



**GLENELG SEA FOREST SEAWEED FARM:
AIRD A MHILL, LOCH ALSH**

**APPENDIX 1:
PROJECT INFORMATION &
SCHEDULE OF WORK**

REVISION A, 24-MARCH-2022

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1 Introduction

1.1 Overview

Glenelg Sea Forest Ltd (GSF), are applying to Marine Scotland for licenses to set light lines seeded with algae (various native, local species) on new, a new purpose built Seaweed Farm, at Aird A Mhill, Loch Alsh.

It is the aim to have the necessary consents in place to put the first equipment in the water by Aug-2022; with deployment of lines to begin in Sep/Oct-2022, and Harvesting in Apr/May-2023. MS-LOT will be informed via an FEP5 form as directed on all operations undertaken; and GSF will undertake regular monitoring of seaweed growth and duty of care over lines.

Securing the licence for this exciting new venture is fundamentally important to GSF; and their work to achieve this is detailed throughout the appendices, which demonstrate GSF's commitment to:

- sustainability, environmental stewardship and to the sensitivity of other stakeholders within the proposed operating environment.
- Scotland's National Marine Plan.
- engagement with identified stakeholders.

1.2 Farm Details and Installation

The farm at Aird a Mhill will be installed over a three year period:

- Stage 1 will comprise the installation of 4 individual longlines, 150m long, within one of the agreed grid footprints. The lines will be moored securely to the seabed; and these moorings will later form part of the wider grid system. Refer to Appendix 4 for Farm Layout.

For information as part of the marine licence application, but which will not be completed until a later stage of the project, stages 2 and 3 are set out below:

- Stage 2 will see the long line system converted to a grid, with the remaining 16-20 lines, set 6-8m apart; and the wider mooring system installed.
- Stage 3 will see the remaining 2 grids on the Aird A Mhill site installed, with 50m between grids.

A drawing showing an indicative plan and elevation of the proposals located in Appendix 4.

2 Site Details

2.1 Location of Farm

The Site location is defined as Aird a Mhill, Loch Alsh, Wester Ross, Highlands (Fig.1); supplementary information (marine chart) is documented in Fig.2.

Aird A Mhill, Appendix 1 – Project Information and Schedule of Work.

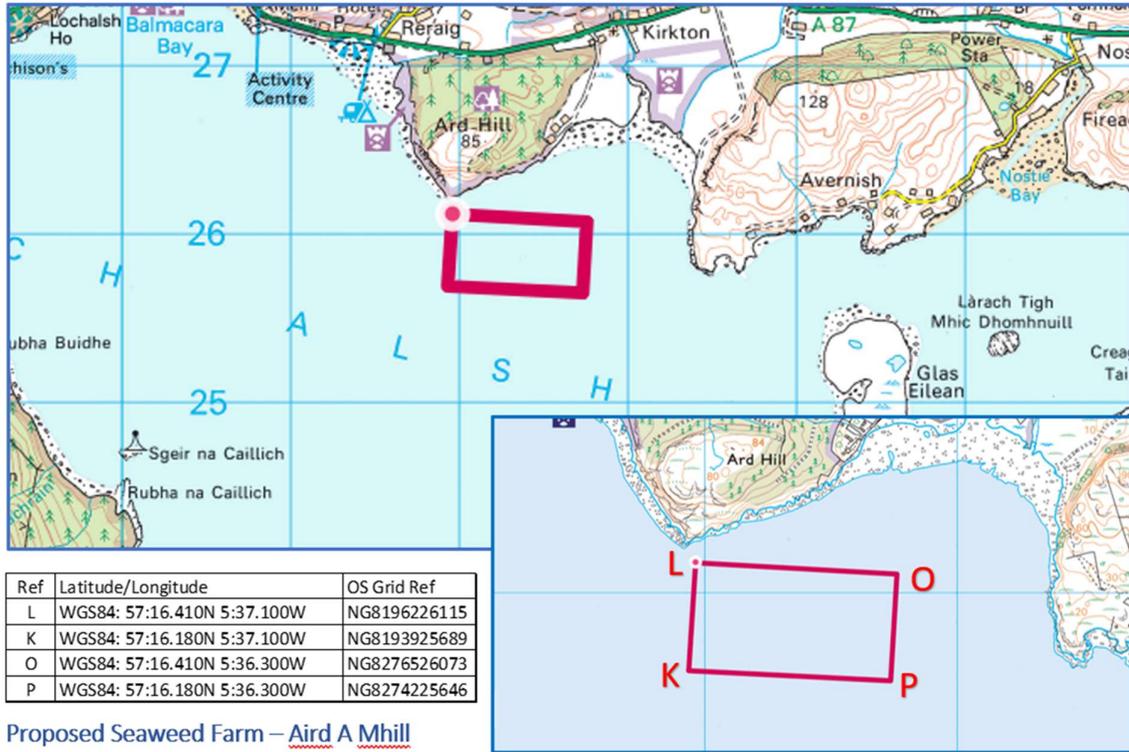


Figure 1: Aird A Mhill Seaweed Farm Location and Coordinates

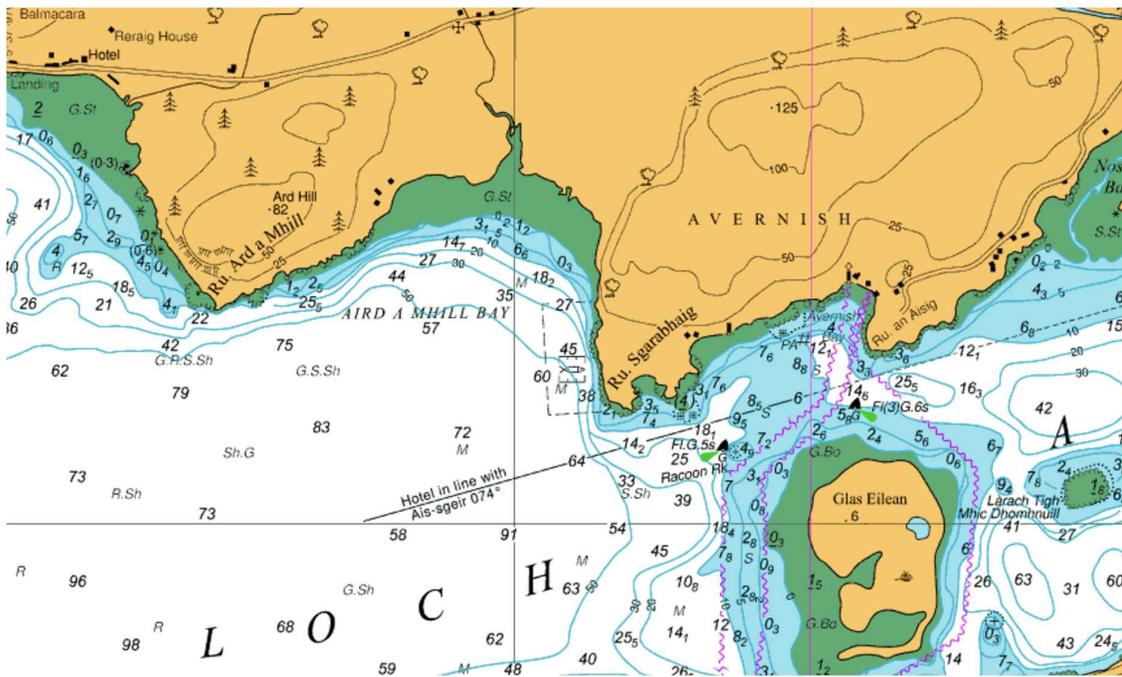


Figure 2: Marine Chart Extract, showing location of Aird A Mhill

3 Species, Seeding and Lines

3.1 Seaweed Species

GSF are applying for consent to cultivate several native Scottish seaweed species – *Alaria Esculenta* (Atlantic Wakame), *Saccharina Latissima* (Sugar Kelp), *Laminaria Digitata* (Oarweed). All these are found growing wild locally. Initially, the main target species are *Alaria Esculenta* and *Saccharina Latissima*. The details of the cultivation process described below is for *Alaria*, and this is also close to the process of the other species.

3.2 Seeding Process

Alaria is a brown kelp found on lower littoral and sub-littoral rocks exposed to strong wave action across Scotland's west coast.

The plant seeds into the water in late November through to early January, through fruiting bodies (sporophylls) that develop near the base of the plants. Seeded stock is cultured from locally-sourced reproductive material. The collection of fertile plants will comprise very small volumes (<1 wet kg), with no more than around 25% from any given patch on the seabed or on the shore. The small amounts collected are propagated in laboratory conditions into stocks of cells that can be held in stasis to suit operational needs. Around 1-2 months ahead of deployment, the cells are triggered to develop into microscopic plants that can be attached to growing media; typically thin twine wound round spools in 100m lengths. These spools are held under controlled conditions in aquaria until juvenile plants become visible (around 1- 2mm long), at which point they are out-planted onto growing rope on the seaweed farms. Partnership with commercial partners for cell culture and preparation of growing media is underway.

3.3 Line Deployment

Following on from installation of the mooring system and main lines; the culture (growth) lines will be deployed by small (>8m LOA) work vessels operated by local crew.

Narrow ropes (10mm or 12mm) are passed through the spools of *Alaria* string and the two fixed together.

These combined lines are strung out in either horizontal, vertical or zig-zag patterns (site- specific optimum growing patterns for Loch Alsh sites will be assessed on an ongoing basis) at depths between 0m and 3m initially, and 6m later on, below water level.

During stage 1 (trial, year 1) GSF intend to use an underwater longline structure based on a 150m length. Then in stages/ years 2 and 3, the moorings for these initial long lines will be incorporated as part of a grid system.

Deployment will be completed between mid-October and late November to give the juvenile plants time to establish on the lines before the darkest winter days shut down their growing. Growth should start to pick up again in late February as day length grows.

3.4 In-water Equipment

Both stages 1, 2 and 3 (long line; and grid system) will have no surface infrastructure such as cages; and will be secured in place by a mooring and anchor system. Only the cushion (outer) and dropper line (intermittent) buoys will be visible on the surface, as will appropriate special marks denoting the site outer limits.

All in-water equipment being deployed is removable.

4 Harvesting and Processing

4.1 Harvesting Process

The plants will grow rapidly through April into May. We would expect that 1.5kg/m to 4kg/m of line could be achieved between April and mid-May. Greater growth would be achieved if the lines are left into June and July, possibly 5kg, perhaps even 7kg per metre; but the seaweed begins to be heavily fouled by other seaweeds, crustaceans and slimes and the value as a crop reduces to zero. Regular monitoring will decide the optimum harvest periods.

Harvesting will use a simple roller frame with cutting heads that will trim the useable material of the plant into bins or boxes while leaving the rope and growing base of the plant intact. GSF are looking at other cultivation operations where these can be returned to the water and coppiced again to create a second crop, but this is dependent on the level of fouling.

4.2 Onward Processing

To keep the seaweed to the highest standard the product needs to be brought to shore and processed as soon as possible. The processing is essentially one of lowering the water content without excessive heat, similar to herb processing. This creates a stable, storable product that can be rehydrated as an ingredient.

Other species and small amounts of Alaria may be kept as a wet, fresh ingredient with shorter shelf life, but the bulk of seaweeds are expected to go through a drying process.

5 Future Work and Support

Seaweed cultivation requires no input other than sunlight, creates a clean new habitat whilst it grows and other than a week at deployment in October/November and a few weeks harvest in April/May; minimum potential disturbance to wildlife is taking place. GSF are confident that seaweed cultivation will be truly sustainable industry if allowed to begin.

Looking to the future work and how GSF will be able to expand, GSF:

- have local premises earmarked in the Highland region for drying seaweed and will in time need to develop a bespoke drying facility local to their growing sites to take on the increased volumes. A shore base, office and storage facilities, purpose-built deployment and harvesting vessels plus contracted equipment, staff and other consumables will be required to make this new venture into a success;
- are in contact with a community interest company that is being set up for the processing, for all the seaweed farms within the area; and
- are collaboratively working with KelpCrofting and GreenSeaSolutions to share vessels, processing plant and knowledge.

6 Potential Disturbance

6.1 Development Phase

The development phase at each site will last only a week. It will require a 10 to 20m vessel to install anchors into the seabed, 100m plus from the shoreline, creating a pre-laid mooring system. Cables will then be strung between the anchor lines and buoys attached.

6.2 Operational Phase

All operations will take place in daylight. Deployment periods will be August and October, and harvesting periods will be in April through into May. Visits to the site for sampling, monitoring and maintenance checks will be made with a small workboat.

6.3 Ongoing Presence

For the greater part, the seaweed farms in Loch Alsh 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 summer months, which are a fallow period. After the October/November deployment, the majority of the time the Loch Alsh farm will be left unattended in December through to March, which is the winter slow growing period. Visits to the farms site will be made during the winter months to check on the condition of the farm structure. Weather permitting, there will be preventative checks made prior to any storm events occurring and also post-storm checks on the farm structures and navigation marks.

Sampling of the seaweed for quality and growth monitoring will be undertaken whenever possible during farm visits.