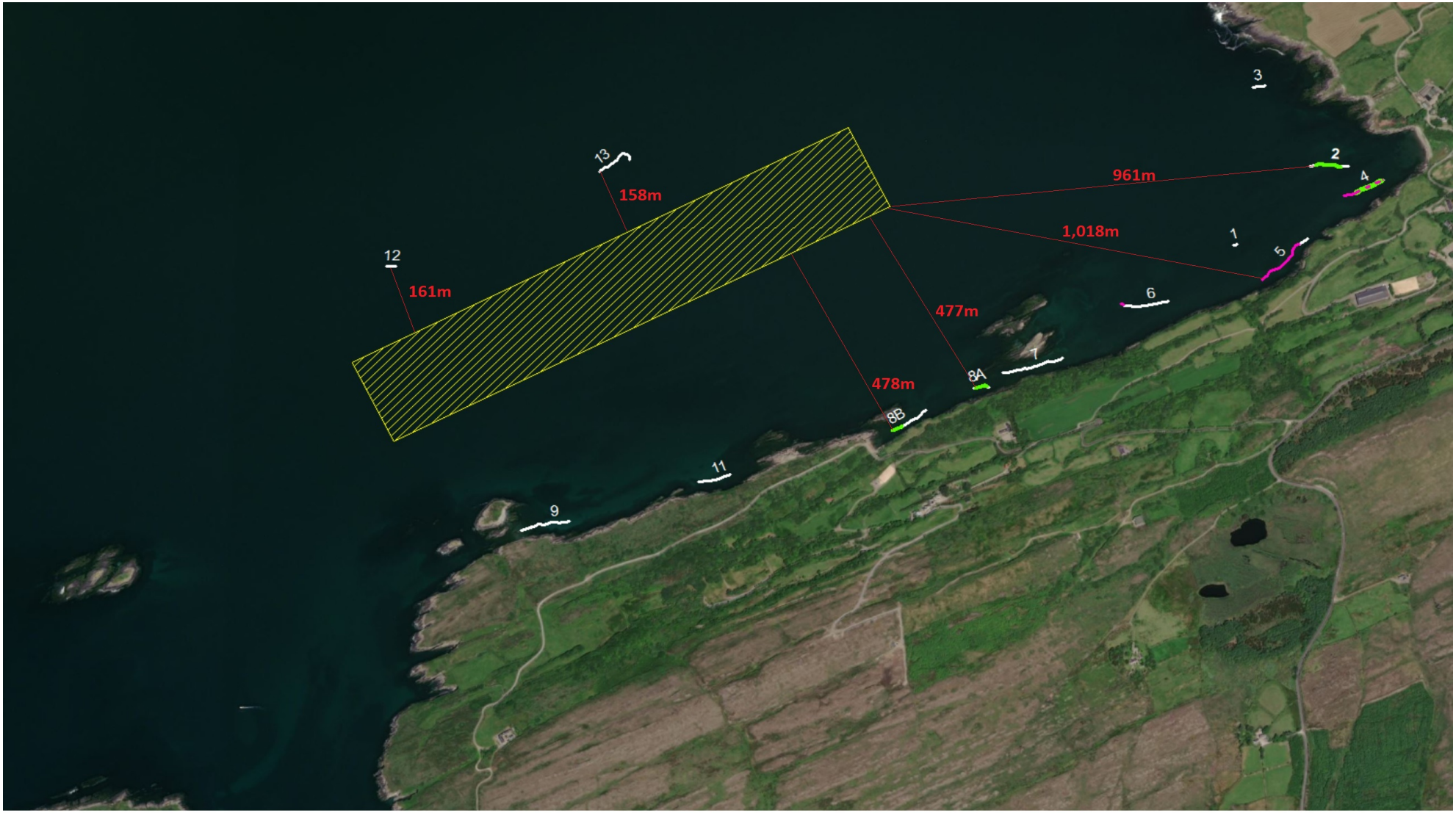

Figure 3.3 MERC survey - transects showing distances between aquaculture site T05/590 boundary and recorded sensitive subtidal communities

Figure 3.4 Aquafact video surveys

4. Discussion and Conclusion

The video surveys successfully collected high quality video data in relation to subtidal seabed habitats at a number of locations adjacent to the intertidal foreshore to the south and southeast of the proposed aquaculture site T5/590 during April 2022.

In general terms, the diverse communities recorded in the shallow subtidal are indicative of sheltered to moderately exposed conditions in this area. While relatively sheltered, it is likely that occasional episodes of ocean swell are likely to penetrate the eastern portion of Dunmanus Bay and occur in this area, while wind waves and tidal flows are normally prevalent and as such are dominant features of the nearshore environment.

Shallow subtidal seabed

Biological communities in shallow subtidal areas varied in accordance with the range of seabed habitats recorded, which comprised both subtidal reef (as outcroppings of bedrock) as well as sedimentary seabed. Associated species assemblages are typical and representative of biological communities associated with a range of shallow subtidal seabed habitats in southwestern Irish coastal waters.

Video data analysis confirmed the presence of subtidal beds of seagrass *Zostera marina* at a number of locations adjacent to the intertidal foreshore to the south and southeast of T5/590. Seagrass occurred as a number of individual smaller beds on mixed sediment habitat, within a mosaic of seabed communities occurring in depth ranges from the immediate subtidal to c. -5.5m (Below Chart Datum). Further areas of sandy seabed were host to significant areas of living maerl as well as fossil maerl community. Areas of bedrock habitat were characterised by an established diverse macro-algal community. The presence of both seagrass and maerl is considered to be a positive indicator of the status of the marine environment generally. These two communities are associated with highest biodiversity of any coastal habitats in Irish waters. Seagrass beds were recorded at a number of locations where it occurred in particular abundance, as associated with higher shoot densities. Blade length was well developed and there appeared to be low levels of sedimentation on shoots and seabed's areas generally.

Maerl beds were recorded as smaller areas of both living and dead maerl. In some locations maerl was recorded as being in particularly healthy condition with almost 100% living maerl being recorded. No presence or accumulations of sediments was recorded on or near maerl beds.

The shallow subtidal seabed communities all appeared to be in a largely natural condition. No evidence of significant impacts through sedimentation or eutrophication were observed. However, the presence of the invasive alien Japanese wireweed (*Sargassum muticum*) on 9 out of 11 video transects conducted in shallow waters is significant. Where *S. muticum* becomes established within existing algal communities (including seagrass beds), this tall fast growing non-native algae may cause significant negative impacts to the native flora by increasing competition for space and causing shading effects, depriving native species of light as it rapidly colonises areas of seabed in the shallow subtidal. The species is well established in this area and it is likely to increase in abundance over time as it spreads further in area and density also increases. This is likely to impact on the status of both maerl and seagrass communities in the medium to longer-term, as both species of algae are sensitive to shading and light loss effects

Deeper subtidal seabed beneath/adjacent to T5/590

Results from the desk review indicate the presence of a sedimentary seabed habitat characterised by epifauna and a burrowing benthic in-fauna. The extent and full nature of the associated community in the area beneath and adjacent to the site is unclear from the desk review and survey work undertaken, however there is sufficient evidence to confirm the seabed habitat in the area is a sedimentary in nature and is dominated by muds and softer sediment mixes comprising varying sand/mud components. A range of epifaunal species are present including seapens *Virgularia mirabilis,* burrowing anemones *Cerianthus lloydii*, *Cerianthus pedunculatus*, *Anthopleura ballii* and *Pachycerianthus multiplicatus* and brittlestars *Amphiura filiformis, and/or Acrocnida brachiate*. A number of the species recorded have known sensitivities including seapens *Virgularia mirabilis,* while the Giant fireworks anemone *Pachycerianthus multiplicatus* (recorded in very close proximity to the site during research activity undertaken in 1995) is rare in Irish waters; a review of records with the National Biodiversity Data Centre as of June 2022 confirmed a total of 24 records, confirming that the species is recorded only from nearby Bantry Bay and Kenmare River, as well as from Kilkieran Bay in Co Galway.

Environmental and ecological impacts of suspended mussel aquaculture

As well as potential for having positive environmental effects, suspended mussel aquaculture can have a range of harmful environmental and ecological impacts, especially in circumstances where nearby sensitive receptors are not adequately taken into account during licensing and/or management of aquaculture activity. The potential for harmful impacts of suspended bivalve aquaculture is well documented in the literature and can include a diverse range of impacts and effects. Examples of harmful impacts that may be associated with suspended bivalve culture include:

Seabed impacts

- Alteration of seabed habitats through accumulation of bio-deposits (faecal solids and pseudo-faeces)
- Accumulation of shell debris created through inadequate management, natural mortality
- Accumulation of debris from sunken equipment
- Loss of species diversity
- Alteration /elimination of seabed communities

Water body/chemistry

- Changes in nutrient load
- Changes in turbidity
- Changes in BOD/COD

Species effects / Introductions

- Introduction of invasive alien species
- Opportunistic native species population surge

Disturbance/displacement

- Avi-fauna
- Marine mammals

Ecosystem effects

- Effects on system stability and/or productivity related to food and/or oxygen availability

A wide range of factors and variables need to be considered and accounted for when assessing (or predicting) the possible nature and scale of impacts that may be associated with an existing or proposed suspended aquaculture project and for identifying and implementing necessary mitigations. Typically,

an assessment involves detailed studies and evaluation using a source – pathway – receptor type analysis.

A number of studies have been conducted in support of evaluating AP 6/2018 an aquaculture licence for site T5/590 including:

- Dunmanus Benthic Survey 2021
- Dunmanus Hydrography Report
- Aquafact/RPS Water Quality Modelling Dunmanus
- MERC spatial video survey 2022

On the basis of the outputs from the above studies the following conclusion has been reached in relation to risk to the ecology of Dunmanus Bay.

Assessment of risks to shallow subtidal ecology, including seagrass and maerl communities

It has been confirmed that both seagrass and maerl communities are present in the shallow subtidal foreshore to the south and southeast of T5/590. In one small area, seagrass and maerl co-occur, which, while rare is not unique in Irish waters. The presence of both seagrass and maerl is a strong indicator of environmental health and pressures to both communities have increased throughout much of their respective ranges in both in Europe and globally. This has resulted in significant loss of these communities in many areas. Ireland presently is host to some of the best remaining examples of maerl and seagrass communities in European waters and given this together with the strong association with high biodiversity and the value of each as indicator of environmental health, preservation of all seagrass and maerl communities is a key conservation objective of many marine Natura 2000 network sites in Ireland. While Dunmanus Bay is not part of Ireland's Natura network of sites, the Environmental Impact Assessment Directive[1] requires that certain aquaculture projects be screened for Environmental Impact Assessment where there is potential for harmful impacts to result from a project. In this context it is noted that as per Section 3.3 of the Interpretation of definitions of project categories of Annex I and II of the EIA Directive,
"*Algae and mollusk farming are typically extensive forms of aquaculture*" and are therefore not considered to be intensive forms of fish-farming. Accordingly, the project likely is not subject to EIA screening as per current interpretations[2].

Notwithstanding the above, it cannot at this stage be conclusively determined that no impact will arise in relation to the sensitive seagrass and maerl communities identified as being adjacent to the application site T5/590. Water quality modelling and hydrographic studies (Aquafact, 2021) indicates residual current at the proposed lease area during mean spring tide will be between 0.00 and 0.02 m/s, while average total suspended bio-waste (pseudofaeces + faecal pellets) concentration during a typical spring mid-flood tide is likely to be in the range 0.0-0.02(g/m3) in the water column above some of the area where maerl and seagrass occur. While the studies indicate very low rates of total suspended biowastes in areas close to or at the location of seagrass and maerl communities are likely under typical conditions, it is not clear from the studies if additional risk factors identified which may affect tidal currents (such as the mentioned wind effects) could cause higher suspended solid loads in the water column affecting sensitive communities, or that these have been taken into account in modeling and therefore long-term predicted outcomes.

[1] *Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.*

[2] Interpretation of Definitions of project categories of Annex I and II of the EIA Directive. EU, 2015. ISBN 978-92-79-48090-4

Potential additional risks to seagrass and maerl that may be associated with possible introduction of further invasive alien species through import of mussel seed and/or aquaculture equipment from other sites, or from explosions in populations of opportunistic native species e.g. ascidians (which may settle on maerl substrate) have not been evaluated. Evidence exists at other sites in Irish waters where suspended mussel aquaculture close to or above maerl and seagrass communities has had serious deleterious impacts, resulting in their becoming fragmented and broadly degraded, in some cases completely smothering maerl communities in bio-wastes.

Assessment of risks to ecology of sedimentary communities at or adjacent to proposed lease area

The seabed area within and adjacent to the proposed lease area is characterised by sediments with a varying degree of sand and mud component. Associated seabed biological communities are characteristic of mixed sedimentary seabeds with burrowing fauna as well as mobile and sessile epi-fauna being present. Available data and evidence indicates the presence of rare species within a relatively biodiverse benthic community in the seabed area adjacent to the proposed lease area. The extent of the seabed habitat and associated community is unknown, it may be extensive and extend into the lease area or it may be more limited in extent, however the available information has not allowed for a deeper understanding of the nature and geographic extent of the community.

Considering the predicted water quality modelling (Aquafact, 2021) and likely settlement patterns for combined bio-wastes (faecal pellets and pseudo-faeces) it is clear that the majority of bio-wastes will settle within the lease area and the immediate adjacent surrounding seabed area. It is predicted that sediments are unlikely to be re-suspended meaning that bio-wastes are likely to accumulate beneath the mussel lines over time and not be moved once settled out of the water column. A pronounced shift in seabed particle size composition over time is therefore very likely in circumstances of overhead mussel aquaculture. The likely outcome for the associated benthic community would see a significant localised seabed impact as a consequence of a change in settlement volume, sediment grain size and type. This would very likely result in a localised gross change to seabed habitat, with associated medium to long-term changes in associated seabed community and species assemblages. Sensitive species populations would very likely be impacted.

Conclusion

Apart from their intrinsic value as indicator species for the health of the local ecosystem, both maerl and seagrass are known to provide a range of ecosystem services and functions generally very likely play an important role in the maintenance of biodiversity and associated local populations of a range of marine species. In this regard the maintenance and restoration of degraded ecosystems such that both maerl and seagrass communities recover and are protected from sources of future impact is a key focus of many current European marine conservation initiatives. The need to protect of maerl and seagrass communities should therefore be reflected in the approach to licensing of new aquaculture sites in Irish waters. Where uncertainty exists in relation to possible impacts, then a precautionary approach is warranted and recommended until such time that risks to sensitive receptors are firmly quantified.

With respect to the biological community of the seabed adjacent to the proposed lease area, evidence indicates the presence of a relatively diverse seabed community including presence of some rare and/or sensitive species. There are outstanding uncertainties in relation to this community's extent and importance to local biodiversity due to gaps in available data. However, the presence of both maerl and seagrass in nearshore area is significant, while the presence of at least one faunal species (Giant fireworks anemone) in the area adjacent to the proposed foreshore lease is likely to be of national importance. Were Dunmanus Bay a designated Natura 2000 network site, maintaining the extent and distribution of maerl, seagrass and rare species would with certainty be a key conservation objective,

which would be the focus of regular monitoring. While Dunmanus Bay is not currently a Natura 2000 network designated site, the requirement to protect sensitive and/or rare communities remains a key consideration.

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