Assessments of Impacts of the Maritime Usage Report (AIMU)

The Sustainable Harvesting of *Ascophyllum nodosum* and *Fucus vesiculosus* for Bays in Greatmans Bay

COMMERCIALLY CONFIDENTIAL

Document in support of a Marine Usage License Application presented to the Maritime Area Regulatory Authority

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Acronyms and Abbreviations

AIMU	Assessment of Impact on the Maritime Usage
ARLHS	Amateur Radio Lighthouse Society
CO2	Carbon Dioxide
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMODnet	European Marine Observation and Data Network
EPA	Environmental Protection Agency
EU	European Union
GES	Good Environmental Status
GHG	Greenhouse Gas
MARA	Maritime Area Regulatory Authority
MARPOL	International Convention from the Prevention of Marine Pollution from Ships
MSFD	Marine Strategy Framework Directive
MSO	Maritime Safety Office
NMPF	National Marine Planning Framework
NM	Nautical Mile
SAC	Special Areas of Conservation
SOP	Standard Operating Procedure
SPA	Special Protection Areas
WFD	Water Framework Directive

1. Introduction

To ensure the Maritime Area Regulatory Authority (MARA) can fully assess all potential impacts of a proposed seaweed harvesting operation, an Assessment of Impacts of Maritime Usage (AIMU) report supporting the maritime usage license application has been developed. The scale and complexity of the AIMU have reflected the proposed project.

Arramara Teoranta (Teo) is applying for an exclusive, initial ten-year Marine Usage Licence (MUL) to harvest *Ascophyllum nodosum/Fucus* spp. in the intertidal zone of Greatmans Bay, County Galway. An AIMU report has been prepared for this area, and a Supporting Information for Screening for Appropriate Assessment (SISAA) has been completed for the bay.

This report, developed by Arramara Teo, identifies the likely effects of seaweed harvesting activities in the relevant maritime area. This report aims to determine the potential impacts of these activities, individually and cumulatively, on the marine environment, ensuring sustainable practices are implemented.

The AIMU report has been prepared in line with MARA's guidelines, as per the Maritime Area Planning Act 2021. It is intended solely to support this application for a Marine Usage License (MUL). The assessment evaluates the proposed harvesting activities' environmental and ecological impacts, considering both short-term and long-term effects. In particular, the potential impacts on marine biodiversity, water quality, and the wider ecosystem are carefully assessed.

As Arramara Teo respects the rights of landholders in County Galway regarding Appurtenant Seaweed Rights on their folios, we have carried out extensive research on this issue and Arramara Teo is only applying for a Marine Usage Licence where we believe MARA has the right to grant such a licence that is maritime areas unencumbered by Seaweed Appurtenant Rights. All maritime areas that have mapped appurtenant seaweed rights have been excluded from the Arramara Teo application. In the case of unmapped appurtenant seaweed rights the maritime area contiguous to the townland of all folios with appurtenant seaweed rights has been excluded based on an abundance of caution. We have not discovered any profit á prendre rights registered with Tailte Éireann, but if such rights exist or any other valid rights emerge for consideration at the public consultation stage of the MUL process Arramara commits to respecting those rights.

2. Project Description for Greatmans Bay

NOTE: Harvest volume and biomass data is commercially sensitive and strictly confidential information and not to be disclosed without prior consent from Arramara Teo.

Arramara Teo is seeking an exclusive 10-year Maritime Usage License (MUL) to harvest 2271 tonnes of *Ascophyllum* and *Fucus* (Table 1) from the intertidal shores of Greatmans Bay, County Galway (Figure 1). This bay was chosen due to a long-standing tradition of seaweed harvesting by harvesters supplying Arramara Teo and an abundant seaweed resource.

To achieve these goals, Arramara Teo has undertaken multi-year seaweed survey campaigns in the relevant marine area (the intertidal zone of Greatmans Bay). This dataset was used to develop a robust harvesting plan that allows for the sustainable harvesting of seaweed in this bay while protecting the marine environment.

Details of the Sustainable Harvest Plan are found in the accompanying SISAA report. The report also addresses the potential cumulative effects of other ongoing maritime activities in the bay, ensuring that the proposed seaweed harvesting will not adversely affect marine habitats, protected species, or broader conservation goals.

The project aims to establish a sustainable seaweed harvesting model that supports local ecosystems and communities. The harvesting area has been closely monitored by trained Arramara Teo science personnel for over 10 years. Annual harvest quotas have been developed to allow for regrowth post-harvesting and minimise disruption to local marine life. Arramara Teo advocates for industry accountability in resource management, ensuring that exclusive management of specific harvest areas helps maintain the long-term sustainability of seaweed populations.

The total area covered by this MUL, along with the harvestable area, total biomass and annual harvest quantities for each sector are provided in Table 1.

This MUL includes the rocky intertidal area where the targeted seaweed species grows. Historic and continued annual surveys by Arramara Teo have allowed significant knowledge of the seaweed resource to be gained, including potential total biomass and regrowth timescales post-harvest.

Arramara Teo continues to conduct annual biomass surveys in the proposed MUL area, which provides guiding decisions on the most appropriate harvesting techniques to ensure all activities align with best practices in marine conservation.

In addition to managing exclusive harvest areas, Arramara Teo supports the coexistence of multiple commercial enterprises harvesting the same species, provided each operates within clearly defined, exclusively licensed areas to ensure responsible resource management. The project includes a thorough assessment of potential cumulative impacts with other maritime activities, and site investigations validate survey data to ensure sustainable seaweed harvesting practices. This AIMU report reflects the project's alignment with MARA guidelines, demonstrating a commitment to sustainable resource management and environmental stewardship.

Region	Sector	MUL Area (ha)	Intertidal Bed Area (ha)	Density Asco (kg/m^2)	Density Fucus (kg/m^2)	Density Asco and Fucus (kg/m^2)	Cover (%)	Asco Height (cm)	Number of transects	Proposed Annual Harvest (t)
Greatmans	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Total	272	137.2						36	2271

Table 1 - Area and seaweed biomass within each bay sector of this MUL

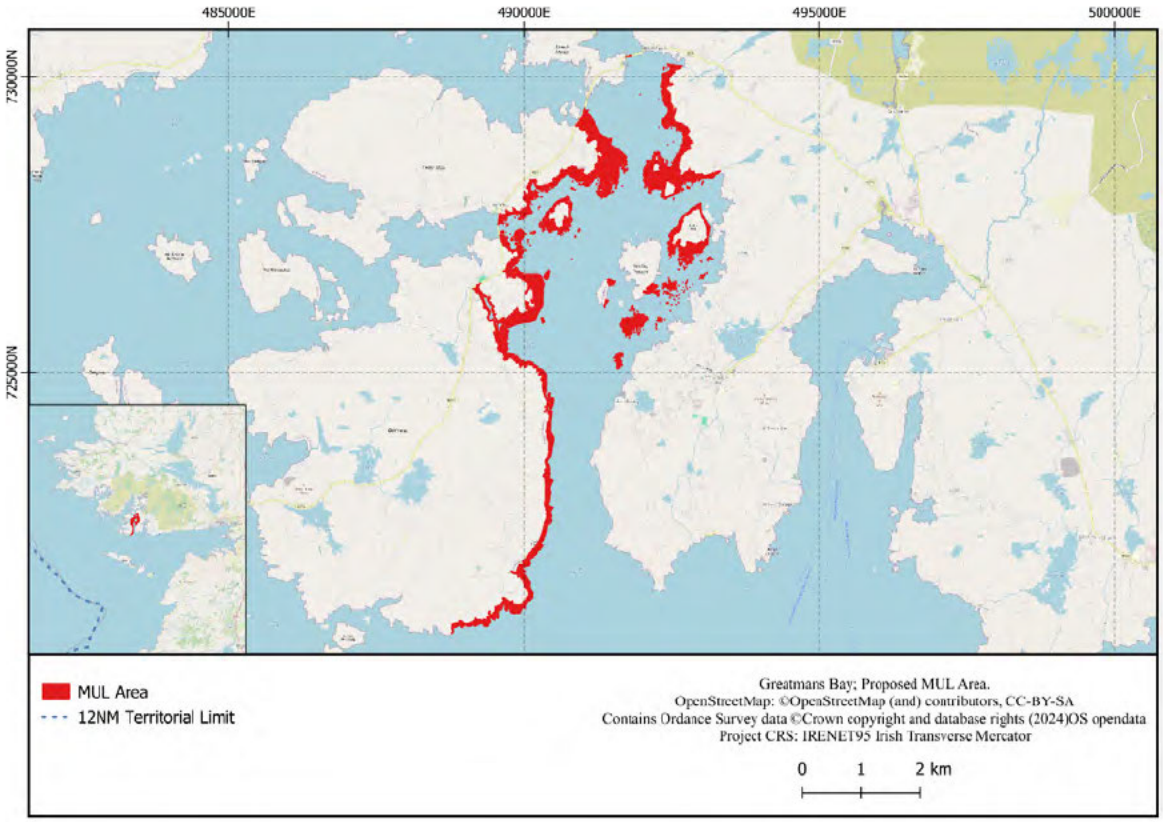

Figure 1 - Proposed harvesting areas included in the Marine Usage License application

3. Needs & Alternatives

Products

The seaweed resource used by Arramara Teo over the period of its existence since 1947 changed from a concentration on storm cast *Laminaria* in the earlier years to the hand-harvesting of inter-tidal species – a longstanding tradition along Ireland's west coast.

Over a 78-year history, Arramara Teo has developed a targeted, species-specific approach to responsibly processing Ireland's resource for domestic and export uses. This includes yet is not limited to the supply of products in-Ireland and abroad that are sold as animal feed supplements, soil conditioners and other uses.

Having experienced the ebb and flow of not only commercial interest in seaweeds, but also the available workforce to harvest and process the resource; Arramara has emerged as Ireland's largest processor of *Ascophyllum nodosum.*

Three long-term benefits have evolved during the past decade that position Arramara to work in harmony with Ireland's Government agencies and academic, commercial and consultancy communities to establish this country as a world leader in responsible, sustainable seaweed resource management:

1. An exciting, heightened awareness of the current and future commercial value of Ireland's seaweed resources if managed responsibly.
2. A recognition amongst the coastal communities that a sustainably managed seaweed resource can help sustain and perpetuate their own culture and quality of life by allowing them to live in and make careers within their own communities.
3. A greater awareness of the need to regulate the wild harvest of Seaweed species to insure sustainability of the resource and proper compliance with Europe Environmental Directives.

Economic Activity

Arramara Teo was established to provide an economic base for sustainable commerce in rural western Ireland, and particularly its coastal communities. Arramara Teo has provided sustainable economic benefits to local and regional suppliers of goods and services over the past 78 years.

Arramara's direct contribution to the local economy is estimated at €4 million on an annual basis which equates to an economic contribution of €20 million. The economic multiplier used in this calculation is 5 based on a high marginal propensity to consume locally as against saving or spending abroad. A further €1 million is paid annually to the exchequer and €1 million on national goods and services.

Obtaining MUL to sustainably manage and harvest the seaweed resource means that this economic activity will continue and grow for the benefit of Ireland and the remote rural communities of the west coast.

Environmental

Environmental sustainability is not only the foundation of the seaweed industry but is central to Government and European Union priorities. We operate in a different and ever changing political and environmental climate than when Arramara Teo was founded.

Arramara Teo, following acquisition by ASL, has engaged new learning in aspects of resource management and environmental sustainability. This has taken many forms including, but not limited to:

- Arramara Teo was a pioneer in installing dedicated Resource Management; an integral link between the sustainability of the seaweed, the activities of the harvesters, commercial demands and the sensitivity of protecting intertidal ecosystems.
- Arramara Teo has taken the initiative to educate harvesters (current and next generation) and other stakeholders in the importance of environmental stewardship, resource management and best practices.
- Arramara Teo has elevated the commercial profile of Ireland's seaweed resource by improving quality and thus improving the market value of that resource. This has resulted in a shift away from base materials supply and toward added value production in western Ireland, including the supply of added-value products in-Ireland and abroad sold as soil conditioners, animal feed supplements and for other uses.

Social

The concepts surrounding the industry's commitment to social enterprise and development is a relatively new global trend. For Arramara Teo, however, such concepts are rooted in the reason for its establishment in the 1940s. Coastal communities had long recognized the benefits garnered from the use of seaweed, but recognition by community and business leaders that an industry based on seaweed could bring life to a community must certainly have been regarded as a novel idea at the time.

Arramara has been able to make a substantial social contribution. The ability of local harvesters to supply this small commercial company with seaweed has been felt by many families along the more remote coastal communities of the west of Ireland.

Cultural

Arramara Teo has been able to contribute to the sustainability of Ireland's language and culture. Again, because of its location and its impact across many communities, Arramara has afforded families the opportunity to remain in their own communities thereby contributing to the various expressions of culture in those areas. This very clearly ties in with Údarás na Gaeltachta's mandate to promote social, cultural and economic activity, to sustain communities, which enables people to continue living in their native areas. Arramara Teo is one of the few private companies that invests in a dual communication strategy. This is evidenced through the investment in the Arramara website with a version as Gaeilge.

4. Land & Soils

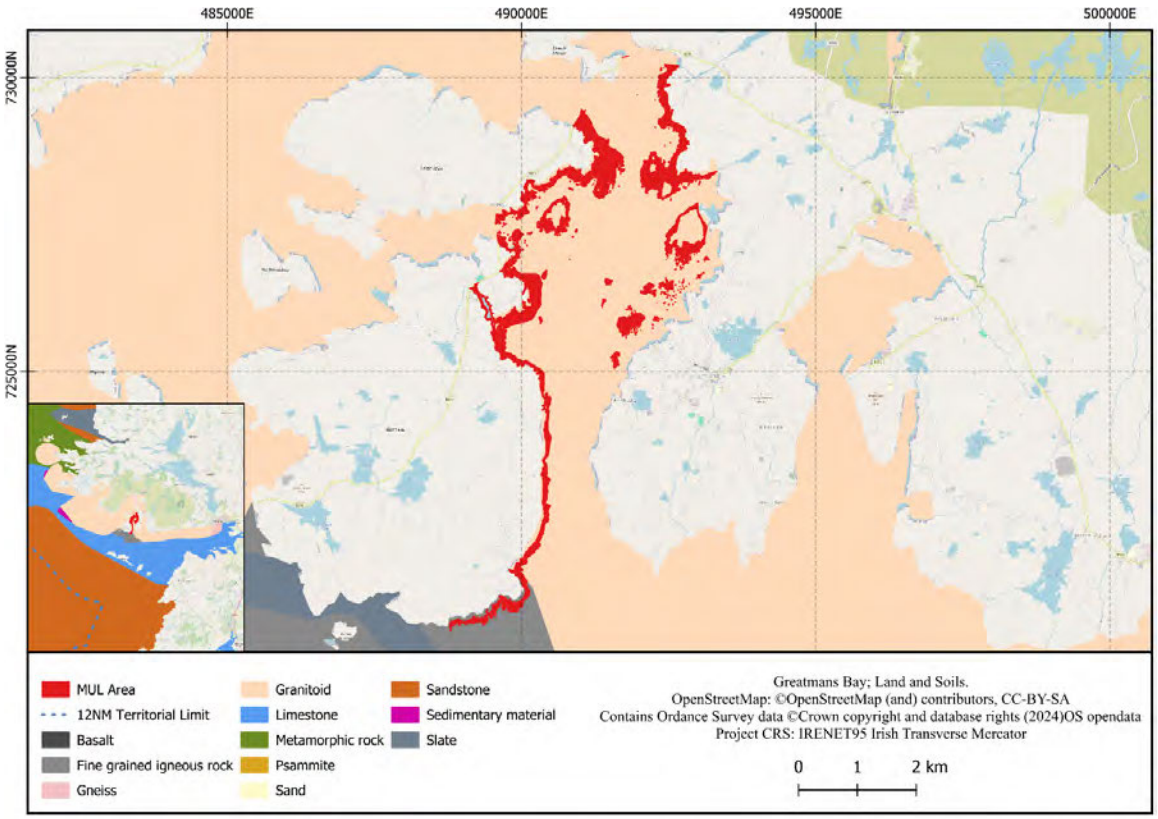

Figure 2 - Geological formations in the vicinity of the MUL area

The seafloor geology within the MUL area is primarily comprised primarily of granitoid rock, with a small outcrop of fine-grained igneous rock to the south of Maumeen (Figure 2).

The seaweed harvesting activities are restricted to the rocky intertidal zone, where individual harvesters manually cut seaweed without disturbing terrestrial soils or penetrating below the marine substrate. This harvesting practice, combined with the naturally occurring wave actions that continually shape the intertidal zone, supports minimal additional disturbance to land and soil.

Considering the small-scale, temporary nature of the proposed harvesting operations in the rocky intertidal zone, significant impacts on land, soils, or the seabed across the MUL area are not anticipated, even without additional mitigation measures. Observations indicate that any minor sediment displacement during harvesting is quickly stabilised by natural wave action, further supporting sediment resilience.

Mitigation Measures:

None required.

5. Water

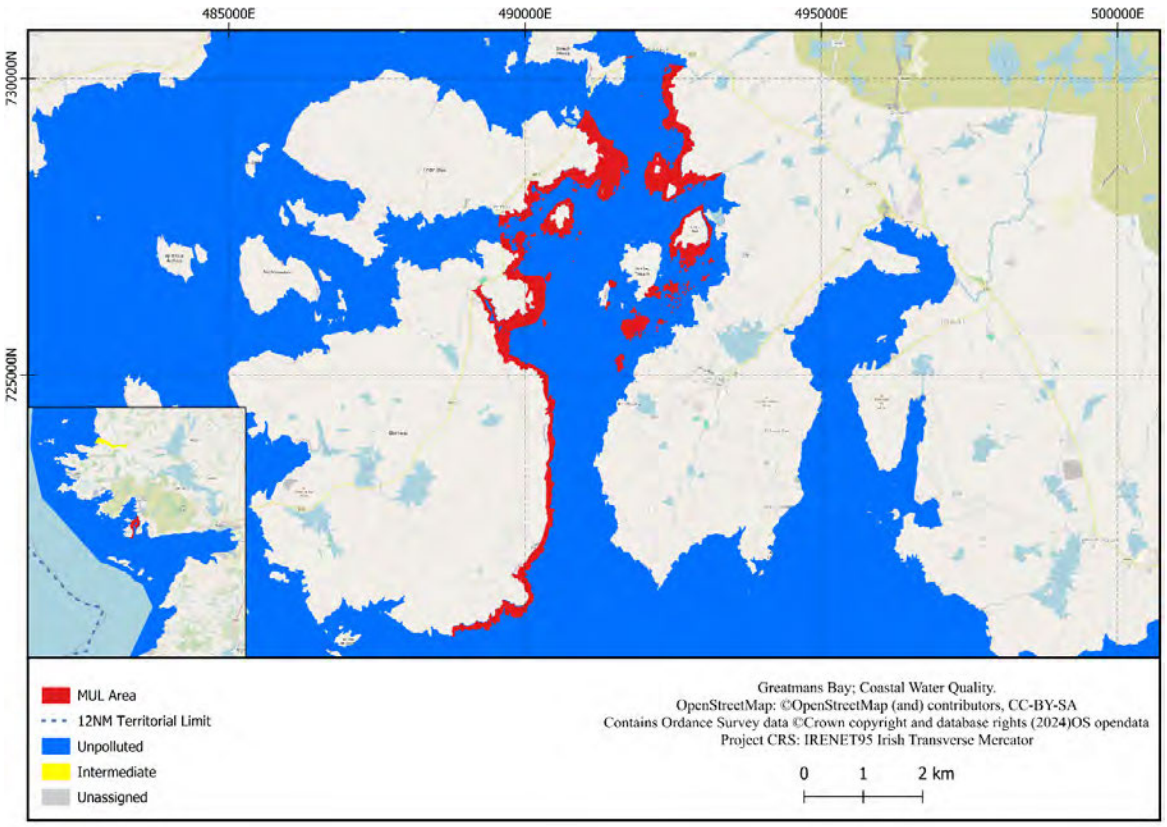

Figure 3 - Coastal water quality in the vicinity of the proposed MUL area

Sustainable seaweed harvesting practices in the intertidal zone are designed to preserve water quality by ensuring that harvesting activities are temporary, low-intensity, and conducted with minimal disruption to the marine environment. Harvesting operations by Arramara Teo specifically target the intertidal zone, where any disturbance is limited to the rocky substrate and is consistent with natural, frequent wave actions.

The potential for pollution from these activities is low. Refuelling of Arramara Teo's harvesting vessels does not occur on the foreshore, eliminating a primary risk of contamination. Additionally, all vessels engaged in harvesting comply with the International Convention for the Prevention of Marine Pollution from Ships (MARPOL) to ensure best practices are followed, minimising potential contamination risks. Standard operating procedures (SOPs) include protocols for spill prevention and on-site containment equipment, although the likelihood of any spill event is low. No significant fuel reserves are stored near harvesting sites, further reducing any pollution risk from fuel handling.

Vessels used for harvesting activities are fully certified by the Maritime Safety Office, and operations release no harmful substances into the marine environment. Compliance with all relevant maritime standards, including the Water Framework Directive (WFD), ensures a negligible risk of accidental pollution. The waters within the entire MUL area are classified as unpolluted under the WFD (Figure 3). Arramara Teo's harvesting operations are expected to maintain these classifications through environmentally responsible practices.

The likelihood of sediment disturbance from boat motor operations is minimal, highly localised, and short-term. Given the low level of harvesting within the bay, these activities do not alter tidal currents, wave action, or sediment transport processes, preserving the hydrodynamics and sedimentology of the intertidal zone.

Importantly, no offshore Special Areas of Conservation (SACs) or marine Special Protection Areas (SPAs) are proximal to the harvesting zones. The closest SACs to the MUL area, such as the North-West Porcupine Bank SAC (IE002330) and the Porcupine Shelf SAC (IE002267), are situated at distances over 100 km, well beyond any area of influence. Similarly, Hovland Mound Province SAC (IE002328), South-East Rockall Bank SAC (IE003002), and Belgica Mound Province SAC (IE002327) are located even further offshore. The absence of marine SPAs along Ireland's western seaboard (Figure 4) underscores that no impact on protected marine zones is anticipated.

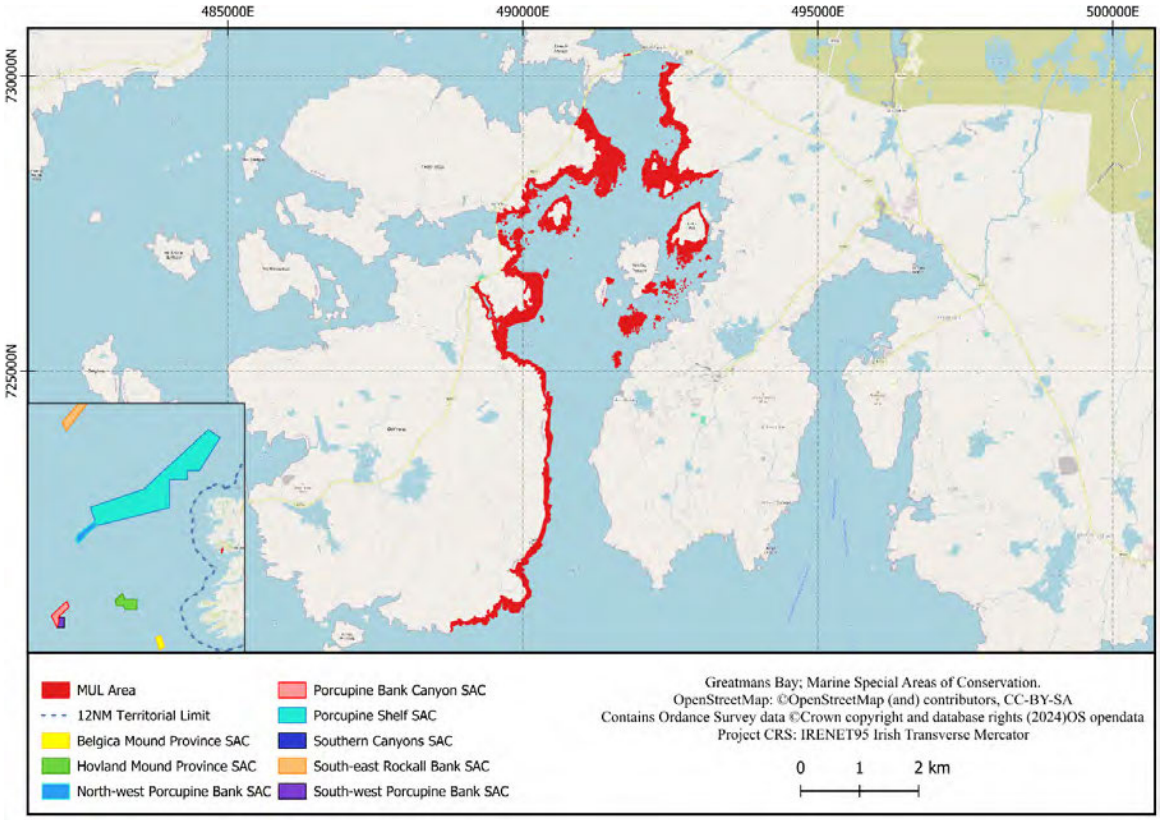

Figure 4 - Marine Special Areas of Conservation in relation to the proposed MUL area

Overall, Arramara Teo's sustainable harvesting practices for *Ascophyllum* and *Fucus* will adhere to stringent environmental protection standards, ensuring that the water quality and marine ecosystems within the MUL area remain unaffected. Given these sustainable methods, and even in the absence of additional mitigation, the potential for any significant impact on water resources within the MUL area is negligible.

Mitigation Measures:

None required.

6. Biodiversity

The benthic habitats within the proposed MUL area predominantly comprise rocky intertidal zones interspersed with patches of shallow sublittoral rock, sand, and biogenic reef habitats that support diverse epibenthic communities. These habitats, characteristic of sheltered and semi-exposed coastal areas in the western seaboard of Ireland, provide a unique and varied ecological substrate. The nature of Arramara Teo's seaweed harvesting activities, which will focus on sustainable practices and avoid disturbances to sensitive habitats, is designed to limit impacts on these critical benthic ecosystems.

The harvest of *Ascophyllum nodosum* has been extensively examined in Canada, the United States, and across Europe, with Nova Scotia having a significant history of research over the last 80 years. It is well established that *Ascophyllum* nodosum beds recover swiftly after harvest (Ugarte et al., 2006; Johnston et al., 2023). Long-term investigations have found no effect of the harvest on the biomass and structure of *Ascophyllum nodosum*, even after 20 years of uninterrupted commercial harvesting (Lauzon-Guay et al., 2021, 2023). Given the quick recovery and the absence of long-term alterations in the structure or biomass of *Ascophyllum nodosum*, impacts on associated communities are highly unlikely. Short-term assessments examining the effects of the harvest on ichthyoplankton (Van Guelpen and Pohle, 2014) or invertebrates (Fegley, 2001; Hamilton and Nudds, 2003; Trott and Larsen, 2012; Phillippi et al., 2014) have found either no or only brief impacts from the harvest. In a review for the Maine Department of Marine Resources' Rockweed Working Group, Beal (2015) concluded that "any adverse effects on habitat and invertebrate densities due to rockweed removal are short-lived or not statistically significant" and that, based on the available data, "there is no reason to adopt a precautionary approach." As shown above, and based on all available research, the proposed harvest and management of *Ascophyllum nodosum* in Ireland is sustainable and serves as a model for sustainable management used by other regions.

Seabirds

Arramara Teo's harvesting operations, limited to marine environments, do not interact with terrestrial ecosystems. Seabird species that have the potential to breed in the area, such as Fulmar (*Fulmarus glacialis*) [A009], Gannet (*Morus bassanus*) [A016], Guillemot (*Uria aalge*) [A199], Kittiwake (*Rissa tridactyla*) [A188], Leach's Storm-Petrel (*Hydrobates leucorhous*) [A207], Manx Shearwater (*Puffinus puffinus*) [A009], Puffin (*Fratercula arctica*) [A013], Razorbill (*Alca torda*) [A016], and Storm Petrel (*Hydrobates pelagicus*) [A009], rely on nearby cliffs and offshore islands for nesting and foraging. Given these locations, they remain unaffected by the intertidal harvesting activities.

Seabird species that frequently or intermittently forage in rocky intertidal zones include Black-headed Gull (*Chroicocephalus ridibundus*) [A179], Common Gull (*Larus canus*) [A182], Cormorant (*Phalacrocorax carbo*) [A017], Herring Gull (*Larus argentatus*) [A184], Lesser Black-backed Gull (*Larus fuscus*) [A183], Shag (*Gulosus aristotelis*) [A017], Arctic Tern (*Sterna paradisaea*) [A194], Common Tern (*Sterna hirundo*) [A193], Little Tern (*Sternula albifrons*) [A195], Roseate Tern (*Sterna dougallii*) [A193], and Sandwich Tern (*Thalasseus sandvicensis*) [A191]. See accompanying SISAA Reports for additional information.

Mitigation Measures:

Seasonal Awareness: Harvesting plans consider sensitive seasons (e.g. seabird breeding) to avoid disturbances, particularly in intertidal zones with known foraging activity.

Operational Limitations: Continued use of Arramara Teos small, quiet, and infrequent motorised boats limits both underwater noise and physical disturbance, preserving habitat integrity for benthic, avian, and marine mammal species.

Other Waterbirds and Waders

Bird species that utilise the rocky intertidal habitats along Ireland's western seaboard encompass various foragers, divers, and waders, each with unique habitat preferences and feeding behaviours. Notably, shallow-diving birds such as the Sandwich Tern (*Sterna sandvicensis*), Red-throated Diver (*Gavia stellata*), and Slavonian Grebe (*Podiceps auritus*) feed in the intertidal zone primarily when areas are submerged. Harvesting operations will be scheduled to avoid these times, ensuring minimal overlap with their feeding activities. Further detailed information on shorebirds throughout the proposed MUL is found in the SISAA.

Sandwich Terns (*Thalasseus sandvicensis*) typically nest in colonies on coastal ground areas like shingle spits, dunes, and islands, usually above the high-water mark, keeping their breeding habitats safely outside harvesting zones (Raynor et al., 2012, Valle & Scarton, 2023).

Species like the Great Northern Diver (*Gavia immer*), Red-breasted Merganser (*Mergus serrator*), and Common Scoter (*Melanitta nigra*), which are deeper divers, do not utilise the rocky intertidal zone for feeding (Jarrett et al., 2021). Their diets involve diving to greater depths, meaning Arramara Teo's harvesting activities in the intertidal zone will not interfere with their feeding or nesting habits. Red-breasted Mergansers, for example, breed on inland lakes and rivers, while the Common Scoter's small breeding population is primarily restricted to large inland lakes in the west (Heffernan & Hunt, 2022), both far removed from the coastal intertidal harvesting areas.

Certain intertidal feeders like the Light-bellied Brent Goose (*Branta bernicla hrota*), Ringed Plover (*Charadrius hiaticula*), Sanderling (*Calidris alba*), Bar-tailed Godwit (*Limosa lapponica*), Curlew (*Numenius arquata*), and Dunlin (*Calidris alpina schinzii*) are more likely to be affected by harvesting activity. However, the potential disturbance to these species is minimal, as birds within approximately 50 meters of harvesters will simply move to nearby shore sections. Harvesting activities are highly localised and cover only small shoreline sections at a time, minimising disruptions.

Breeding habitats for these intertidal-feeding birds typically lie away from the coast. For instance, Ringed Plovers prefer nesting on beaches above the high-tide line or in wetlands, while Dunlins favour coastal wetlands, bogs, and wet grasslands (O'Hara & Carr, 2017, Conway et al., 2019). Even when breeding sites are coastal, such as Ringed Plovers on shingle and sandy beaches or Curlews in bogs and wet grasslands, these locations remain sufficiently distant from the rocky intertidal to prevent disturbance from harvesting. Furthermore, while Red-Breasted Mergansers may nest in coastal lagoons or vegetated areas, they do not nest within the intertidal harvesting zones.

Mitigation measures have been identified to further protect bird species within sensitive areas. Although seaweed harvesting is not expected to impact bird species significantly, the following measures will be implemented to mitigate any potential disturbance:

Mitigation Measures:

Seasonal and tidal timing of harvest activities: Scheduling harvesting operations to avoid peak feeding times of shallow-diving species.

Marine Mammals

Marine mammals, including Bottlenose Dolphins (*Tursiops truncatus*) [1349], Common Porpoises (*Phocoena phocoena*) [1351], Grey Seals (*Halichoerus grypus*) [1364], Otter (*Lutra lutra*) [1355], and Common Seals (*Phoca vitulina*) [1365], may be observed within Greatmans Bay (SACs in the vicinity of the MUL designated to protect marine mammal species are found in the accompanying SISAA Report). Although the operational presence of harvesting vessels can potentially induce transient disturbances to these cetaceans, mustelids and pinnipeds, the seaweed harvesting boats operated by Arramara Teo mitigate such impacts. These vessels are characterised by their small size and quiet operation, remaining idle during harvesting activities and only utilising their small motors during transit. This operational strategy significantly reduces acoustic noise and minimises behavioural disruptions. Furthermore, adherence to area-based management protocols ensures that harvesting activities are conducted in a manner that preserves the ecological integrity of marine mammal populations. Consequently, the likelihood of significant disturbances to these marine mammals is substantially reduced, maintaining the resilience and stability of their populations within the MUL marine ecosystems.

There is expected to be no disturbance to marine mammals from traditional hand harvesting of seaweed.

Mitigation Measures:

Buffer Zones: Establish a 200m buffer around known seal haul-out sites to minimise any potential disturbance from vessel operations.

Restricted Motor Use: Boat motors are operated only during transit to and from harvest sites, reducing acoustic impacts in ecologically sensitive zones.

Nursery/Spawning Fish

The west coast of Ireland supports a range of fish nurseries for Black-bellied Monkfish (*Lophius budegassa*), Blue whiting (*Micromesistius poutassou*), Herring (*Clupea harengus*), Haddock (*Melanogrammus aeglefinus*), Mackerel (*Scomber scombrus*), Cod (*Gadus morhua*), white-bellied anglerfish (*Lophius piscatorius*), Hake (*Merluccius merluccius*), Megrim (*Lepidorhombus whiffiagonis*), Whiting (*Merlangius merlangus*) and Horse mackerel (*Trachurus trachurus*).

Nursery grounds for species such as Black-bellied Monkfish, Blue whiting, Haddock, Hake, and Megrim are distant from the MUL area and unaffected by seaweed harvesting activities. Moreover, nursery grounds for species closer to the MUL area, including Herring, Mackerel, Cod, White-bellied

Anglerfish, Whiting, and Horse mackerel, span extensive stretches along Ireland's western coastline. The limited geographical footprint and low-intensity nature of harvesting in the intertidal zone ensure that migration patterns and population health remain unaffected.

Additionally, important offshore spawning grounds for Herring, Haddock, Megrim, Hake, Mackerel, Cod, Horse mackerel, and Blue whiting are distant from the harvesting area and thus remain unaffected. Species with spawning grounds that may overlap the MUL area, such as Whiting, inhabit extensive portions of the Irish coast and are resilient to the low-impact intertidal harvesting of seaweed (see Figures 5 to 15).

The infrequent, localised nature of harvesting, in conjunction with the expansive distribution of nursery and spawning habitats, collectively minimises the likelihood of disturbance to fish populations. The area-based management plan employed by Arramara Teo further ensures that sediment dynamics are unaffected, with any disturbances caused by harvesting vessels being brief and localised. Thus, no substantial adverse impacts are expected on fish populations within the MUL area, safeguarding the ecological integrity of marine ecosystems in the region.

Mitigation Measures:

None required.

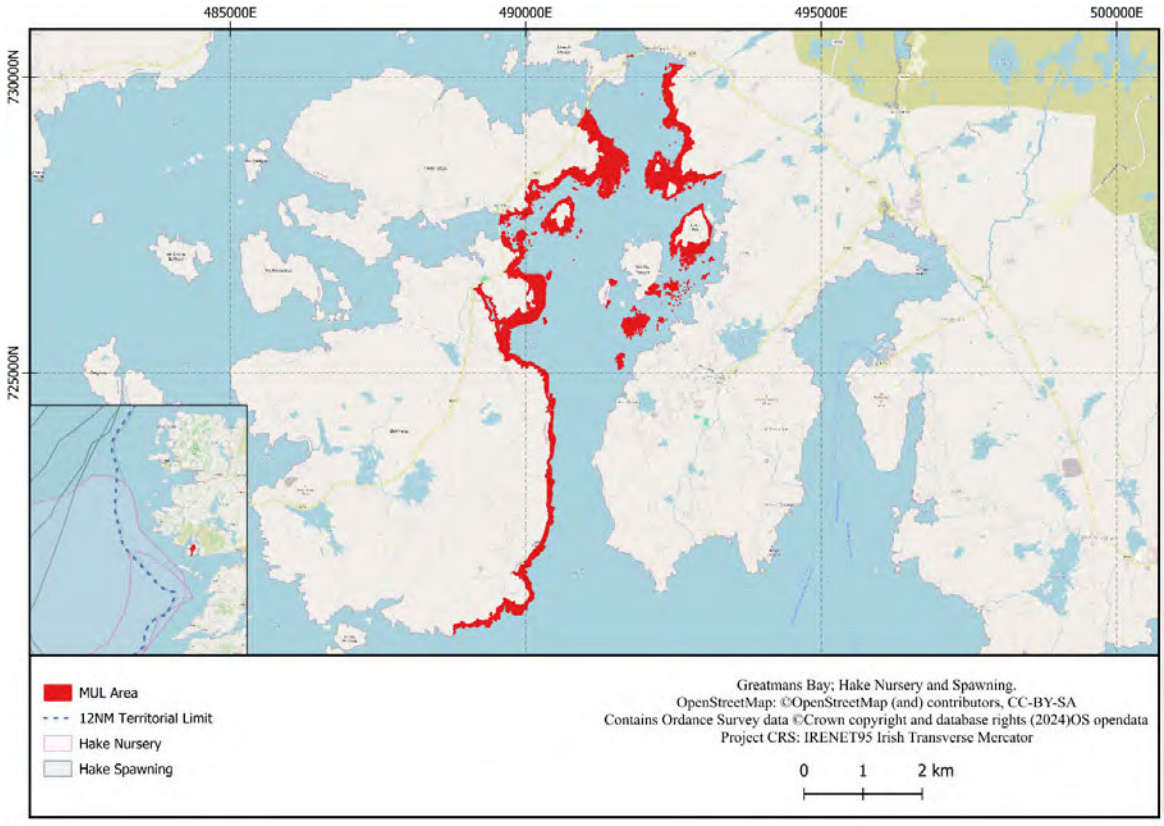

Figure 5 - Hake Nursery and Spawning Grounds

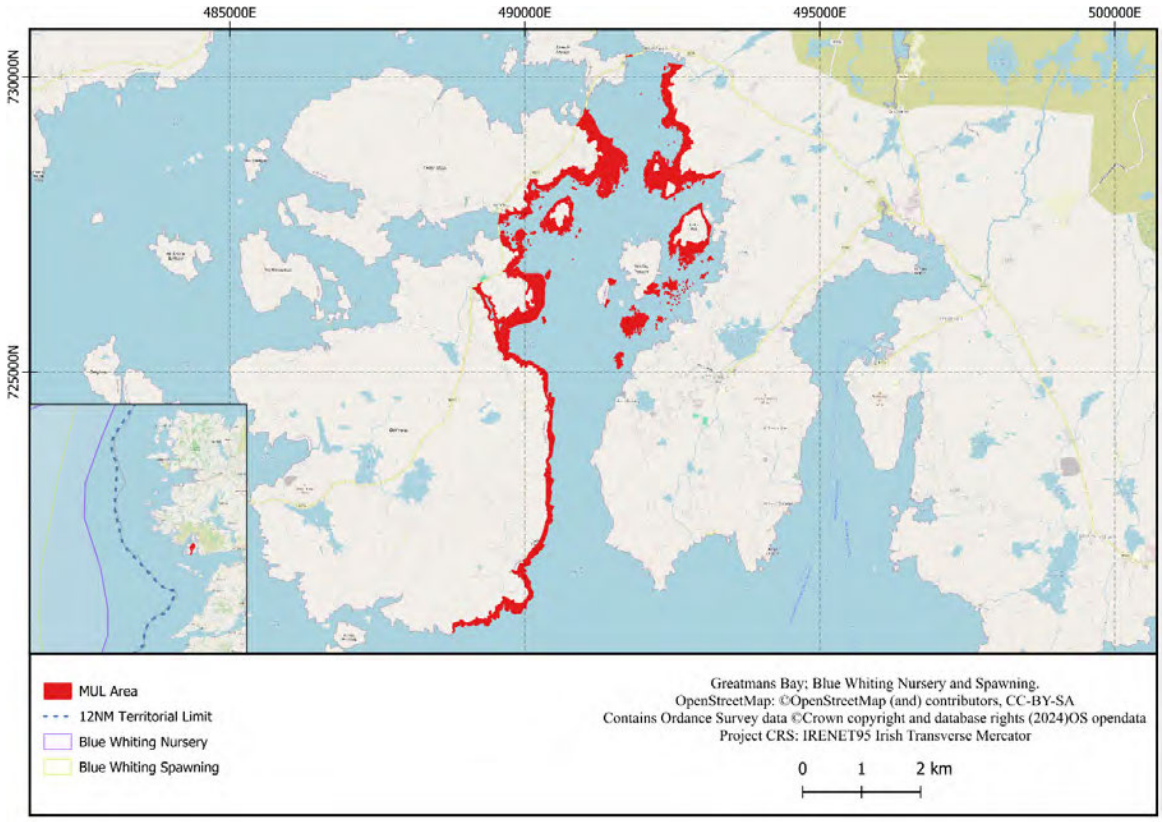

Figure 6 - Blue Whiting Nursery and Spawning Grounds

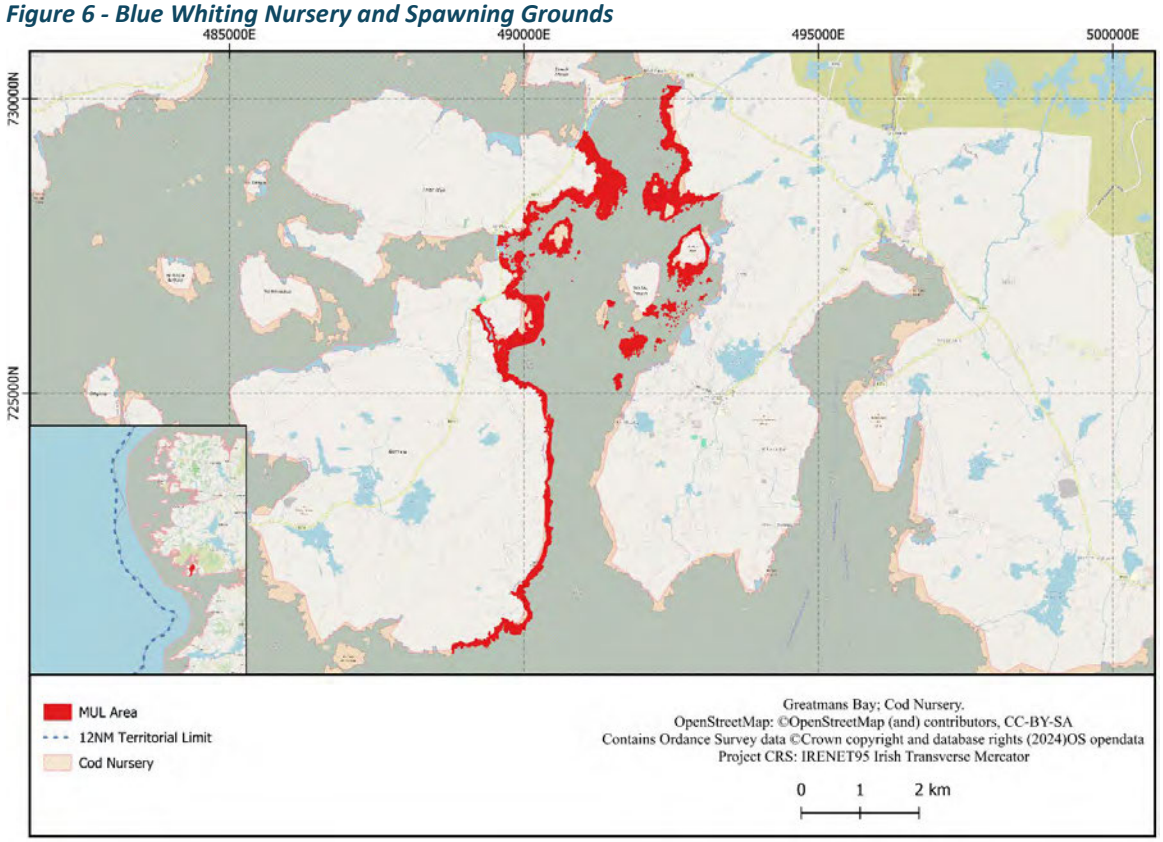

Figure 7 - Cod Nursery

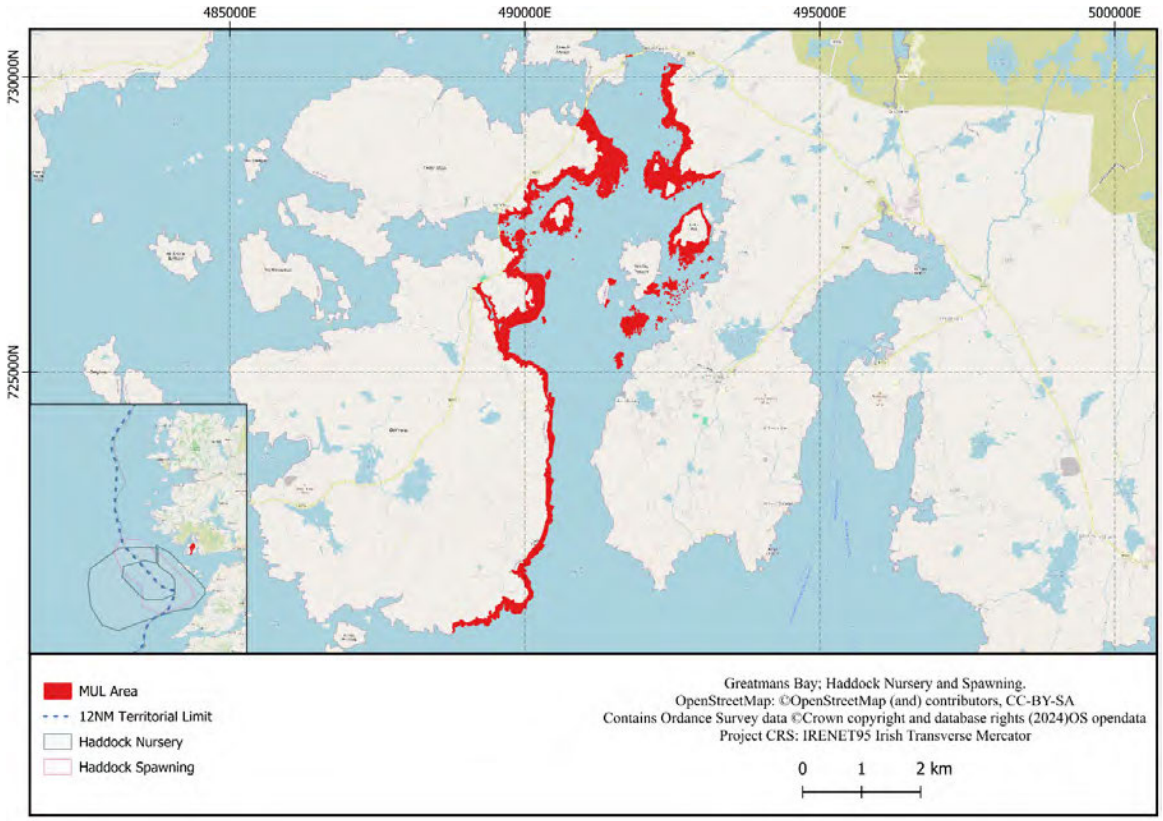

Figure 8 - Haddock Nursery and Spawning Grounds

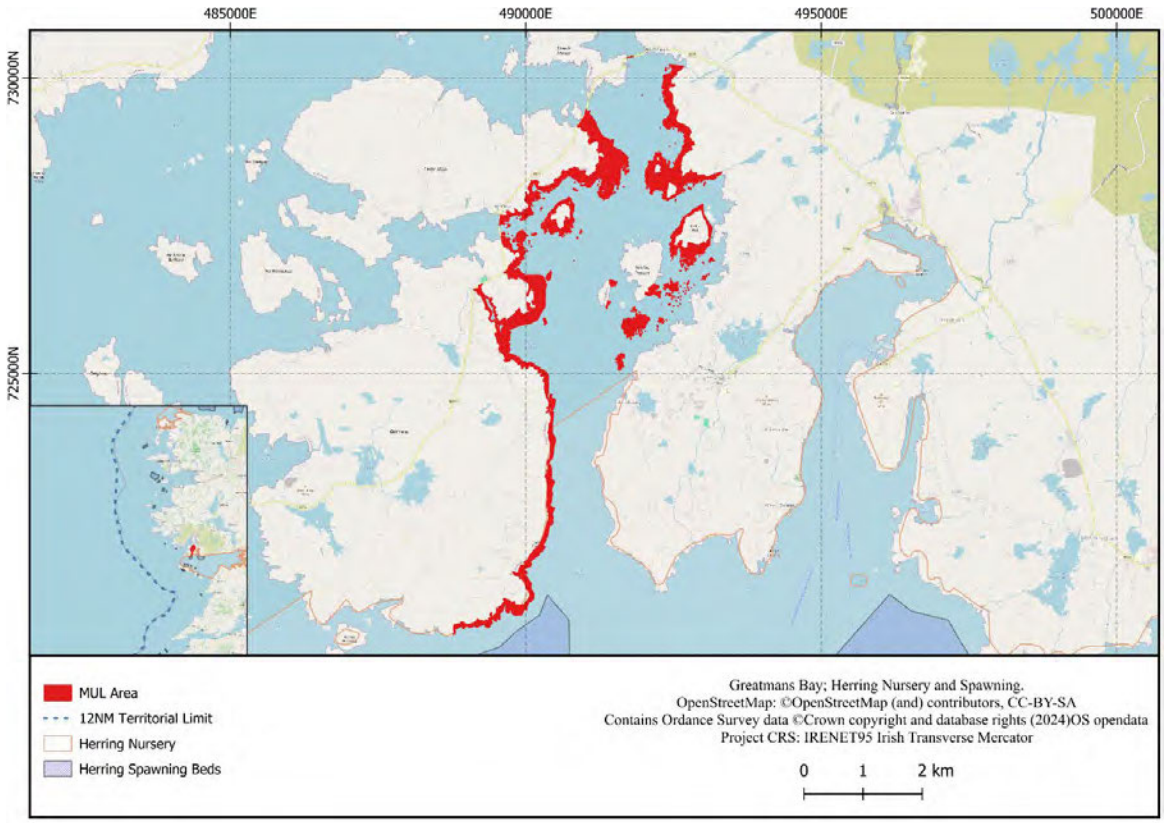

Figure 9 - Herring Nursery and Spawning Grounds

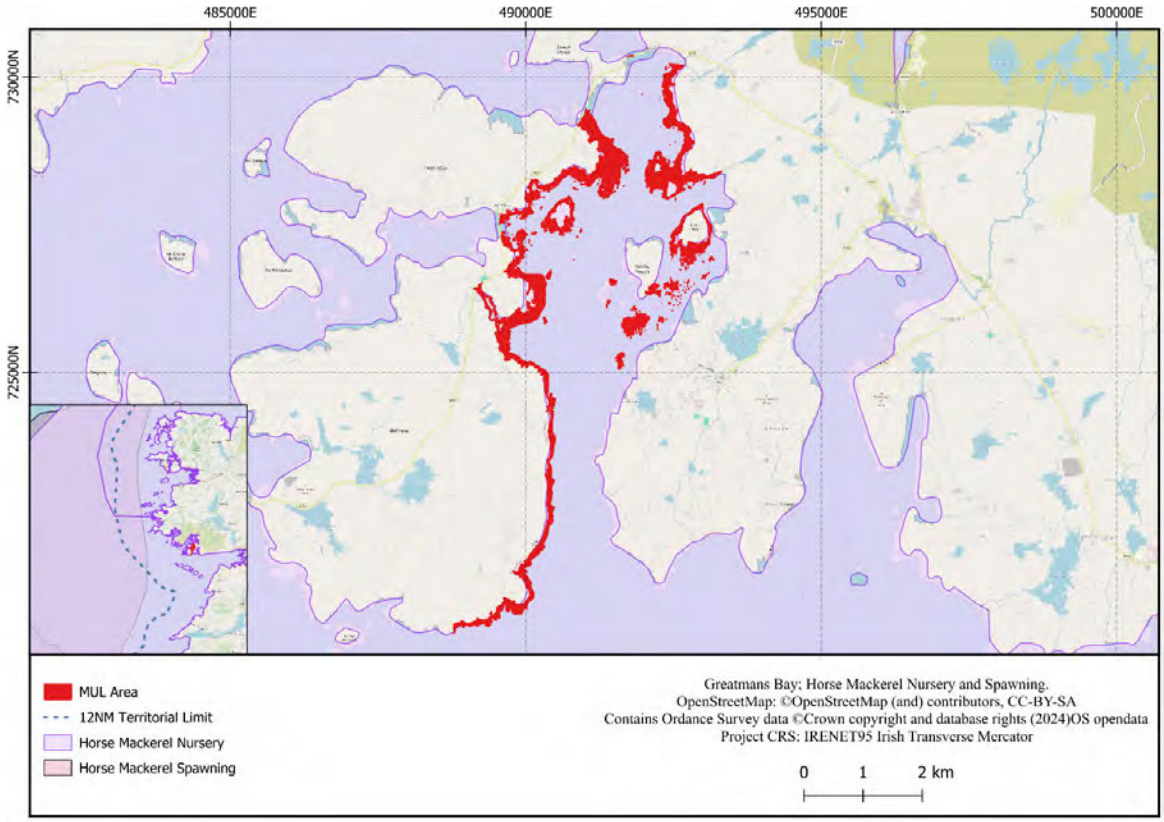

Figure 10 - Horse Mackerel Nursery and Spawning Grounds

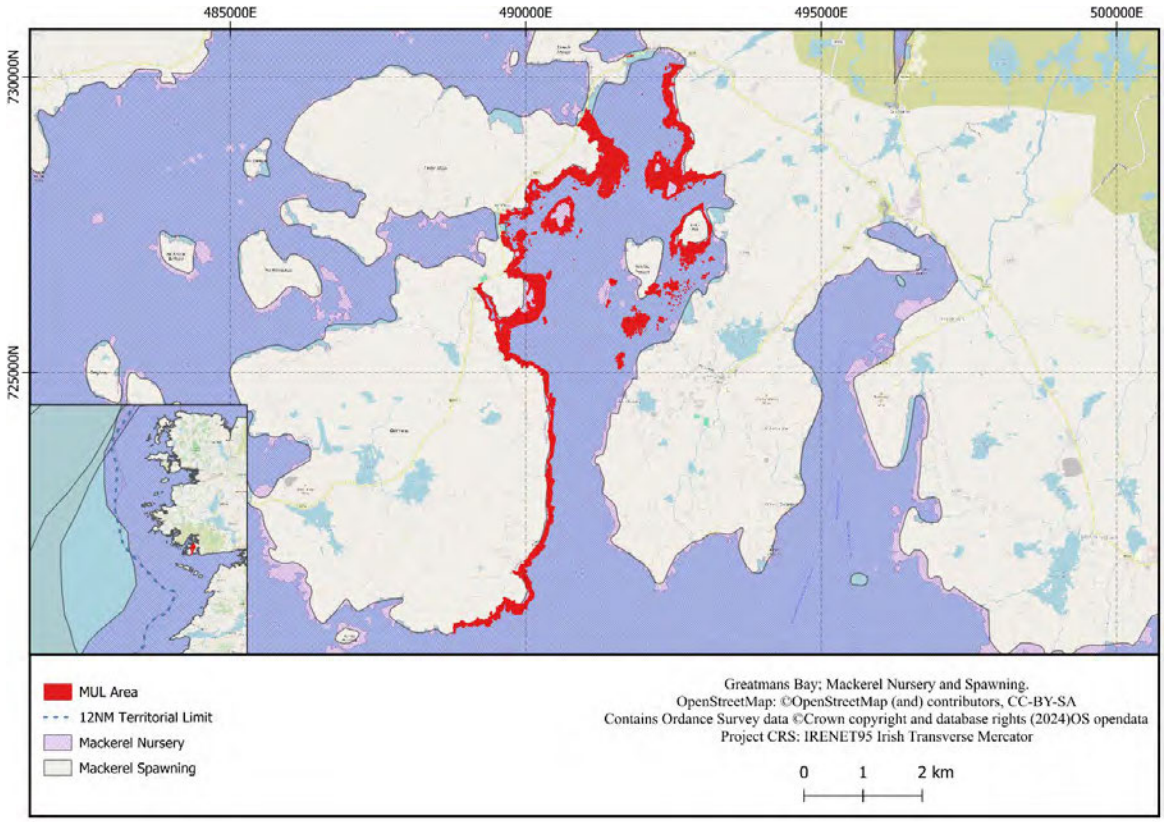

Figure 11 - Mackerel Nursery and Spawning Grounds

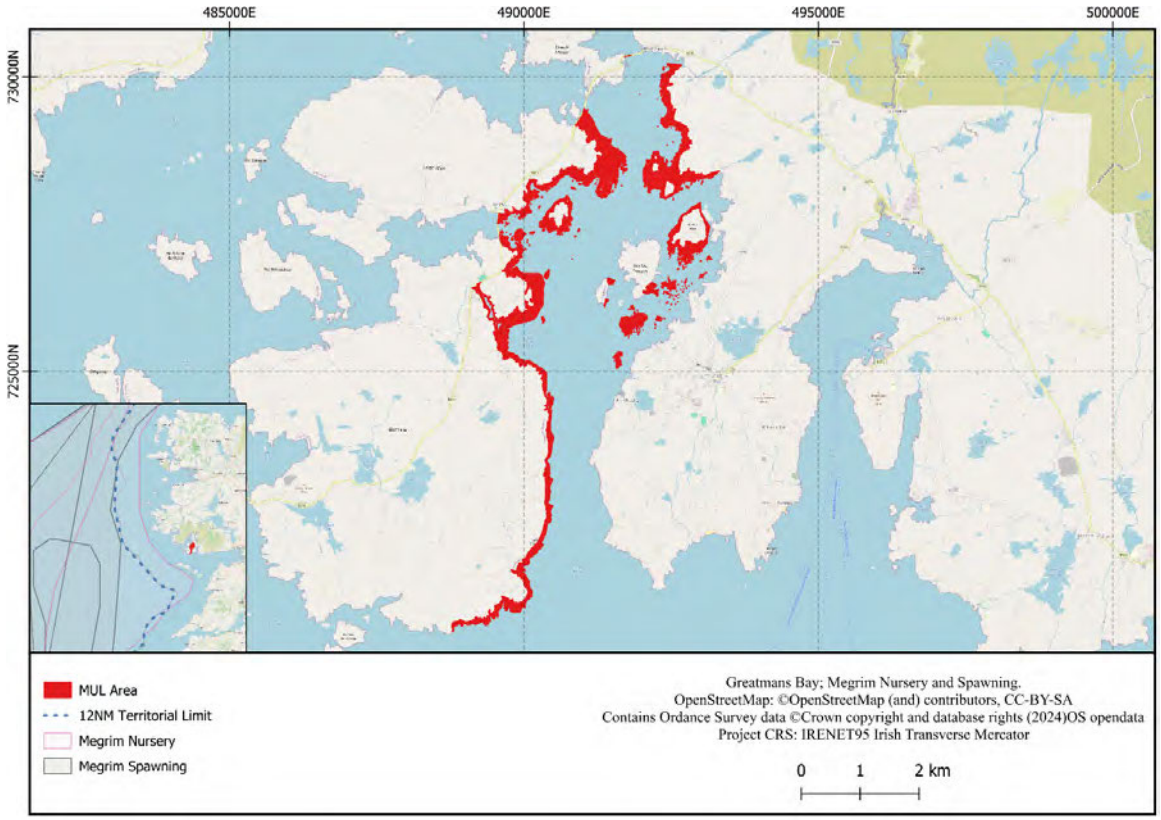

Figure 12 - Megrim Nursery and Spawning Grounds

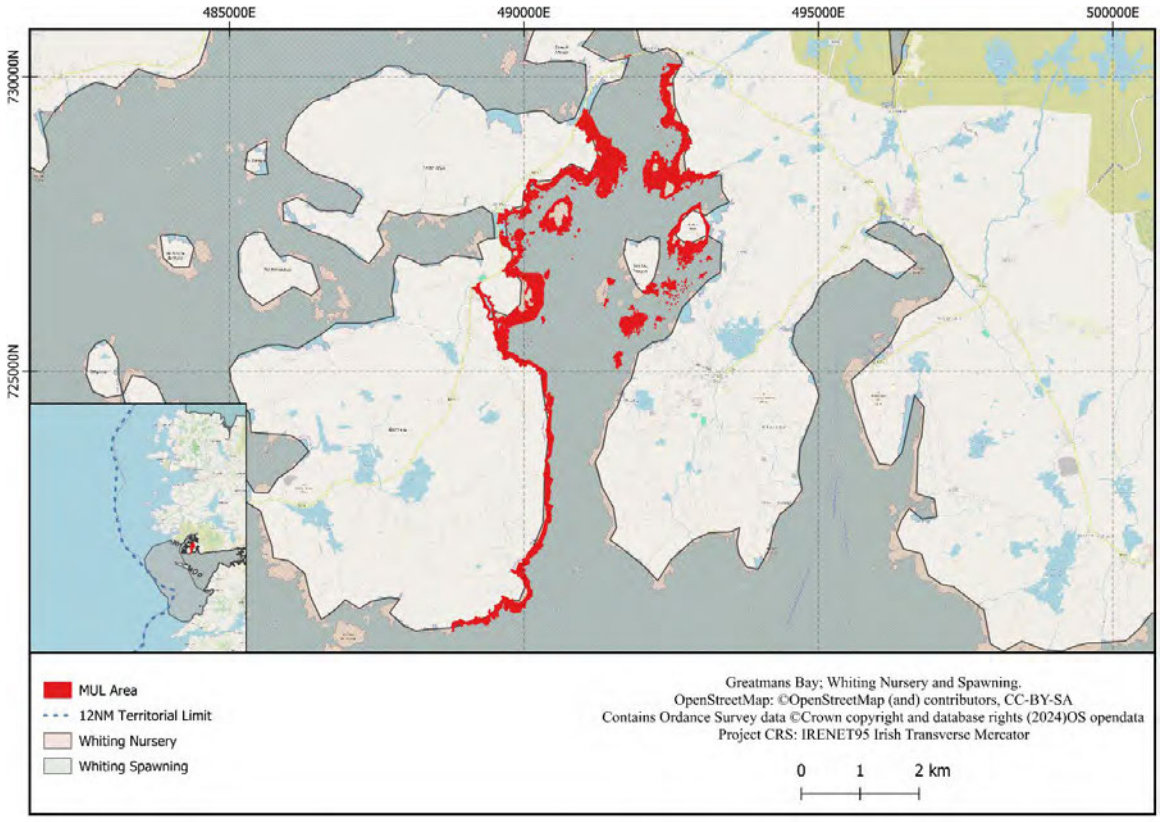

Figure 13 - Whiting Nursery and Spawning Grounds

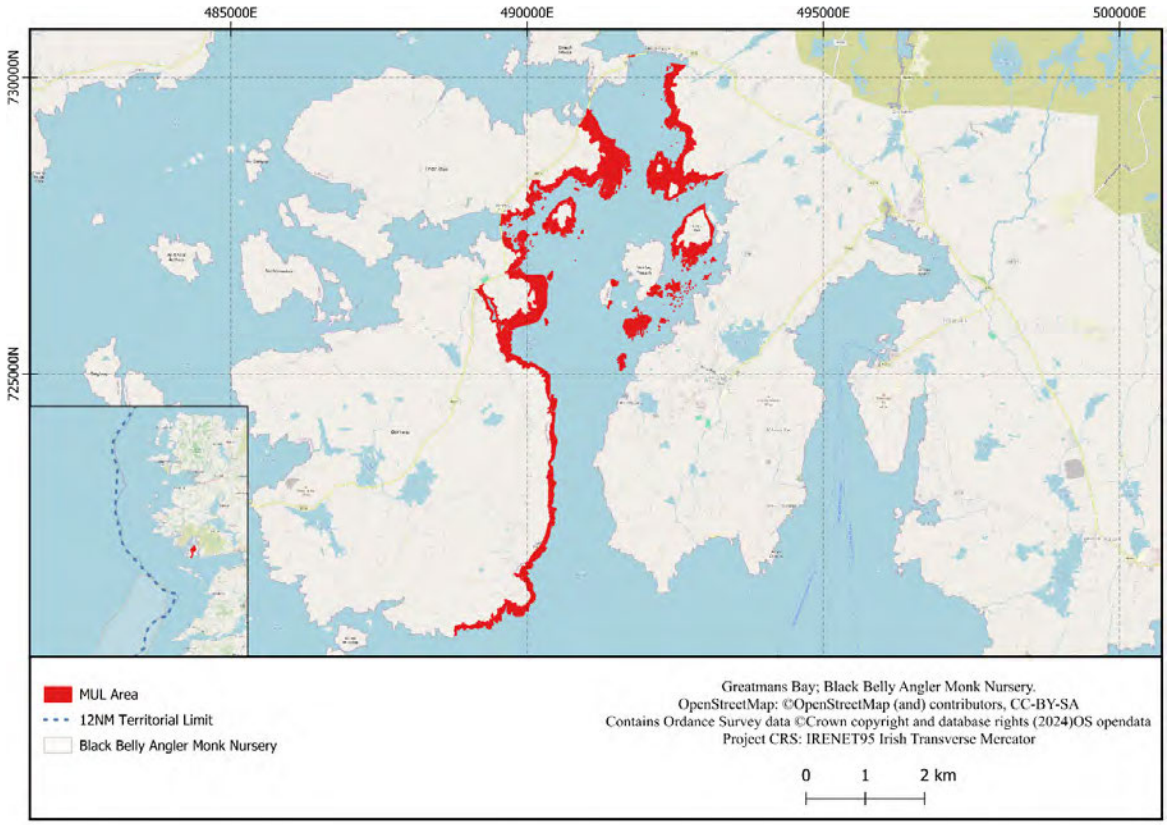

Figure 14 - Black Belly Angler Monk Nursery and Spawning Grounds

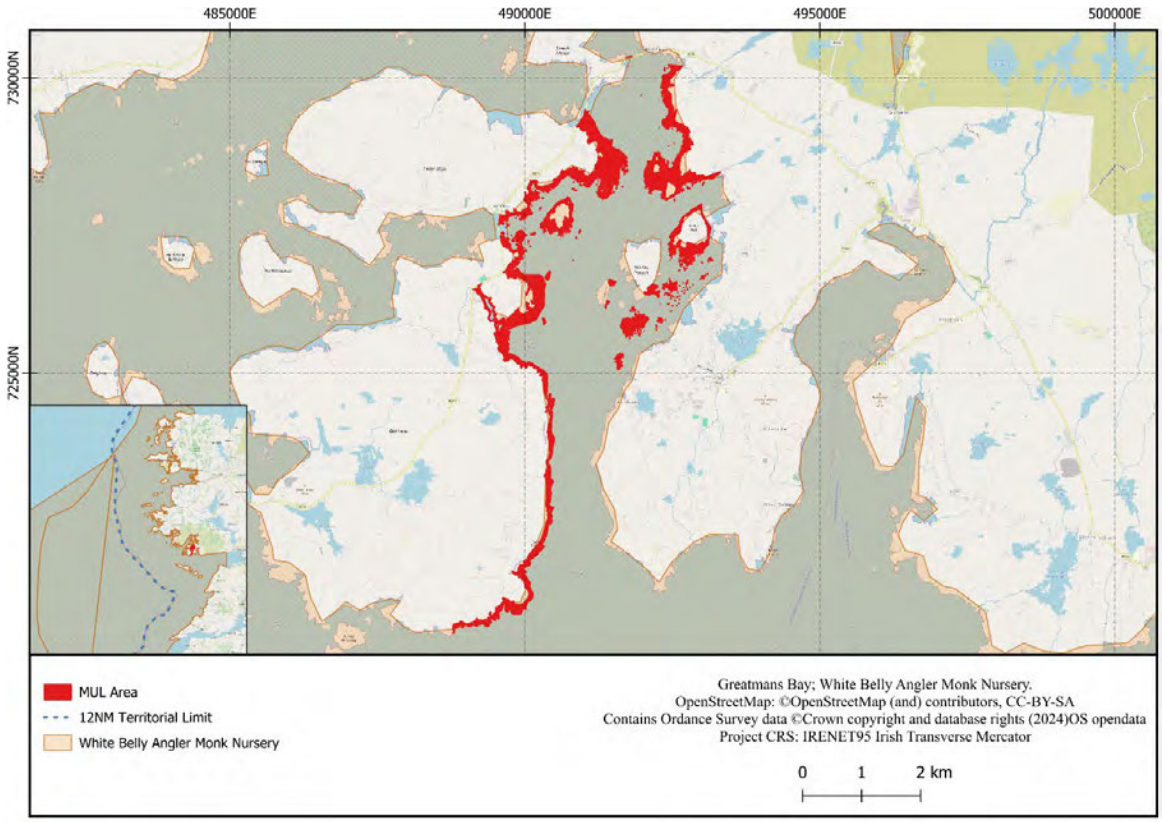

Figure 15 - White Belly Angler Monk Nursery and Spawning Grounds

Migratory Fish

Several migratory marine fish species are present on Ireland's western seaboard (Table 2).

Species	Habitat description
Atlantic salmon (*Salmo salar*)	Atlantic salmon (*Salmo salar*) are present in Irish waters as they migrate from oceanic habitats back to freshwater rivers and streams to spawn. They generally arrive in Irish coastal and estuarine waters from spring through autumn, with peak migration occurring between May and October. This movement primarily takes place in coastal areas and estuaries before they ascend rivers to complete their spawning cycle (McCarthy et al., 2008).
Sea lamprey (*Petromyzon marinus*)	Sea lamprey (*Petromyzon marinus*) are found in Irish waters as part of their anadromous migratory cycle, where they move from the ocean to freshwater rivers for spawning. They typically enter Irish estuaries and coastal waters in late spring to early summer, with peak migration occurring between April and July before they move into rivers to spawn (King & Roche, 2008).
River lamprey (*Lampetra fluviatilis*)	River lamprey (*Lampetra fluviatilis*) are present in Irish waters as part of their migratory life cycle, moving from estuarine and coastal environments into freshwater rivers to spawn. They typically migrate upstream in late autumn and winter, with peak movement occurring between November and February (King & Linnane, 2004).
Twaite shad (*Alosa fallax*)	Twaite shad (*Alosa fallax*) are present in Irish waters as they undertake their annual migration from the sea to freshwater rivers to spawn. They typically enter estuaries and coastal waters in late spring, with peak migration occurring from April to June, before moving into rivers to complete their spawning cycle (Maitland & Hatton-Ellis, 2003).
Allis shad (*Alosa alosa*)	Allis shad (*Alosa alosa*) are found in Irish waters as they migrate from marine environments into freshwater rivers to spawn. They typically enter coastal and estuarine waters in the spring, with peak migration occurring between April and May, before moving upriver to complete their spawning cycle (Aprahamian & Lester, 2001).

Table 2 – Migratory Marine Fish Species present on Ireland's Western Seaboard

The west coast of Ireland supports essential migratory routes and spawning habitats for key fish species, including Atlantic salmon (*Salmo salar*), Sea lamprey (*Petromyzon marinus*), Twaite shad (*Alosa fallax*), and Allis shad (*Alosa alosa*). The sustainable harvesting practices proposed by Arramara Teo, which are limited to the rocky intertidal zone, are designed to avoid significant interaction with these migratory fish populations. Harvesting occurs in the intertidal in geographically specific areas that do not interfere with the main migratory pathways or spawning grounds of these species, which generally occupy estuarine and freshwater systems during critical life stages.

The small-scale and limited nature of the harvesting activities, coupled with the avoidance of heavy equipment, minimises the risk of disturbing these species' natural behaviours, migration routes, or habitat use. Additionally, sediment disturbances caused by using in-transit boat motors are minimal, localised, and temporary, with sediments resettling shortly after operations, thus ensuring that these activities do not adversely affect water quality or habitat conditions vital for migratory fish.

In summary, the sustainable seaweed harvesting plan, with its low intensity and confined operational footprint within the intertidal zone, is expected to have negligible impacts on migratory fish

populations such as Atlantic salmon, Sea lamprey, Twaite shad, and Allis shad. This approach preserves the ecological functionality of the region's coastal habitats, thereby ensuring the stability and resilience of these species within the MUL area, even in the absence of additional mitigation measures.

Mitigation Measures:

None required.

7. Fisheries & Aquaculture

Fisheries

The proposed MUL area either overlaps with or is adjacent to several key fisheries (Figures 16 to 21). These include pot fishing (targeting lobster *Homarus gammarus* and shrimp *Crangon crangon*), net fishing (primarily for Bait, some Crayfish (*Palinurus elephas*) net fishing occurs in deeper waters to the south of Greatmans Bay), line fishing (for Pollack (*Pollachius pollachius*) and Mackerel (Scomber scombrus) occur in deeper waters south of Greatmans Bay), bottom trawl (for Mixed Demersal which occurs in the deeper water south of Greatmans Bay and Cashla Bay) and dredge fishing (for species like scallop *Pecten maximus*). There is no overlap between the MUL area and commercial bottom trawling or line fishing zones.

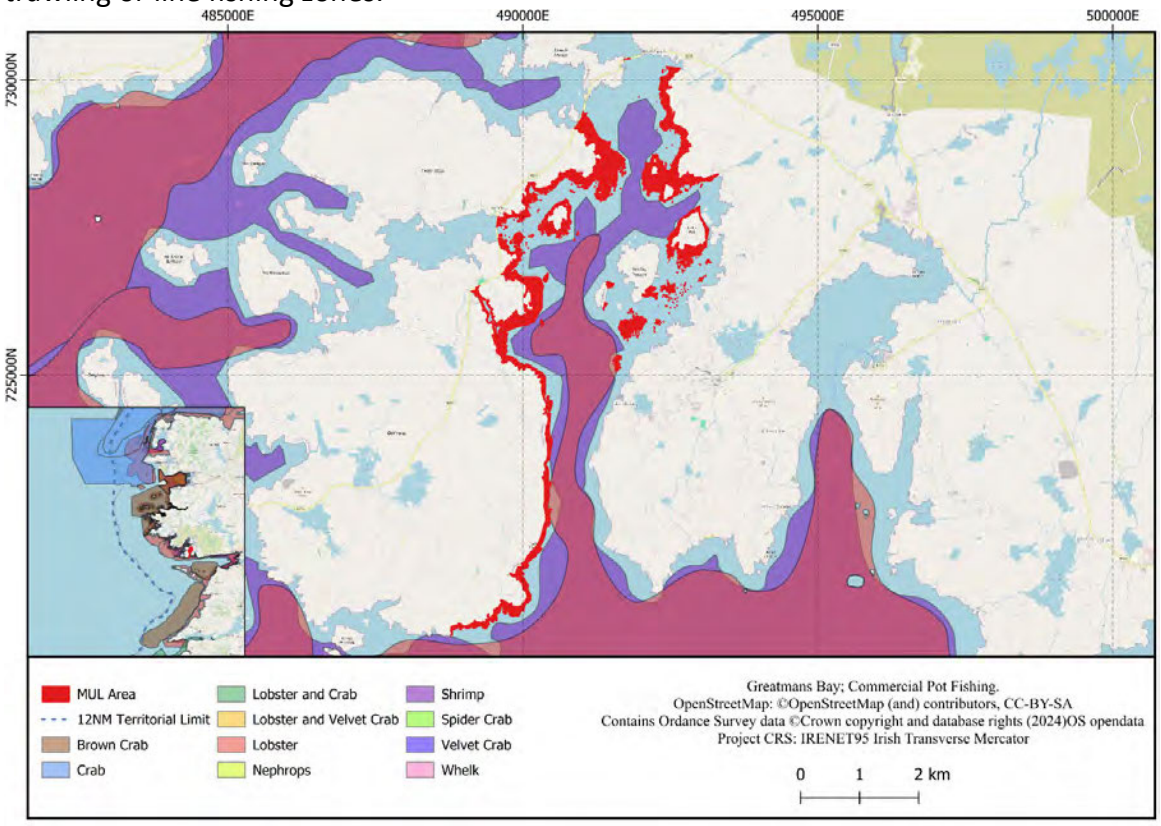

Figure 16 - Commercial fisheries in the vicinity of the MUL area (pot fishing)

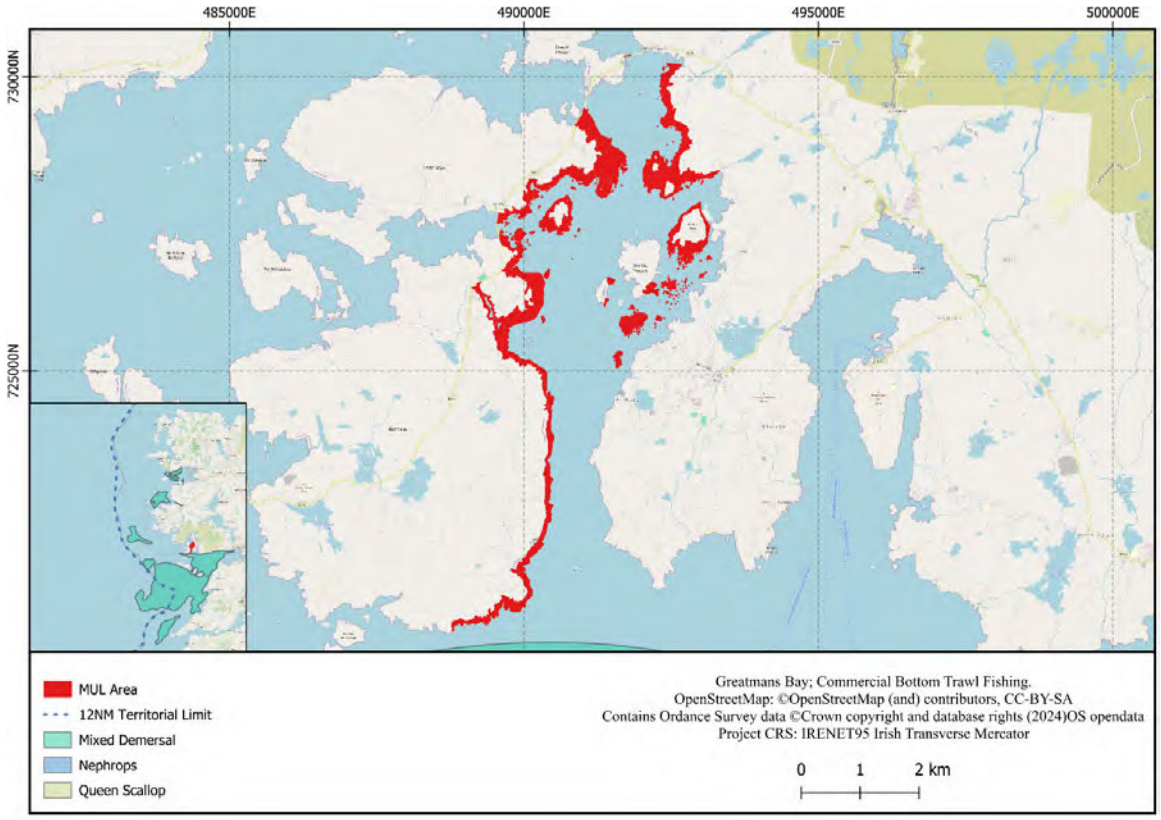

Figure 17 - Commercial fisheries in the vicinity of the MUL area (bottom trawl fishing)

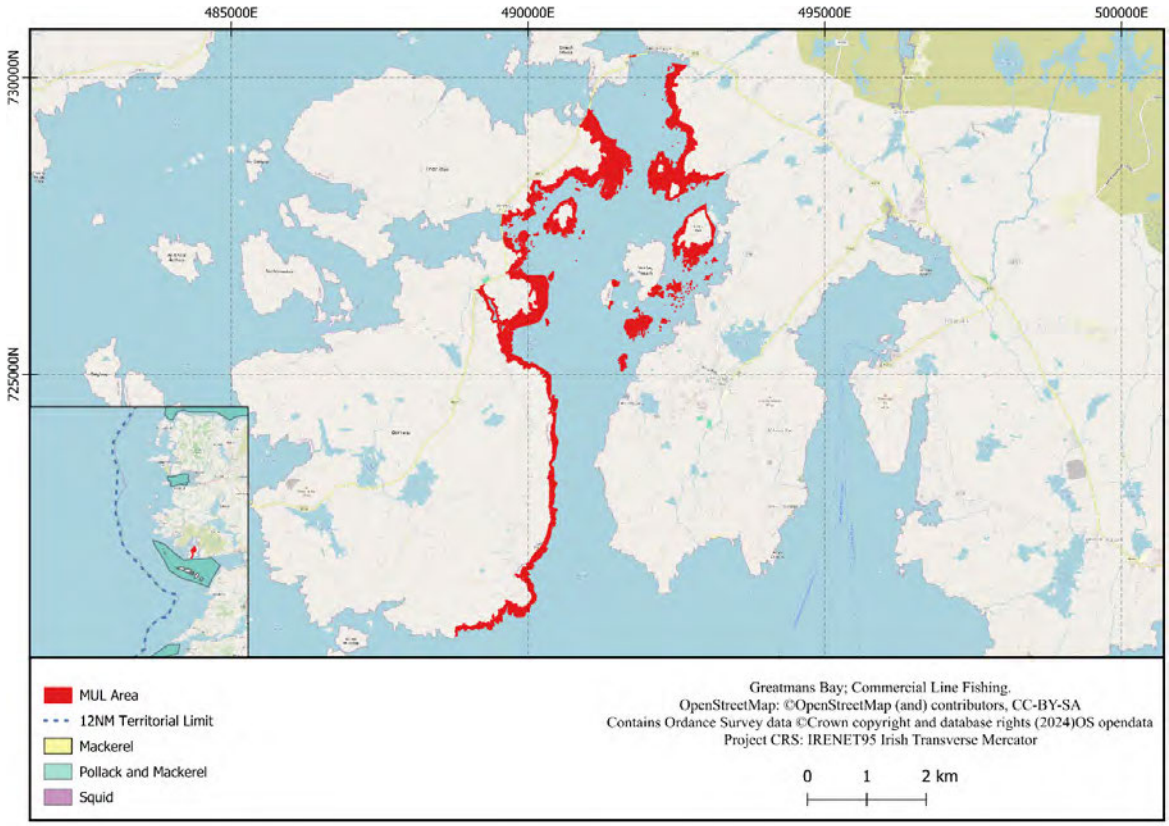

Figure 18 - Commercial fisheries in the vicinity of the MUL area (line fishing)

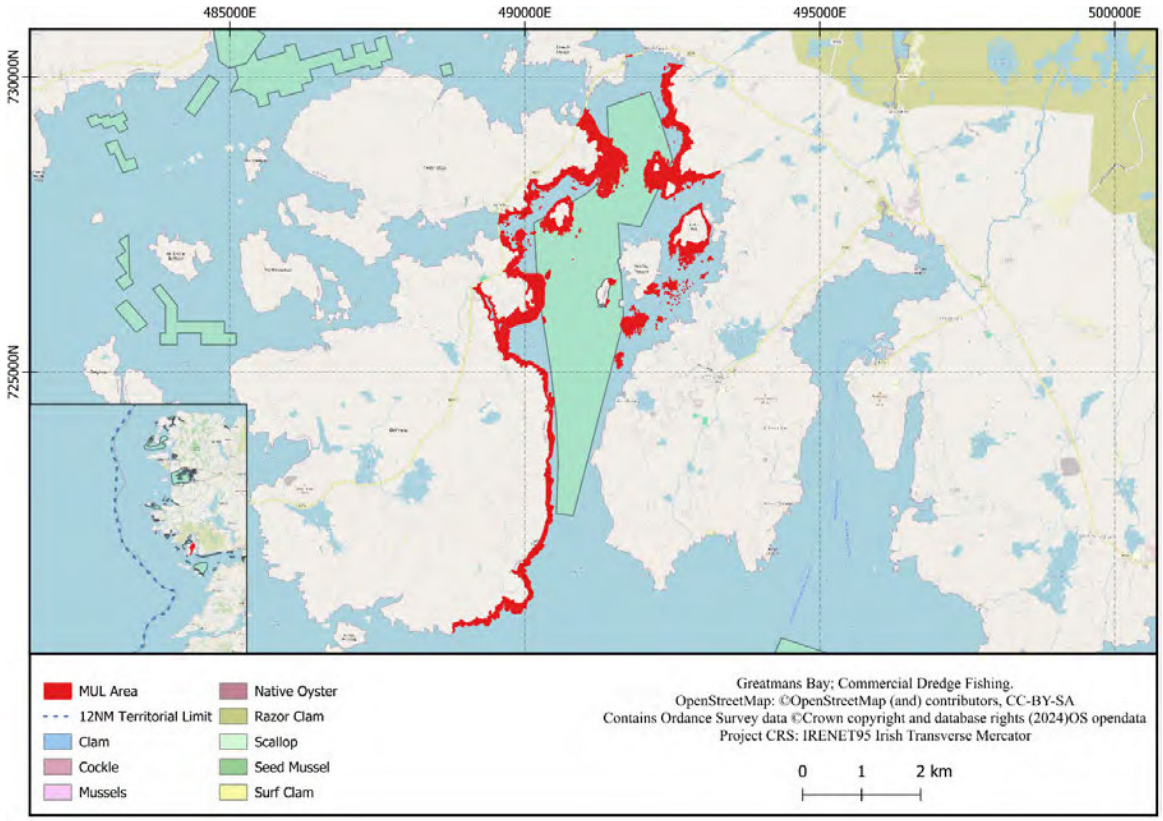

Figure 19 - Commercial fisheries in the vicinity of the MUL area (dredge fishing)

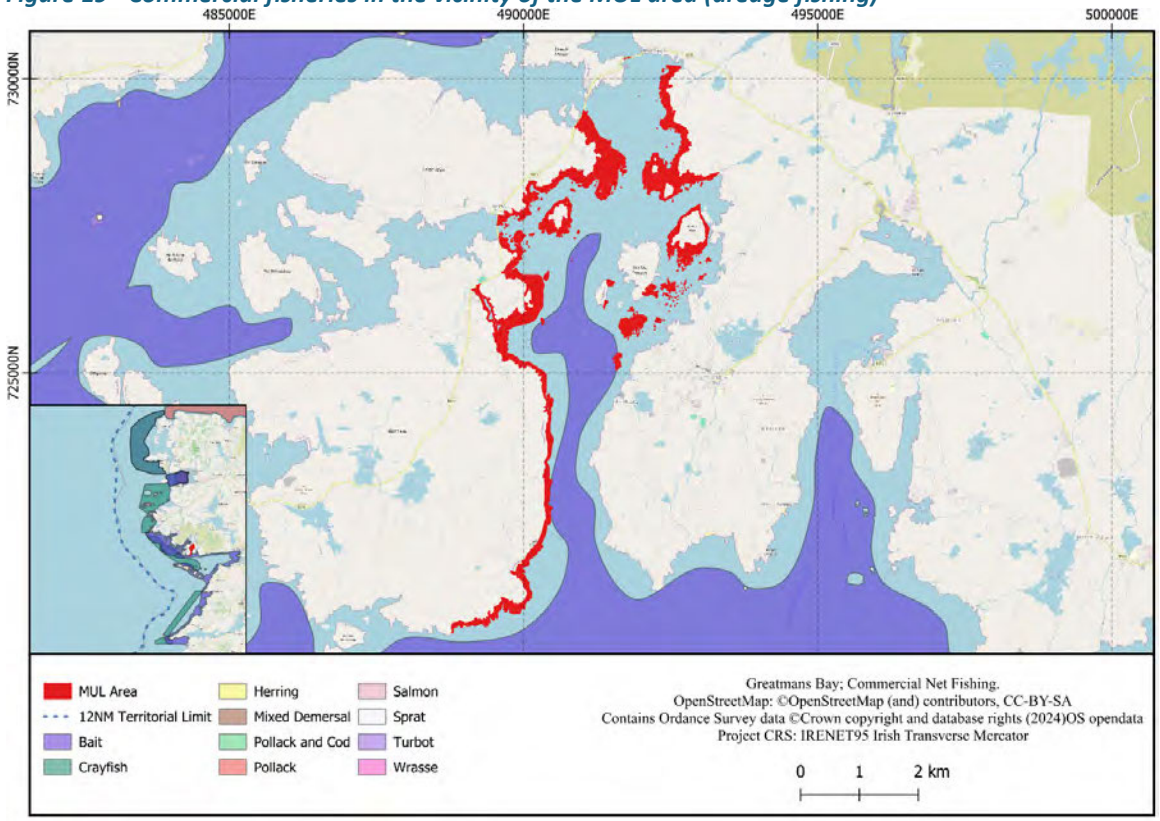

Figure 20 - Commercial fisheries in the vicinity of the MUL area (net fishing)

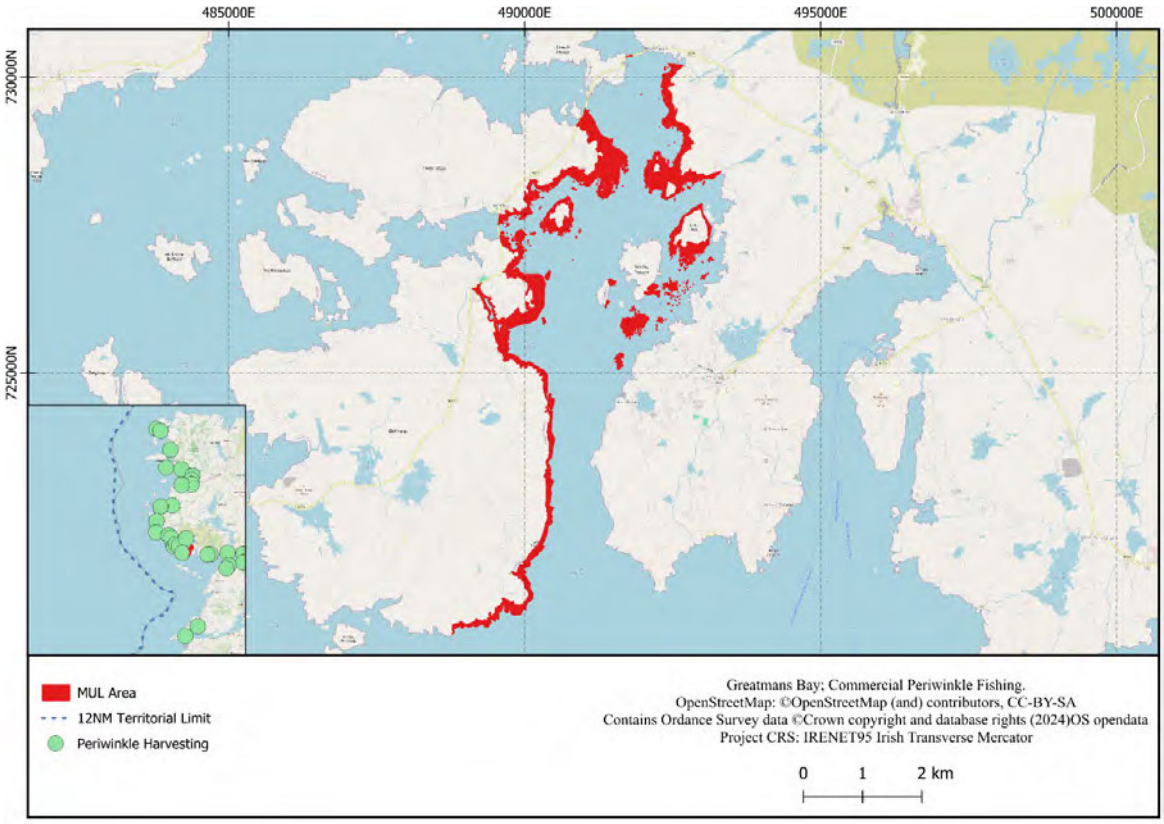

Figure 21 - Commercial fisheries in the vicinity of the MUL area (periwinkle fishing)

Additionally, there is no overlap between the MUL area and commercial periwinkle (*Littorina littorea*) harvesting.

Given the limited spatial and temporal extent of Arramara Teo's harvesting activities, which avoid direct overlap with these commercial fisheries, any impact on fisheries or aquaculture installations is expected to be minor and short-term. Consequently, no significant adverse effects on local fisheries operations are anticipated.

Aquaculture

Aquaculture installations are located throughout the proposed MUL area, primarily supporting finfish farming. These installations, along with their specific locations, are listed in Table 3. Arramara Teo's seaweed harvesting activities are limited in scope and restricted to specific, geographically defined areas within the rocky intertidal zone, which prevents direct interaction with aquaculture and fishery operations. Since aquaculture installations do not occur within the intertidal zone where harvesting is conducted, and given the temporary, low-impact nature of the harvesting activities, potential impacts on water quality and adjacent fisheries are considered negligible.

Bay	Site ID	Status	Farm Type	Species Detailed
Finfish Production				
Greatmans Bay	IE0586	Active	Salmon	Salmon
	IE0585	Active	Salmon	Salmon

Table 3 - Aquaculture installations

Mitigation Measures:

To further minimise any potential disturbance, a buffer zone of 200 m is established around all aquaculture installations. This measure ensures a precautionary approach to safeguarding water quality and operational space for aquaculture.

8. Noise & Vibration

Arramara Teo's seaweed harvesting operations produce minimal noise and vibration due to the limited intensity and infrequency of activities. The harvesting vessels are equipped with small 30 to 60 HP Yamaha motors (see Figure 22), which typically emit sound levels ranging from 85 to 100 decibels (dB) at the source (Richardson et al. 1995). These sound levels attenuate rapidly in the marine environment, with sound pressure diminishing significantly over short distances, especially in the intertidal zones where ambient wave action contributes to background noise levels.

Given the low-powered motors and operational distance from the shoreline, the noise generated by Arramara Teo's boats is unlikely to exceed or meaningfully alter ambient soundscapes. The impact of this additional noise is expected to be negligible in comparison to natural marine and coastal sounds, particularly as boats only engage motors during transit to and from the harvest areas. Once at the site, boats remain idle, further reducing any acoustic disturbance to the surrounding environment.

Figure 22 - Typical motors utilised by Arramara Teo boat and rake harvesters.

Marine mammals, such as bottlenose dolphins (*Tursiops truncatus*), typically inhabit deeper offshore waters and are not generally found in the intertidal areas impacted by seaweed harvesting. Therefore, the sound levels generated by these activities are not anticipated to induce auditory injury or significant behavioural changes in marine fauna. Fish and marine invertebrates in the intertidal zone are similarly expected to experience negligible disturbance, as the duration and frequency of exposure to boat noise are minimal.

Mitigation Measures:

Buffer Zones: To further mitigate potential noise-related impacts on sensitive marine species, a 200-meter buffer zone is maintained around known seal haul-out sites to reduce the likelihood of auditory disturbance.

Limit engine usage: Additionally, as a precautionary measure, boat motors are only utilised during transit to and from harvesting sites. This operational strategy ensures that noise levels are minimised when boats are in proximity to intertidal habitats and sensitive fauna.

In summary, the presence of small-scale harvesting boats creates only minor, localised, and transient noise and vibration disturbances. Hand-harvesting activities, meanwhile, generate no mechanical noise, remaining entirely within the background ambient levels of the marine environment. As a result, the potential for adverse effects on marine wildlife and ecological soundscapes remains low.

9. Landscape/Seascape

The coastal landscapes within the MUL area exhibit a remote, natural character dominated by a complex metamorphic & igneous indented coastline, small bays & small islands (Figure 23). These coastlines feature minimal industrial development amidst a low population setting. Some major population centres are present along the Irish west coast; however, these areas are a considerable distance from the MUL area.

Despite its remoteness, the MUL area sees regular local activity, as fishermen, small vessels, and other maritime users frequently engage in activities such as fishing, seaweed harvesting, and recreational boating along these coastal waters of Atlantic Galway Bay and Islands. Given the distance from major ports and urban centres, the visual impact of harvesting operations is minimal.

Arramara Teo's seaweed harvesting boats are compact and designed for low visibility, ensuring that their presence is both temporary and inconspicuous. These small vessels, combined with the infrequent and low-intensity nature of harvesting operations, prevent any significant or lasting visual impact on the surrounding seascape. Hand harvesters, working in pairs, create no visible disturbance to either landscape or seascape, blending into the coastal environment without disruption.

Overall, the nature of Arramara Teo's sustainable harvesting methods ensures that the visual impact on the landscape and seascape within the MUL area remains negligible, preserving the area's natural beauty and character. Even in the absence of these mitigation measures, no significant alteration to the seascape or landscape is anticipated.

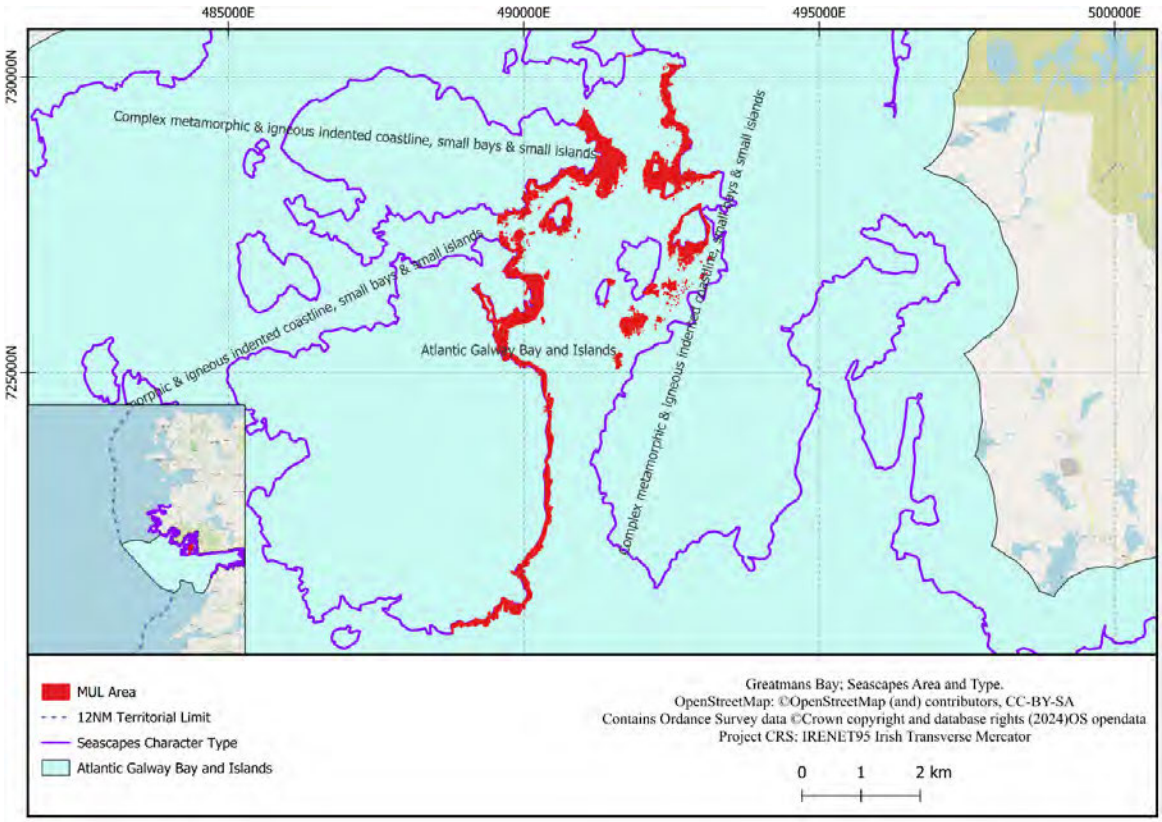

Figure 23 - Seascapes character type and area

Mitigation Measures:

None required.

10. Traffic & Transport (including navigation)

The seaweed harvesting operations utilise specially designed vessels (Figure 22) that operate at low speeds and often remain stationary during harvesting, effectively minimising any potential interference with other maritime users. Harvesting activities are confined to the rocky intertidal zone, far from significant commercial ports, ferry routes, or high-density vessel traffic areas. Seaweed unloading is conducted on small piers, well away from any areas of substantial marine traffic, thereby reducing the likelihood of collisions or navigational conflicts.

Given the relatively low vessel density in the MUL area, the impact of seaweed harvesting on marine traffic is expected to be minimal. EMODnet Vessel Density Maps indicate that passenger and commercial vehicle densities are extremely low around Greatmans Bay (Figure 24). The main navigation route within the vicinity of the MUL area is associated with the harbour traffic in and out of the ports of Greatmans Bay. Arramara Teo vessels remain exclusively within inner bay zones and avoid outer waters, while these vessels operate in deeper waters, which are sufficiently distant from harvesting zones to avoid any operational conflict.

The limited scale of the harvesting operations further mitigates potential impacts on marine traffic and transport. The vessels used by the harvesters are assigned to specific bays with a maximum

operational range of under 10 km, and harvesting occurs over a limited number of days annually (approximately 140 days for boats and 140 days for towing *climíní*). Once a sector is harvested, vessels and rake harvesters will not return to that area for at least 12 months, avoiding repetitive traffic patterns that could interfere with local navigation. As a result, no significant disruption is anticipated to shipping, navigation, or recreational boating within the MUL area, even in the absence of mitigation measures.

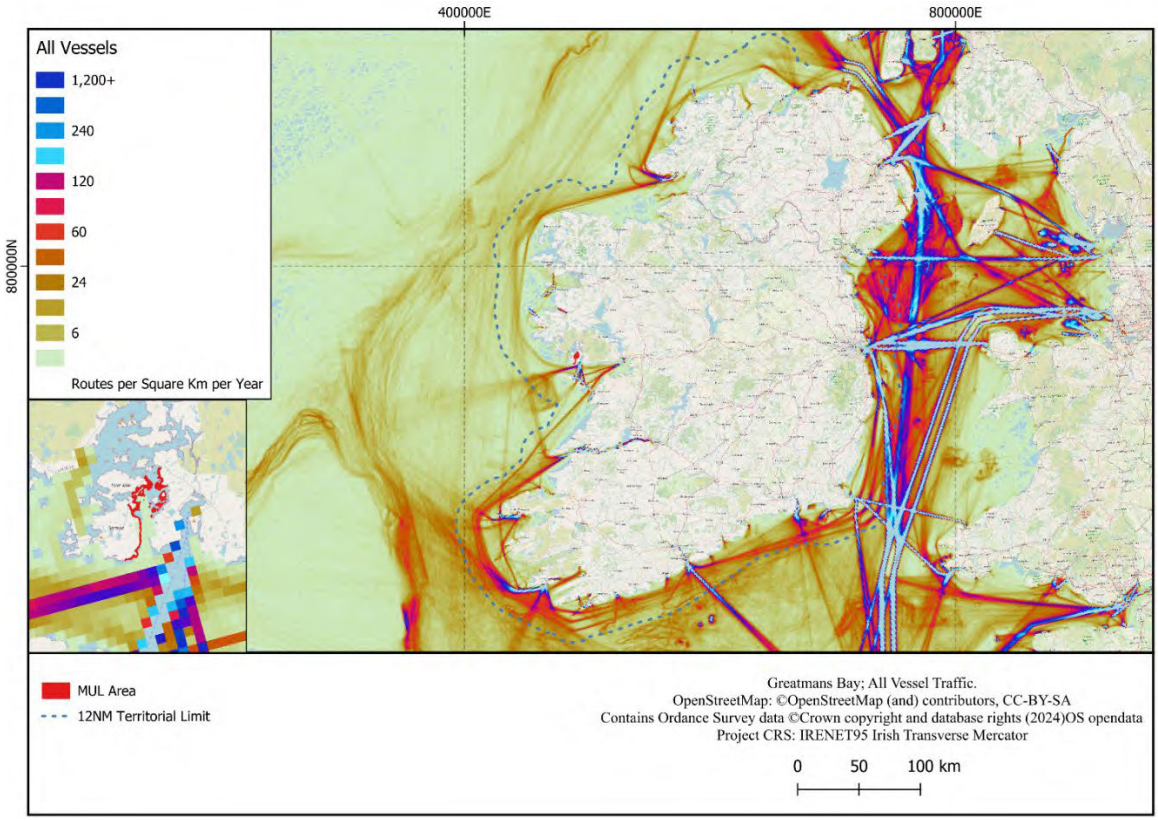

Figure 24 - All Vessel Density Traffic (AIS 2022)

Mitigation Measures:

None required.

11. Cultural Heritage (including underwater archaeology)

Shipwrecks

A thorough review of cultural heritage resources across the MUL area was conducted using data from the National Monuments Service Historic Environment Viewer, the Wreck Viewer (https://www.archaeology.ie/), and INFOMAR wreck data (https://www.infomar.ie/). This search revealed zero recorded wreck sites being adjacent to the MUL area (see Figure 25).

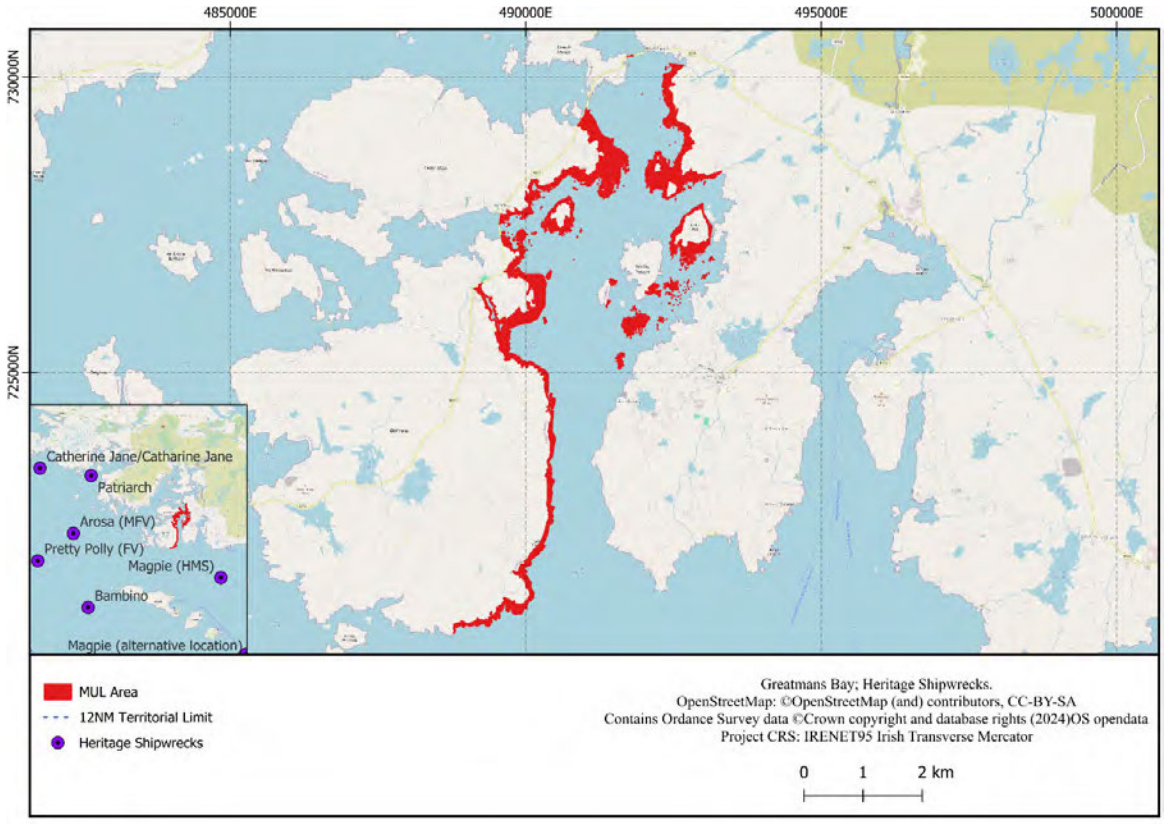

Figure 25 - Heritage wrecks within and outside of Arramara Teo's proposed MUL area.

UNESCO Sites

The proposed MUL area is far from UNESCO World Heritage Sites. The closest site, *Sceilg Mhichíl*, is over 120 km from the nearest point of the MUL area. Given this distance, there is no potential for interaction with UNESCO-designated cultural heritage areas.

Lighthouses

No lighthouses are located within or overlap with the MUL area, and those nearby are far from the planned harvesting sites (Figure 26). Consequently, the proposed seaweed harvesting will not affect these cultural landmarks' visual and operational aspects.

Harvesting activities will be confined to the rocky intertidal zone and avoid deeper waters where archaeological or wreck sites are likely to be present. There is negligible risk of impacting cultural heritage, including underwater archaeological sites. This spatial restriction ensures the preservation of underwater archaeological resources, aligning with national conservation standards.

Furthermore, seaweed harvesting is a culturally and historically significant practice in Ireland, especially in the rural coastal communities along the western seaboard (MacMonagail, et al., 2017). The sustainable practices employed by Arramara Teo will support the continuation of this traditional activity, reinforcing its cultural relevance and maintaining its heritage value. The promotion of sustainable seaweed harvesting practices contributes to the safeguarding of this tradition, keeping it integrated within the social fabric and heritage of coastal Ireland.

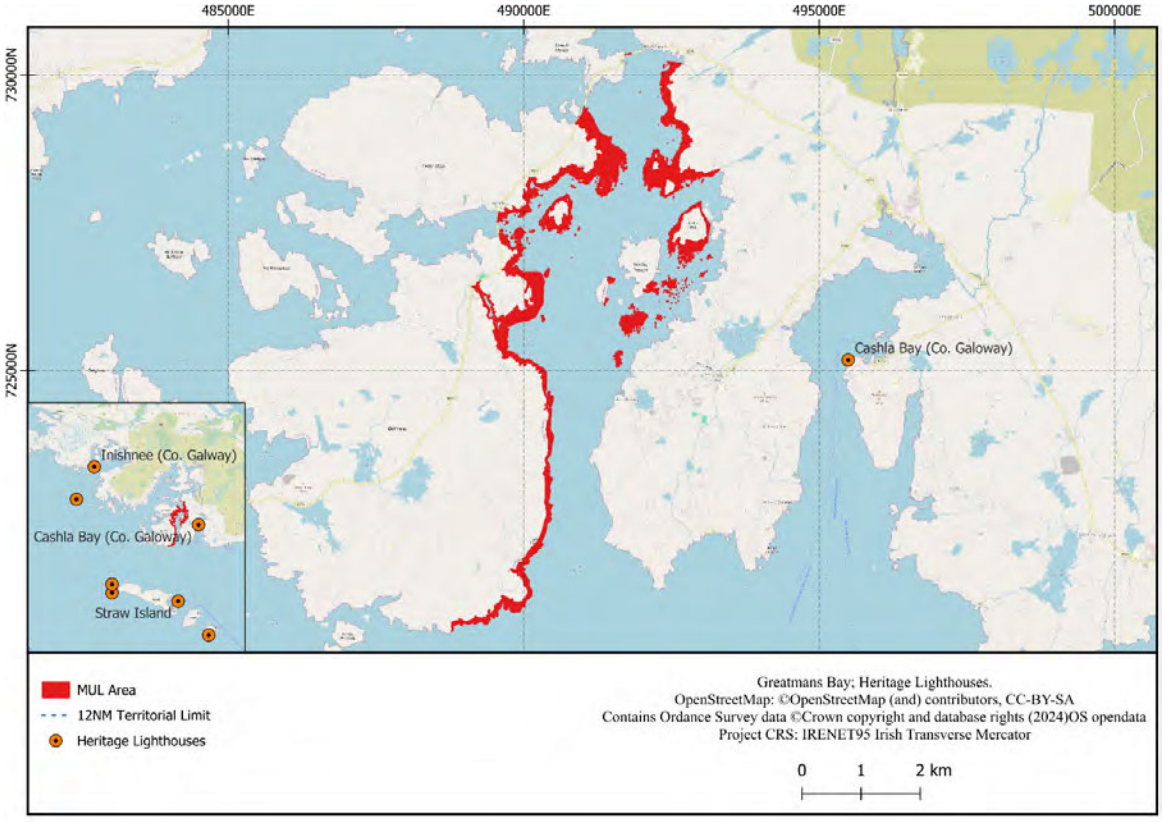

Figure 26 - Heritage lighthouses within 12 nm of the MUL area

In conclusion, the proposed seaweed harvesting will have no significant impact on cultural heritage sites, wrecks, or underwater archaeology within or near the MUL area. This project not only ensures the protection of cultural heritage assets but also respects and perpetuates the cultural legacy of sustainable seaweed harvesting along the Irish coast.

Mitigation Measures:

None required.

12. Population & Human Health

The proposed seaweed harvesting within the MUL area is situated in a remote, sparsely populated coastal region (Figure 27), ensuring no significant impacts on nearby population centres or human health. The harvesting operations will be restricted to the rocky intertidal zone, far from densely populated areas, which minimises any potential interaction with local communities. Arramara Teo's primary objective is to conduct harvesting activities with no adverse effects on human health or local populations.

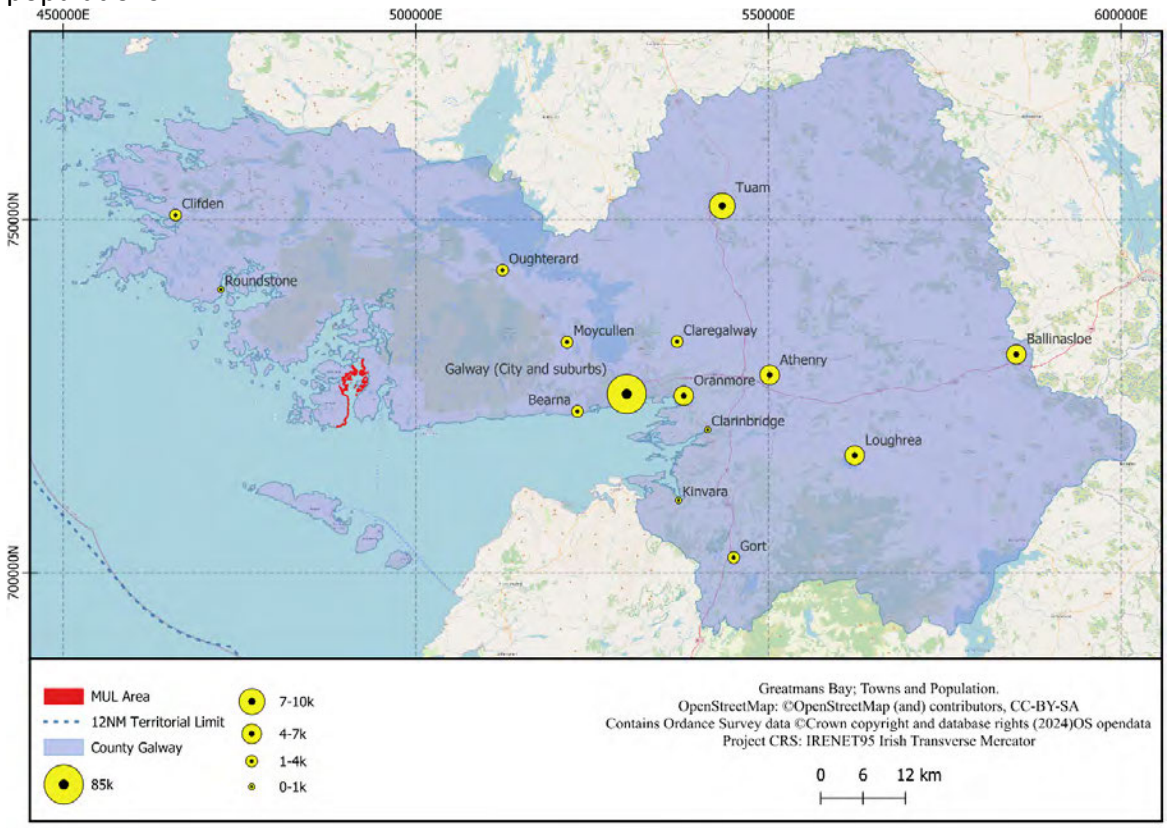

Figure 27 - Towns and Cities in the vicinity of the proposed MUL

13. Major Accidents & Disasters

The proposed seaweed harvesting activities will not increase the likelihood of natural disasters such as earthquakes, subsidence, landslides, erosion, or flooding. Due to the nature of the project and its location, the potential for major accidents or disasters is considered extremely low. The project does not involve any activities near hazardous industrial sites (see Figure 28), and there are no significant risks associated with the harvesting operations that could lead to major accidents or disasters. Given the remote and rural nature of the project area, any potential for such incidents is considered highly unlikely, even in the absence of mitigation measures.

The proposed seaweed harvesting activities are highly unlikely to contribute to or increase the risk of natural disasters, such as earthquakes, subsidence, landslides, erosion, or flooding. The nature of the harvesting operations, confined to the rocky intertidal zone in a remote and rural area, inherently

limits the potential for major accidents or disasters. Additionally, the project does not involve proximity to any hazardous industrial sites, such as Seveso sites, nor does it involve activities that carry significant inherent risks that might lead to large-scale accidents.

The project's operational framework, which does not include the storage or use of hazardous materials, and its rural coastal setting reduce the likelihood of incidents that could impact local communities, the environment, or infrastructure. The absence of activities near populated or industrial areas further minimises the risk of any significant disruption or emergency incident.

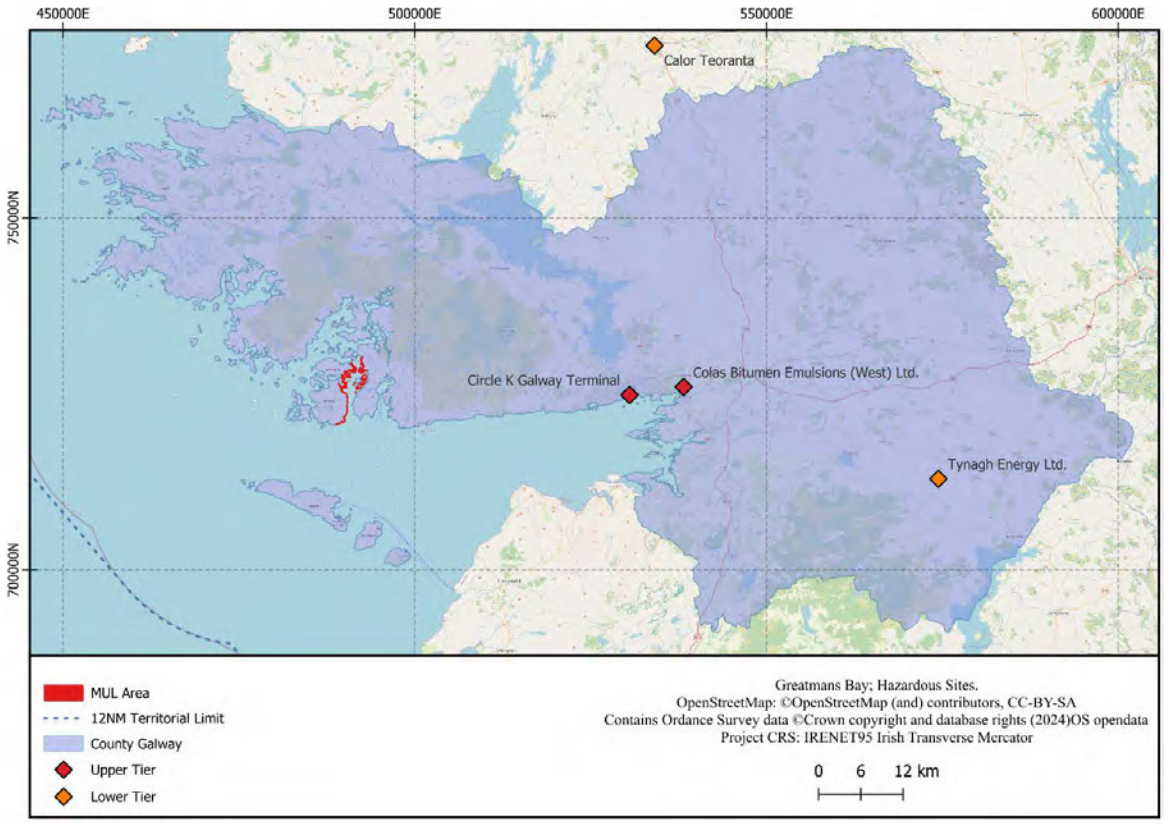

Figure 28 - Arramara Teo proposed MUL area in relation to Hazardous Industrial Sites (Seveso sites)

Given the low-risk profile of the harvesting operations, no significant threat of major accidents or disasters is anticipated, even in the absence of additional mitigation measures.

Mitigation Measures:

None required.

14. Health and Safety Compliance

All harvesting and site monitoring activities will strictly adhere to applicable national and international health and safety standards, including the *Safety, Health and Welfare at Work Act 2005* and the *Safety, Health and Welfare at Work (General Application) Regulations 2007*, as amended. Furthermore, Arramara Teo complies with prominent international safety conventions under the *International Maritime Organization (IMO)* and the *International Labour Organization (ILO)*, aimed at preventing

pollution and safeguarding maritime personnel. With comprehensive safety and compliance measures in place, no adverse effects on human health are anticipated throughout the harvesting operations.

15. Safety Protocols for Seaweed Harvesting Operations

All Arramara Teo harvesting vessels adhere to the *International Regulations for Preventing Collisions at Sea* (COLREGs), in addition to other relevant maritime safety protocols. These measures include the use of formal *Marine Notices*, appropriate navigational lights and signals, and internationally recognised warning indicators. Onboard safety equipment, such as flares, smoke bombs, and lights, will be readily available, ensuring safe navigation and enhancing visibility to prevent accidents. Moreover, Arramara Teo utilises newly maintained vessels that meet stringent Irish Department of Transport regulations, minimising risks to personnel through well-maintained equipment and vessels certified for safe operations.

16. Preventative Measures and Personnel Safety

All seaweed harvesting activities are governed by rigorous national and international health and safety standards, including the *Safety, Health, and Welfare at Work Act 2005*, which safeguards personnel engaged in harvesting operations.

In conclusion, with these structured measures and strict adherence to health and safety regulations, the proposed seaweed harvesting operations pose no significant threat to population centres or human health within the MUL area, even in the absence of additional mitigation measures.

17. Air Quality

The proposed seaweed harvesting activities are expected to have a negligible impact on local air quality due to the limited number of active vessels and the minimal engine power used. These motors will only be in use for brief periods during transit to and from the harvesting sites, thereby limiting fuel combustion and emissions.

The intermittent operation of these small vessels, coupled with the low density of harvesters, results in an emissions profile that is negligible in terms of impact on air quality, especially when compared to the natural dispersion and dilution factors in coastal environments. Furthermore, there are no nearby urban or industrial areas that could compound or be affected by emissions from these operations.

Given the scale and operational scope of the harvesting activities, there is no likely significant impact on air quality across the area covered by this MUL.

Overall, the minor emissions from the harvesting boats involved in boat and rake method are expected to have no adverse effect on the local air quality, maintaining a clean and healthy environment in the coastal region, even in the absence of additional mitigation measures. There are no emissions form hand harvesting.

Mitigation Measures:

None required.

18. Climate

The seaweed harvesting plan developed by Arramara Teo is projected to have an insignificant impact on both air and water quality and will not contribute meaningfully to climate change. The limited harvesting frequency, minimal vessel usage, and absence of permanent infrastructure mean that any emissions from harvesting activities will be short-lived, minor, and well below background levels, ensuring compliance with national and EU Air Quality standards. While some greenhouse gas (GHG) emissions from boat engines and personnel transport are inevitable, the total climate impact is minimal.

Harvesting will occur within a specific geographic scope, utilising modern, certified seaweed harvesting vessels that align with stringent safety and environmental regulations. The emissions from outboard motors and limited truck transport for harvested biomass will remain within national standards, further ensuring that the carbon footprint remains minimal. The operations are conducted at low speeds, with vessels limited in number, ensuring that emissions are localised, dispersed quickly, and do not contribute to long-term environmental or climate impacts. All vessel operations are following EU Directives, reinforcing adherence to sustainable practices.

In terms of carbon dynamics, seaweed beds function as temporary carbon sinks, capturing CO_2 and storing it as biomass. In natural conditions, this stored carbon is released back into the sea or atmosphere when the seaweed detaches and decomposes or is consumed by herbivores. Harvesting activities intercept this cycle, diverting carbon that, depending on its end use, may contribute to atmospheric carbon (if used in animal feed) or could be stored longer-term if incorporated into soils. Importantly, harvested seaweed beds exhibit rapid regrowth, thus sequestering carbon again shortly after harvest, underscoring the renewable nature of the resource.

Arramara Teo is committed to the sustainable utilisation of marine resources, and the responsible harvesting practices of *Ascophyllum* and *Fucus* are aligned with climate-neutral objectives. The low frequency, limited scale, and regulatory compliance of these operations ensure that they do not contribute to cumulative GHG emissions. Consequently, the environmental footprint of the harvesting operations is minimised, and there is no anticipated significant impact on climate.

In conclusion, the small-scale, low-frequency nature of Arramara Teo's seaweed harvesting activities ensures no significant impact on climate, even in the absence of additional mitigation measures.

Mitigation Measures:

None required.

19. Waste

The proposed seaweed harvesting operations conducted by Arramara Teo are designed to be entirely waste-free. Due to the nature of the harvesting activities, which involve hand-cutting or minimal

equipment, no waste materials are generated or discarded at any stage of the process. This waste-neutral approach ensures that there is no impact on local waste production or disposal systems and aligns with sustainable environmental practices.

The harvesting process is conducted within the intertidal zone, where all collected biomass is transported directly for processing, eliminating any requirement for on-site waste disposal. Additionally, no ancillary waste (such as packaging materials, fuel containers, or maintenance debris) is produced, as the operations follow strict guidelines to maintain a zero-waste footprint.

In summary, given the waste-free nature of the harvesting operations and strict adherence to waste management protocols, no significant impact on waste generation or disposal is expected, and additional mitigation measures are unnecessary.

20. Material Assets

The remote and offshore nature of the MUL project area ensures that interactions with existing infrastructure assets are minimal. Figure 29 shows ocean energy and windfarm installations. There is no potential for interactions between proposed seaweed harvesting activities and these energy installations. No oil or gas production facilities, marine aggregate extraction sites, telecommunications cables, power cables, or military zones are situated within or near the designated harvesting areas. Additionally, no subsea infrastructure, such as offshore installations, pipelines, or boreholes, is located within the MUL area.

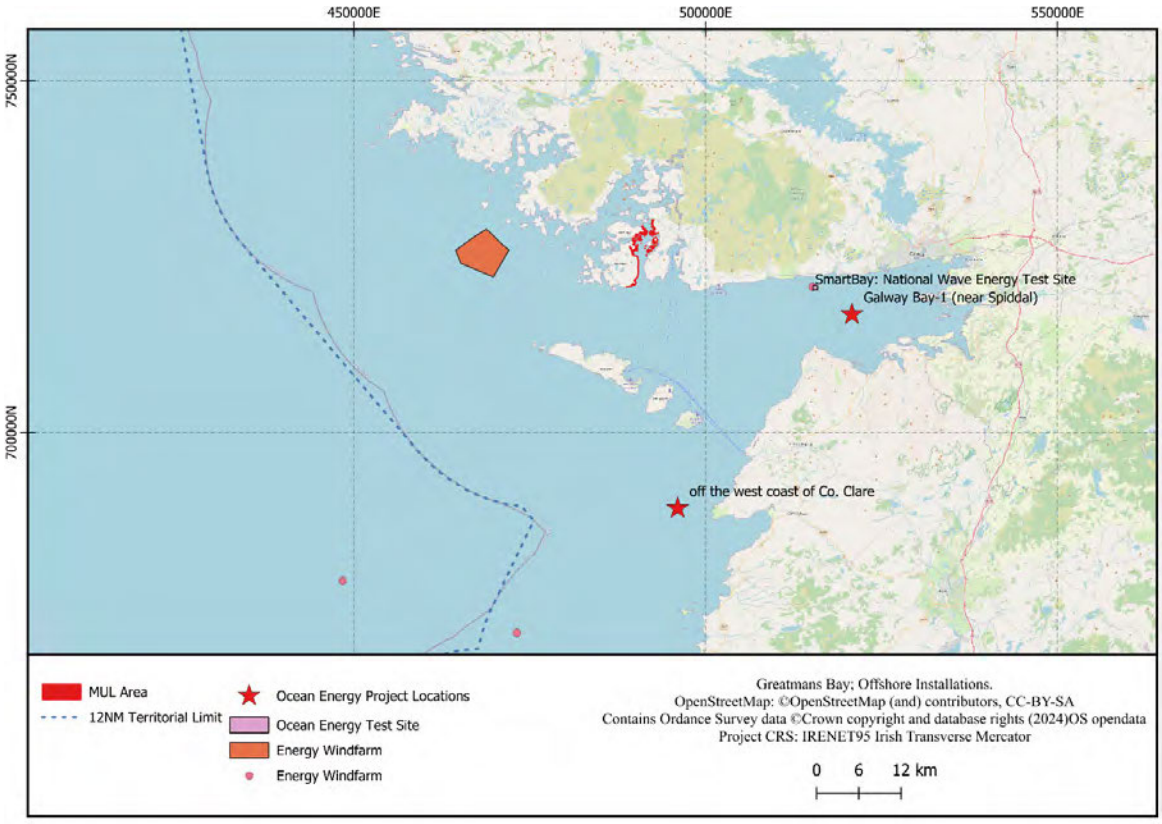

Figure 29 - Proposed MUL area in relation to offshore installations (ocean energy and windfarm installations)

Beyond Ireland's territorial seas, several entities, including CNOOC Petroleum Europe, Europa Oil & Gas, Predator Oil & Gas, and Vermillion E&P, operate in offshore areas. However, these are located at distances too great to warrant concern for any impact from harvesting activities. Similarly, active boreholes are situated beyond Irish territorial boundaries and are thus not relevant to this assessment (Figures 30 and 31).

The limited scale of harvesting activities, combined with their low frequency and lack of interaction with the seabed, ensures negligible impact on critical infrastructure assets in the MUL area. Given the minimal nature of operations and the lack of critical infrastructure in proximity, the proposed sustainable seaweed harvesting is expected to have no significant impact on material assets.

In summary, the nature and scale of the proposed activities, combined with careful planning and adherence to operational zones, result in no significant impact on material assets in the MUL area, even without additional mitigation measures.

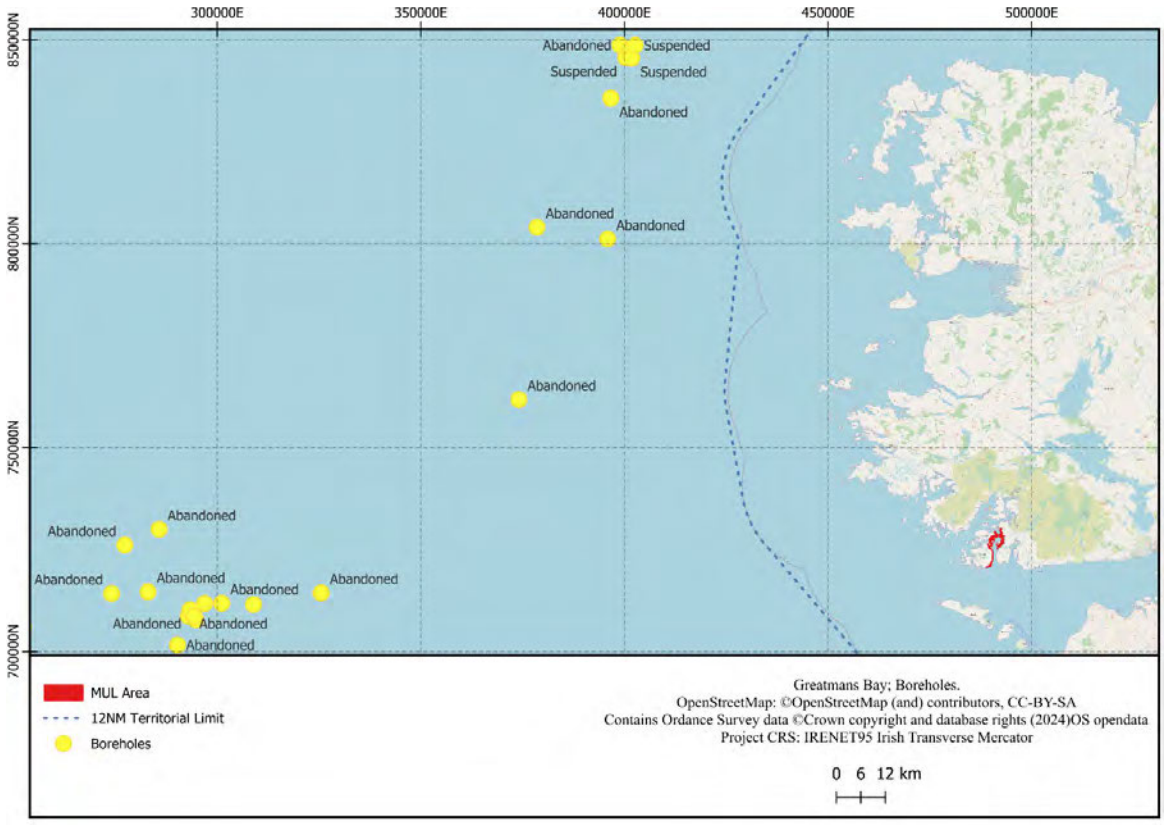

Figure 30 - Arramara Teo proposed MUL area in relation to offshore installations (boreholes)

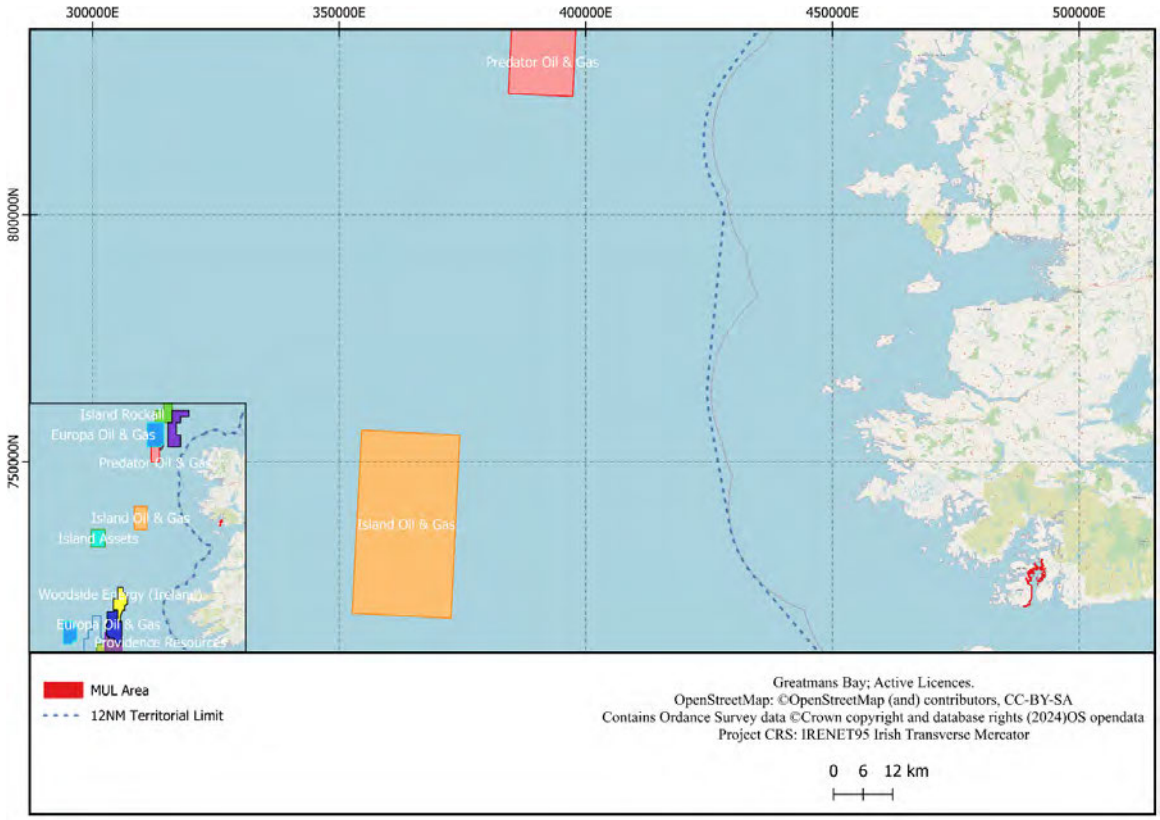

Figure 31 - Arramara Teo proposed MUL area in relation to active licenses.

Mitigation Measures:

None required.

21. Other Developments/Cumulative Impacts

Several datasets were used to determine the potential for in combination/cumulative impacts of seaweed harvesting on proposed developments. See Section 4.7 in accompanying SISAA reports for details.

22. Assessment of Environmental Impacts

Questions to be Considered	Yes / No /? Briefly Describe	Is this likely to result in a significant impact? Yes / No /? – Why?
Brief Project Description: Sustainable seaweed harvesting from the rocky intertidal of south Connemara		
1. Will construction, operation, decommissioning or demolition works of the Project involve actions that will cause physical changes in the locality (topography, land use, changes in waterbodies, etc.)?	**No**	No, harvesting of seaweed, by its nature, does not impact physical characteristics of the sites.
2. Will construction or the operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or are in short supply?	**No**	No, harvesting *Ascophyllum* and *Fucus* is a sustainable practice, and the harvest period allows full regrowth of the targeted species.
3. Will the Project involve the use, storage, transport, handling or production of substances or materials which could be harmful to human health, to the environment or raise concerns about actual or perceived risks to human health?	**No**	No, there will be no storing, handling or production of harmful substances.
4. Will the Project produce solid wastes during construction or, operation, or decommissioning?	**No**	No, the harvest of seaweed does not produce any solid waste
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air or lead to exceeding Ambient Air Quality standards in Directives 2008/50/EC and 2004/107/EC)?	**No**	No, the harvesting of seaweed does not involve the release of any hazardous, toxic or noxious substances into the air.
6. Will the Project cause noise and vibration or the releasing of light, heat energy or electromagnetic radiation?	**Yes**	No, outboard motors on the small skiffs produce limited noise while transiting to and from seaweed beds. The noise is localised, having a short duration and below ambient noise levels. No vibration, light, heat energy or electromagnetic radiation is produced.

Table 4 - Summary of Relevant Characteristics of the AIMU Report / Screening of Significant Effects on the Environment

Questions to be Considered	Yes / No /? Briefly Describe	Is this likely to result in a significant impact? Yes / No /? – Why?
7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal waters or the sea?	**Yes**	There is a very small risk of contamination to coastal waters due to using outboard motors during transit to seaweed harvesting beds. To minimise this potential risk of contamination, all Arramara Teo harvesting boats follow standard vessel operating procedures and precautions, along with required maritime regulations like the MARPOL Convention on Marine Pollution, which will ensure that the likelihood of an accidental discharge of harmful substances such as fuels remains minimal.
8. Will there be any risk of accidents during construction or operation of the Project that could affect human health or the environment?	**Yes**	Harvesting seaweed occurs on the rocky intertidal and involves harvesters working on shore (on foot) or on small boats. There will always be a risk potential when working in these environments. However, specific procedures (training and safety equipment) are in place to minimise the risk. To date, there have been no accidents concerning the harvesting of seaweed by harvesters supplying Arramara Teo due to these implemented procedures.
9. Will the Project result in environmentally related social changes, for example, in demography, traditional lifestyles, employment?	**No**	Seaweed harvesting is a traditional practice in the rural west of Ireland and plays a crucial role in employment in these areas.
10. Are there any other factors that should be considered such as consequential development which could lead to environmental impacts or the potential for cumulative impacts with other existing or planned activities in the locality?	**No**	No cumulative impacts are likely to occur from the sustainable harvesting of seaweed.

Table 4 (cont'd) - Summary of Relevant Characteristics of the AIMU Report /Screening of Significant Effects on the Environment

Questions to be Considered	Yes / No /? Briefly Describe	Is this likely to result in a significant impact? Yes / No /? – Why?
11. Is the project located within or close to any areas which are protected under international, EU, or national or local legislation for their ecological, landscape, cultural or other value, which could be affected by the Project?	**Yes**	See the SISAA report for further details. The harvesting areas overlap several important SACs and SPAs in the west of Ireland. However, the impact on sensitive species and habitats is considered low, and where applicable, mitigation measures will be implemented to ensure no negative impacts to these sensitive areas.
12. Are there any other areas on or around the location that are important or sensitive for reasons of their ecology, e.g. wetlands, watercourses or other waterbodies, the coastal zone, mountains, forests or woodlands, that could be affected by the Project?	**No**	See the SISAA report for further details. The harvesting will not negatively impact important marine habitats. Sustainable seaweed harvesting practices are implemented to ensure limited impact on the coastal zones.
13. Are there any areas on or around the location that are used by protected, important or sensitive species of fauna or flora, e.g. for breeding, nesting, foraging, resting, overwintering, or migration, which could be affected by the Project?	**Yes**	See the SISAA report for further details. The harvesting will not negatively impact important marine habitats. Mitigation measures (such as buffer zones) are implemented out of an abundance of caution.
14. Are there any inland, coastal, marine or underground waters (or features of the marine environment) on or around the location that could be affected by the Project?	**No**	The harvest of *Ascophyllum* and *Fucus* occurs on the rocky intertidal and does not interfere with any marine features or impact on water.
15. Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the Project?	**No**	Seaweed harvesting will not negatively impact areas of high landscape or scenic value.
16. Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the Project?	**Yes**	Arramara Teo harvesters will utilise existing public infrastructure (piers and slipways). There is only a minimal impact on others who also use this infrastructure due to these facilities' short duration and infrequent use.

Table 4 (cont'd) - Summary of Relevant Characteristics of the AIMU Report /Screening of Significant Effects on the Environment

Questions to be Considered	Yes / No /? Briefly Describe	Is this likely to result in a significant impact? Yes / No /? – Why?
17. Are there any transport routes on or around the location that are susceptible to congestion or that cause environmental problems which could be affected by the Project?	**No**	The harvesting occurs in extremely rural parts of south Connemara and considering the low frequency of transport used by harvesters supplying Arramara Teo, it does not impact transport routes or increase congestion.
18. Is the Project in a location in which it is likely to be highly visible to many people?	**No**	The harvesting occurs in extremely rural parts of south Connemara and is not proximate to any densely populated area. Individual harvesters working on isolated shorelines are hardly noticeable.
19. Are there any areas or features of historic or cultural importance on or around the location that could be affected by the Project?	**No**	No features are present within the intertidal zone where seaweed harvesting takes place.
20. Is the Project located in a previously undeveloped area where there will be loss of greenfield land?	**No**	The sustainable harvesting of seaweed occurs on the rocky intertidal, away from terrestrial environs.
21. Are there existing land uses within or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying that could be affected by the Project?	**No**	No existing land uses exist in the vicinity of the proposed harvesting, which would be affected by seaweed harvesting.
22. Are there any plans for future land uses within or around the location that could be affected by the Project?	**No**	There are no plans for land use near the MUL area that could be impacted by seaweed harvesting.
23. Are there areas within or around the location which are densely populated or built-up, that could be affected by the Project?	**No**	The MUL area is in extremely rural, low population-density areas in south Connemara.
24. Are there any areas within or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, that could be affected by the Project?	**No**	There are no sensitive areas in the vicinity of the proposed seaweed harvesting.

Table 4 (cont'd) - Summary of Relevant Characteristics of the AIMU Report /Screening of Significant Effects on the Environment

Questions to be Considered	Yes / No /? Briefly Describe	Is this likely to result in a significant impact? Yes / No /? – Why?
25. Are there any areas within or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, that could be affected by the Project?	**No**	The target species is a perennially growing seaweed, which recovers following sustainable harvesting. There is no impact on local aquaculture or fisheries. Out of an abundance of caution, a 200 m buffer is placed around all existing aquaculture installations.
26. Are there any areas within or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, that could be affected by the Project?	**No**	The MUL area is considered to have low pollution levels.
27. Is the Project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the Project to present environmental problems?	**No**	The MUL area has no history of environmental damage from landslides, tsunamis, earthquakes, erosion or adverse climatic conditions.

Table 4 (cont'd) - Summary of Relevant Characteristics of the AIMU Report /Screening of Significant Effects on the Environment

23. Summary of Mitigations

Chapter	Potential effect
Land & Soils	The seaweed harvesting occurs on the rocky intertidal, away from the terrestrial environment. The project will not significantly impact Land & Soils, and **no mitigation measures** are necessary.
Water	Harvesting seaweed does not impact water quality. **No mitigation measures** are necessary.
Biodiversity	See further detail in the accompanying SISAA report. The seaweed harvesting occurs within and adjacent to several environmentally sensitive European Sites. There may be potential for disturbance of marine mammals (noise) and foraging birds (disturbance by harvesters). **Mitigation measures** will be implemented, including buffer. Following mitigation measures, no likely significant impact on biodiversity is foreseen.
Fisheries & Aquaculture	The sustainable harvesting of seaweed significantly impacts neither Fisheries nor Aquaculture installations. Taking a cautious approach, **mitigation measures** such as implemented buffer zones around aquaculture installations ensure no significant impacts on fisheries and aquaculture.
Air Quality	The sustainable harvesting of seaweeds does not impact air quality. **No mitigation measures** are necessary.
Noise & Vibration	There exists a potential for disturbance to marine mammals from the noise of boat motors. Implemented **mitigation measures** include only using motors when in transit and keeping a buffer zone around seal haul-out sites. Following these measures, there is no potential for significant impact from Noise & Vibration.
Landscape / Seascape	The sustainable harvesting of seaweed does not impact the Landscape / Seascape. **No mitigation measures** are necessary.

Table 5 - Potential Effects Chapter Summary Table.

Chapter	Potential effect
Traffic & Transport	The harvesting occurs in the extremely rural west of Ireland, away from busy transport hubs. Furthermore, marine traffic in the area is low. No likely significant impacts result from the harvesting of seaweed. **No mitigation measures** are necessary.
Cultural Heritage	Seaweed harvesting occurs on the rocky intertidal, which is considerably distant from any important cultural heritage sites and does not impact Cultural Heritage. **No mitigation measures** are necessary.
Population & Human Health	Harvesting seaweed has no significant likely negative impacts on Population & Human Health. **No mitigation measures** are necessary.
Major Accidents & Disasters	Arramara Teo will implement standard safety protocols for all its harvesters, and negative impacts are unlikely. **No mitigation measures** are necessary.
Climate	No significant negative climatic impacts are foreseen from the sustainable harvesting of seaweed. **No mitigation measures** are necessary.
Waste	No waste products are produced from seaweed harvesting, and no significant impacts occur due to the activity. **No mitigation measures** are necessary.
Material Assets	No significant likely impacts to Material Assets are foreseen from the seaweed harvest. **No mitigation measures** are necessary.

Table 5 (cont'd) - Potential Effects Chapter Summary Table.

24. Consideration and Reasoned Conclusions:

- Environmental Impact Assessment Directive
- Water Framework Directive
- Marine Strategy Framework Directive

Statement of Consistency with the Environmental Impact Assessment Directive

The proposed sustainable seaweed harvesting in the MUL area is not classified as a project requiring a mandatory Environmental Impact Assessment (EIA). While certain projects fall under mandatory EIA categories as defined by the EU Environmental Impact Assessment Directive (2011/92/EU, as amended by 2014/52/EU), projects that do not meet these thresholds may still necessitate an EIA if they are likely to result in significant environmental impacts. However, based on the scale, nature, and designated location of this harvesting activity (the rocky intertidal zone) and considering the inclusion of mitigation measures, significant environmental impacts are not anticipated.

In an Irish context, the Planning and Development Act 2000, along with the Planning and Development Regulations 2001, sets the statutory framework for EIA requirements, complemented by the Foreshore Act 1933 (as amended by S.I. No. 544 of 2014) for maritime projects. Schedule 5, Parts 1 and 2 of the Planning Regulations, details the project classes necessitating EIA. The proposed seaweed harvesting does not fall within the project categories listed in Annex I or Annex II of the EIA Directive, nor does it correspond to developments specified in Schedule 5, thereby not meeting the criteria for mandatory EIA.

A comprehensive screening assessment of the proposed activity further corroborates that an EIA is not required, as the nature and scope of the project are unlikely to yield significant environmental effects. The harvesting operation is small-scale, occurring in predefined sectors within designated bays, with operations limited to levels well below the thresholds of concern stipulated in the Directive. Moreover, the activity does not involve any extensive infrastructural development, as access to sites is facilitated by existing road networks, piers, and slipways. Employing sustainable harvesting practices, whether by boat and rake or by hand, the project ensures minimal environmental impact, further substantiating the conclusion that a full EIA is unnecessary.

This conclusion aligns with a review of applicable legislation and a thorough consideration of the environmental context and impact potential of the proposed activity. Overall, the sustainable seaweed harvesting project is consistent with the objectives of the EIA Directive, demonstrating a commitment to environmental stewardship without necessitating a full EIA process.

Statement of Consistency with the Water Framework Directive

The Water Framework Directive (WFD), as established in Article 4, aims to protect, enhance, and restore all water bodies, ensuring they achieve "good ecological and chemical status" (GES) while preventing any deterioration. Arramara Teo's proposed seaweed harvesting activity aligns with these objectives, with an assessment indicating no significant adverse effects on local water bodies.

The proposed harvesting operations are restricted to rocky intertidal zones, avoiding direct interference with inland, transitional, or coastal waters that fall under the WFD. No pollutants, chemicals, or harmful substances will be released into the environment, as all vessels involved adhere to International Convention for the Prevention of Pollution from Ships (MARPOL) standards, effectively minimising the risk of spills or contamination. Additionally, no refuelling of vessels takes place on the foreshore, further safeguarding water quality.

While temporary and minimal sediment mobilisation may occur, this effect is both localised and short-lived, ensuring no sustained impact on water quality. These conditions fulfil WFD objectives by maintaining the status of water quality and preventing any deterioration due to the proposed seaweed harvesting.

In conclusion, the AIMU report affirms that the sustainable seaweed harvesting project proposed by Arramara Teo is consistent with the objectives of the WFD. The proposed activities are not anticipated to compromise the chemical or ecological status of local water bodies and will support the continued attainment of good water quality status in the region.

Statement of Consistency with the MSFD Directive

The Marine Strategy Framework Directive (MSFD) sets forth an ecosystem-based approach to managing human activities in the marine environment, aiming to protect, preserve, and ensure the sustainable use of marine resources across EU waters. Under the MSFD, Member States like Ireland are tasked with defining and monitoring the characteristics of a clean, healthy, and productive marine ecosystem, ensuring they meet the criteria for achieving Good Environmental Status (GES). Key areas of focus include biodiversity conservation, the health of fish populations, control of eutrophication, and the integrity of the seafloor.

Arramara Teo's proposed seaweed harvesting activities align with the objectives of the MSFD by implementing sustainable, low-impact practices that minimise disturbances to marine ecosystems. The harvesting operations are confined to rocky intertidal zones, specifically avoiding habitats critical to marine biodiversity, such as spawning sites and other sensitive areas identified through MSFD-mandated habitat mapping (Table 6). The temporary, small-scale nature of these activities ensures that there are no long-lasting impacts on seabed integrity or water quality, thereby eliminating any need for extensive discussions on construction, operational, or decommissioning phases.

The sustainable harvesting methods applied in this project do not contribute to any degradation of marine habitats or ecosystems. By following best environmental practices and operational protocols, the project supports Ireland's commitment to maintaining and enhancing GES, in line with the goals and standards set by the MSFD.

MSFD Description	Assessment for Seaweed Harvesting	Impact	Mitigation
Descriptor 1: Biodiversity	The rocky intertidal areas of south Connemara are rich in biodiversity. Harvesting may impact local species, but due to the scale, it will be minimal.	Minimal disturbance expected	Sustainable harvesting techniques/plans ensure minimal impact on biodiversity. Buffer zones around seal haul-out sites are in place.
Descriptor 2: Non-Indigenous Species	There is no introduction of non-native species associated with seaweed harvesting in this region.	No introduction of invasive species	None required.
Descriptor 3: Commercial Fish & Shellfish	Harvesting occurs in areas with commercial fish populations, but activities do not impact breeding, nursery, or fishing areas.	No significant impact on fisheries	A 200 m buffer zone around Aquaculture installations.
Descriptor 4: Marine Food Webs	Harvesting seaweed, an important habitat-forming species, could affect the local food webs.	Minor disruption expected	Ensure a strict sustainable harvest limit of 20% is implemented to protect Marine Food Webs.
Descriptor 5: Eutrophication	Seaweed harvesting does not contribute to nutrient enrichment.	Potential positive contribution	None required.
Descriptor 6: Seafloor Integrity	Limited to intertidal zones, so impacts on the seafloor are minimal.	No significant impact on seafloor integrity	None required.
Descriptor 7: Hydrographical Conditions	The scale of seaweed harvesting is small and does not alter hydrographical conditions.	No impact	None required.
Descriptor 8: Contaminants	No release of contaminants is expected during seaweed harvesting.	No impact	Compliance with best practices for fuel and chemical management.
Descriptor 9: Contaminants in Seafood	Seaweed harvested from the clean waters of south Connemara is unlikely to accumulate harmful contaminants.	No impact	Regularly monitor water quality and WFD status to ensure safety.
Descriptor 10: Marine Litter	Harvesting does not introduce litter, and Arramara Teo complies with strict waste management practices.	No impact	Implement strict waste management protocols.
Descriptor 11: Underwater Noise	Noise generated from small vessels (e.g., 30 HP outboards) during harvesting may cause temporary disturbance to marine mammals.	Minor, localised disturbance	Motors are turned off (idle) during the harvest and only in operation when moving to and returning from seaweed beds. A 200m Buffer will be placed around known seal haul-out sites.

Table 6 - Analysis of MFSD descriptors.

Statement of Consistency with the National Marine Planning Framework (NMPF)

The National Marine Planning Framework (NMPF) establishes a strategic, plan-led approach for managing Ireland's marine activities, prioritising the protection of marine biodiversity and ecosystem health while enabling sustainable resource use. The NMPF supports sustainable marine development in line with Ireland's climate action commitments, aiming to balance economic growth with environmental stewardship.

Arramara Teo's proposed area-based management plan for the sustainable harvesting of *Ascophyllum* and *Fucus* aligns well with NMPF objectives. By focusing on low-impact, sustainable harvesting methods, this project contributes to the economic vitality and cultural heritage of coastal communities, addressing a key priority of the NMPF. The ecosystem-based approach to seaweed harvesting ensures minimal environmental impact, with protections in place to preserve water quality, marine habitats, and local biodiversity, including in Marine Protected Areas and Natura 2000 sites (refer to SISAA for additional details).

In accordance with NMPF guidelines, targeted mitigation measures will be applied where necessary (see Table 6) to prevent potential environmental degradation, thereby supporting a responsible, sustainable approach to marine resource management. This project's commitment to sustainable harvesting practices aligns directly with NMPF's overarching goals of ecological integrity and socio-economic sustainability.

25. Conclusion

Following a comprehensive assessment of potential impacts on the receiving environment—including water quality, biodiversity, marine mammals, fisheries, and cultural heritage—it has been concluded that the proposed seaweed harvesting project poses no significant environmental risks. The activities are temporary, low-impact, and conducted under a sustainable management framework, ensuring no long-term alterations to marine ecosystems or hydrological processes.

The project does not meet the thresholds for a mandatory Environmental Impact Assessment (EIA) under the EU EIA Directive or Ireland's Planning and Development Regulations 2001 (as amended). A screening exercise has confirmed that an EIA is unnecessary due to the specific characteristics of the harvesting activities, including their limited scale, exclusive location in the rocky intertidal zone, and non-intrusive operational methods.

To ensure compliance with key environmental objectives, such as those outlined in the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD), a Natura Impact Statement (NIS) will be prepared if required. The NIS will provide a detailed framework for mitigation measures to address any residual risks and safeguard the ecological integrity of protected sites.

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