GLENELG SEA FOREST SEAWEED FARM:

NOSTIE BANK, LOCH ALSH

APPENDIX 2:

IMPACTS & PROPOSED MITIGATIONS

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Contents

1 Introduction

This document aims to detail the proposed site location in relation to being within and adjacent to designated sites; and the impact, if any, that the farm will have on these designated sites, along with proposed mitigations.

2 Designated Sites

2.1 Special Area of Conservation (SAC)

a) Lochs Duich, Long and Alsh SAC Reefs

The Nostie Bank development site lies within the Lochs Duich, Long and Alsh Reefs SAC for Rocky Reefs (Fig.1), however Glenelg Sea Forest (GSF) consider that the proposed site location is not likely to have any significant effect on protected reef features, due to the distance away from shore. Furthermore, any potential risk to seabed habitat disruption will be mitigated by the selection of environmentally sensitive, low impact mooring equipment.

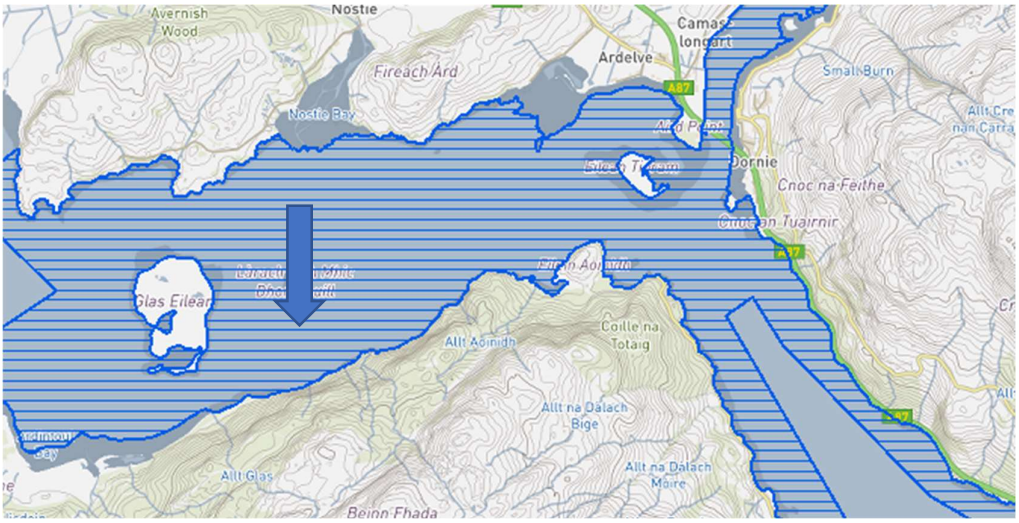

Figure 1 : Map of the site in relation to the Inner Hebrides and Minches SAC. Source NatureScot

b) Inner Hebrides and the Minches SAC for Harbour Porpoise

The site lies adjacent to the Inner Hebrides and Minches SAC, which is designated for protection of harbour porpoise (Fig.2), and is a very large SAC spanning the west coast of Scotland. Considerations by GSF:

- GSF have reviewed the literature and can find no evidence of cetaceans being caught up in finfish, mussel or seaweed farms. Consideration has also been given to the work done by the Scottish Entanglement Alliance, www.scottishentanglement.org in raising awareness of risks to marine mammals from fishing gear. As the seaweed farm will be deployed using mooring lines that are under tension there is considered to be no risk of entanglement posed by the farm.
- The operation of the seaweed farm does not utilise any feed, fertilizer, or chemical or pesticide inputs; or seal scarer (ultrasonic or sound) devices.

GSF will of course remain vigilant to the welfare of these and other sea mammals that are in the area.

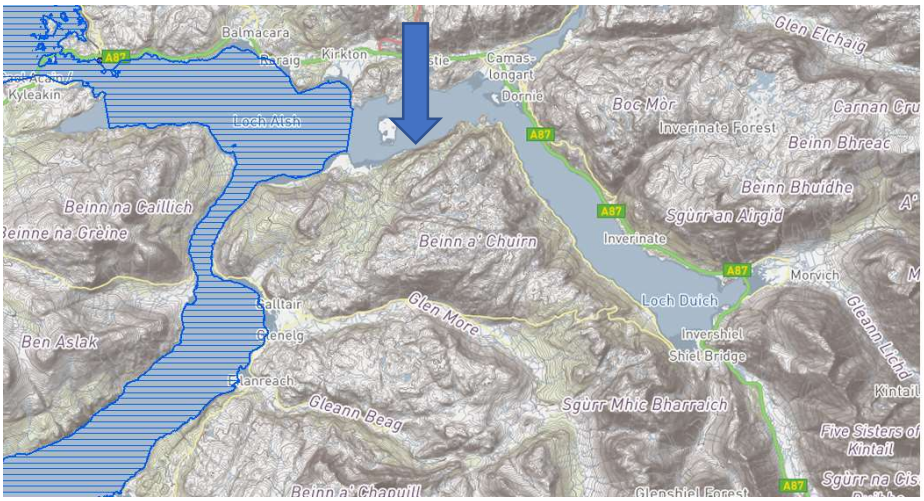

Figure 2 : Map of the site in relation to the Inner Hebrides and Minches SAC. Source NatureScot

2.2 Marine Protected Area (MPA)

The farm site lies within the Lochs Duich, Long and Alsh Nature Conservation MPA (Fig.3), with the following protected features: flame shell beds and burrowed mud. Fig.3, and extract from Nature Scot, indicates the known distribution of protected species in the Loch Alsh MPA. There are no conflicts between these protected features and the intended location of the GSF site.

Notwithstanding the above, GSF is aware of and respects the importance of protecting these complex marine features. In mitigation, they will ensure that the installation, and final placement of the seaweed farm and anchors are completed to prevent any damage to features at the site.

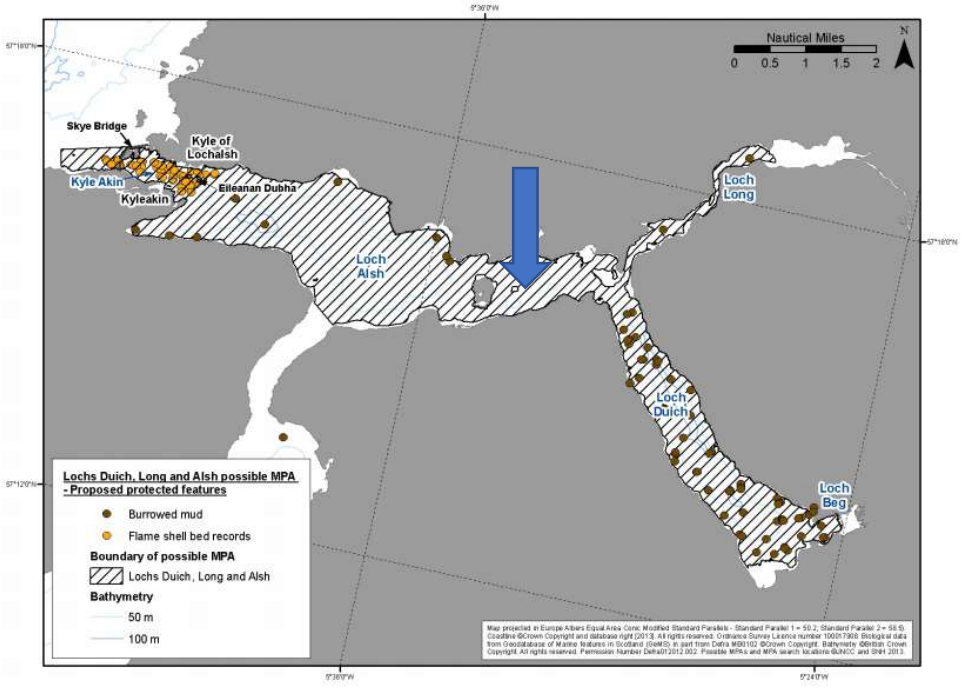

Figure 3: Map of the Lochs Duich, Long and Alsh MPA showing the known distribution of proposed protected features. Source: NatureScot, https://sitelink.nature.scot/site/10416#overview

2.3 Further Assessments

Further assessment of the potential impacts and proposed mitigations are presented below.

a) Benthic Shading

Benthic shading is not well documented or understood in European waters. It is a significant issue intropical latitudes where red seaweeds are grown in very shallow water <2.0m. The intensity of this type of seaweed cultivation can cause significant benthic shading but this is not a concern for cultivation of brown kelps in Scotland.

The Seaweed farm will be sited off from the coast to ensure they do not interact with the Rocky Reefs in the area, both in the SAC for their protection and at the other proposed sites outwith the SAC. This will prevent any shading damage to the wild seaweed forests and the communities they support in these habitats.

Indicative calculations to show the worst case scenario of shading under the seaweed farm that the plants could create as they grow are outlined below.

Assumptions:

- Water clarity is 100% clear and there is no turbidity.
- The lines and floats provide a negligible level of shading.
- The sun's azimuth (midday) at this latitude moves from Sep 40°, Dec 15°, Mar 40°, Jun 60°. But we will assume overhead sun (which it never is); and that the plants will stand out at 90° from the lines (which they never will).
- Even at maximum density, brown kelp plants do not create blanket coverage of the water (coverage est 50% max), nor do they block all available light (shading est 50% max).

Indicative Calculations:

- Assuming seeded lines will be 50m long and 2m apart = 100m^2 of area either side of a line, thus coverage % = plant growth x 50m x 100 x 0.5, shading% = coverage x 0.5
- Seeded lines are placed in the water in Nov, plant length 0cm = 0% coverage = 0% shading
- Growth by end Dec <10cm = 2.5% coverage = 1.25% shading.
- Growth by end Jan <25cm = 6.25% coverage = 3.13% shading.
- Growth by end Feb <50cm = 12.5% coverage = 6.25% shading.
- Growth by end Mar <75cm = 18.8% coverage = 9.4% shading.
- Growth by end Apr <100cm = 25% coverage = 12.5% shading.
- Growth by end May <125cm = 31.25% coverage = 15.63% shading.
- Growth by end Jun <10cm (harvested) = 2.5% coverage = 1.25% shading.
- Growth by end Jul <50cm (regrowth) = 12.5% coverage = 6.25% shading.
- Growth by end Aug <10cm (coppiced) = 2.5% coverage = 1.25% shading.
- Plants naturally stop growing and produce sporophylls (fruiting bodies).

With these assumptions it is estimated that the maximum shading around the end of May, after which harvesting will reduce the plant lengths. The conservatively high figure of ~15% shading at this point should pose no lasting detrimental effect to the benthic communities of the seafloor, 20m to 30m below the seaweed cultivation lines.

The vast volume of water that moves through any given spot in Loch Alsh will make any effects from shading on the water column negligible.

b) Deposition of Accumulations of Seaweed Fragments

Brown kelp plants are robust and at point of harvest almost all plants still have their narrow pointed tips. It is thus concluded, that there is a negligible loss of plant material over the growing season. Photographic evidence of intact plants at harvest has been gathered and reviewed over the last 2 years of seaweed farming operations.

2020 harvesting operation third party data, where 600 kg (wet weight) of Alaria was cut on a regular basis, the offcuts and discards from the operation were swept up and estimated to be less than 3kg (wet weight) of plant material. This equates to ~0.5% of waste of harvest weight. We offer that this is a negligible amount of plant material to drift into the wider system and rot away as vast amounts of other wild seaweeds do.

A process for the disposal of fouled, harvested material will be developed for the disposal of seaweeds that fail our strict quality control procedure during our factory processing. If necessary a suitable license will be sought to give consent for the seaweed to be disposed on land as agricultural composting.

c) Enhanced Sedimentation

As with the issue of benthic shading, the risk of enhanced sedimentation due to alterations in water flow and the potential for physical impacts to arise as a result of the placement of moorings, has received an undue amount of attention. The sites for these seaweed reefs are deliberately chosen for their active nature, both in current and wave exposure. Given the relative mass of the lines and supports of the seaweed reefs and the natural hydrodynamic nature of the brown kelps we intend to grow, there should be no alteration to the water flow at the GSF sites. It should be noted that the scale of cultivation that would be necessary to have any meaningful impact on sediment carrying capacity are of an order of magnitude not seen outside of Asia. As the seaweed cultivation process does not require any inputs of feed or chemical to sustain or nurture the plants, we do not foresee our activities to add to the sedimentation of the area.

d) Operations Required for Site Establishment and Maintenance

This is an area for speculation, but worst case scenarios have been considered:

- The establishment of the farm is estimated to be no more than 1 (working) week of boat time on station.
- Deployment of seaweed lines is estimated to be no more than 2 (working) weeks of boat time on station.
- Harvesting of the lines is estimated to be no more than 4 (working) weeks of boat time on station.
- Plant husbandry, monitoring and sampling will be done regularly by rib or small craft, estimated at fortnightly.
- Maintenance of the farm infrastructure will be contracted to a specialist company, and will not require divers and support vessel. It will likely be bi-annual, a day each time for each farm.
- The level at which more mature plants will require husbandry over time is unknown but will depend upon the farming practices employed such as coppicing or partial cutting.

The Seaweed farm will be sited away from the shoreline and the Rocky Reefs along it and as such the vessel movements during the phases above should pose no greater disturbance during construction of operational phases than any other vessel movement along this coast.

Consultations were undertaken with vessels using this route, including local fishermen and fish farmers, and the farm location altered to address their comments.

e) Seascape Visual Impact

GSF respects the duty of NatureScot (and other competent authorities e.g., SEPA) to be satisfied that a project will not have a 'likely significant effect" on a Natural Site (in this case an MPA).

It is of vital importance to GSF to limit the visual impact of the farm on residents and wider users of the locality (se and land); and great care has been taken in the farm design to achieve this. As the farm sits subsurface, the most obvious visible visual impact will be the special marks for the safety of marine navigation, required by Northern Lighthouse Board as they are at every aquaculture site in Scotland; and the mooring/ dropper line buoys.

The site chosen for the farm is not visible from the trunk road (Fig.4). It is remote and away from normal public view. Buoys will be very hard to see from any distance beyond 1km without binoculars or zoom cameras.

There are some houses along the opposite shoreline (Fig.5). The residents have been consulted as part of the pre application consultation (Appendix 6), and while it was raised, following the GSF response, no objections were received.

Figure 4: Photos of the view towards Nostie Bank, from A87 at Nostie.

Figure 5: Photo of the view towards Nostie Bank from the opposite shoreline.

f) Otters (EPS)

Though otters are seen in Loch Alsh, there appeared to be insufficient evidence regarding numbers and distribution.

Otters are European Protected Species (EPS) and as such have legal protection from harm, disturbance and habitat interference. Nothing in the development or operational phases of the Seaweed Farms will constitute a threat to the life of an otter. Nor will any part of our operation touch land to damage or destroy their holts or holes. What we must look at is whether our activities would constitute a disturbance to otter in their hunting or breeding patterns. The discussion on potential sources of disturbance can be split into 3 parts:

- **Development Phase Disturbance**

  SNH guidance suggests that "*If otters are known or suspected to be breeding, the exclusion zone should normally be at least 200m radius. However, it could be reduced to 100m depending on the nature of the works, topography and natural screening. For shelters, or holts where otters are not breeding, the boundary of the exclusion zone should be a minimum of 30m.*"

  These exclusions zones are nominally looking at physical changes to the land near otters. As the farm will be sited over 100m from the coastline, and will not physically touch or alter the holt or hole of any otter, it should satisfy the 100m rule. The most direct disturbance to the otters would be the presence of a surveyor conducting an survey on the shoreline.

  A male otter's territory can be huge, using 20 km of rivers and coastline to hunt and defend up to 3 females against intrusion by other males. The female otters form sub-territories within, in which they produce up to 3 cubs, usually in early summer. The mother will rarely leave them for the first 10 weeks from birth at which point the cubs will begin to become mobile. They will then follow their mother as she hunts and suckles the young. She will use

multiple holts and holes to dry off (otters don't like being wet!) and to sleep (which they do for more than half the day). They will nurture the cubs for a year up to 18 months to teach them to fish by catching and releasing live fish for the cubs to re-catch.

It is very difficult (without the aid of photo traps) to assess whether otter shelters or holts are being used by a breeding otter or not as females with cubs reduce sprainting to avoid detection. Indeed, it is a crime to do so, without appropriate licenses.

No works that are proposed will fall within the minimum 30m exclusion zone; with the minimum distance from the MHWS at all the sites is approximately 100m.

The installation of the farm occurring later in the year will coincide with any otter cubs becoming fully mobile.

- **Operational Phase Disturbance**

  All operations will take place in daylight. Deployment periods will be October to November. Harvesting periods will be in April through into May. The mainly nocturnal nature of otters will hopefully allow us to present no disturbance to feeding patterns.

- **Ongoing Presence and its effects**

  For the greater part, the farm will be left unattended by vessels. Outwith the operational phases (including all evenings, nights and weekends during the operational phases) little or no activity will take place over the months of June, July, August or September (aka the summer fallow period); and after the October/November deployment, the farm will be left unattended in December through to March (aka the winter slow growing period).

  A brief diurnal phase of otter feeding during the shortest days of the year will coincide with the winter slow growing period, where the Seaweed farm left mostly unattended save for occasional visits by rib to check condition of the Seaweed farm structure (a condition of consent) and to take samples of the seaweed for quality and growth monitoring. We will ensure we do not visit the sites near to dawn or dusk to prevent disturbance to otter feeding times during the hard winter months. Similarly, the summer fallow period will see the Seaweed farm left mostly unattended save for occasional visits by rib to check condition of the Seaweed farm structure (a condition of consent).

g) Breeding Birds

GSF have considered that the development and operation of the proposed farm may cause disturbance to priority bird.

It is unlikely that any priority bird species which breed in Scotland will nest in the areas where the farm is being sited. There are some areas nearby the proposed site that will be used as nesting sites for seabirds.

Wildlife & Countryside Act 1981 makes it illegal to intentionally or, in Scotland and Northern Ireland, recklessly injure or kill any wild bird or damage or destroy an active nest or its contents. The farms are located at least 100m away from the coastline nest sites, therefore none of the farm's operations will interfere with the nest sites

The law on disturbance of non-schedule 1 birds is not so clear.

The "Scottish Marine Wildlife Watching Code" and the "Guide to Best Practice for Watching Marine Wildlife", produced by NatureScot and described by them as "a concise code of conduct…

of broad Principles. On the coast, On the sea, and In the sea… this guidance applies equally to everyone". These state that no legislation provides an actual safe distance from breeding birds but does suggest between 50-150m, and up to 300m for very sensitive species.

The waters of Loch Alsh are regularly crossed by commercial and pleasure vessels of all sizes and power methods. With the ever increasing number of vessels and people who venture out on the water it is difficult to say where near Dornie the site can be considered isolated. Many seabirds are accustomed to the presence of humans and live in harmony with us.

The proposed farm will be sited away from the shoreline (est 100m) which will place them even further from shore nest sites of the breeding seabirds of the area.

The Wildlife and Countryside Act 1981 (as amended) also states in Bylaw 37 (3a+b) that there can be no restriction of passage of a vessel through a marine nature reserve (MPA).

Since the marked outer areas of the proposed farm will extend an area of exclusion to all shipping (except our vessels) to nearly 1km it could be argued that the farm existence will enhance the protection of nesting seabird colonies from disturbance from commercial and pleasure vessels for the greater part of the year.

3 Navigation

a) As with standard aquaculture practice recommended by Northern Lighthouse Board (NLB), the outer extent of the site shall be special marks comprising yellow buoys fitted with yellow crossed topmarks and lit with a flashing sequence. The position of the anchor points will not be marked in any way, to keep the visual impact of the site to an absolute minimum.

In designing the farm layout, the extent has been deliberately restricted in size to minimize impact on other marine users such as commercial and leisure vessels operating in or transiting through the area.

b) As part of the submission, Appendix 6(a), provides information on the recent dialogue with the Maritime and Coastguard Agency (MCA). A Navigation Risk Assessment requires to be submitted to them for acceptance. This is currently being prepared and will be submitted as Appendix 7.