

AnC Re-application - Method Statement

Version	Date	Description	Author(s)	Revised by
V3.0	19/09/2024	Final	Stevie Jarron	

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01 Introduction

Samudra Oceans Limited (Samudra) is a UK company (14470952), registered office - Shoreditch Exchange, Senna Building, Gorsuch Place, London, United Kingdom, E2 8JF. Argyll Aquaculture, who were authors of the original license have been asked to act as Agent for Samudra and write this Re-Application.

Samudra have acquired the Crown Estate Scotland Lease and taken ownership of the Marine Directorate license and the rights and responsibilities for the equipment for the Aird na Cuile seaweed cultivation Farm. A new MD license – 00010788 was issued to Samudra on 27/06/2024. This site was formerly owned by New Wave Foods under MS license - 06704/18/01. The existing MD license is due to expire on 01/10/2024.

The outer boundaries of the existing licensed area of Algal Farm site are laid out as:

56° 22.250' N	5° 32.000' W
56° 22.250' N	5° 32.200' W
26° 21.850' N	5° 32.600' W
56° 21.700' N	5° 32.750' W
56° 21.400' N	5° 32.650' W
56° 21.350' N	5° 32.200' W
56° 21.750' N	5° 32.200' W

The 3 Special Marks as recommended by Northern Lighthouse Board in the original application process, are Y Fl 5s (2m) and laid out in the existing license at points:

56° 22.250' N	5° 32.200' W
56° 21.700' N	5° 32.750' W
56° 21.400' N	5° 32.650' W

The License Re-application and associated documents contained and referred to in this submission provide the critical information required for Marine Directorate - Licensing Operations Team (MD-LOT) and other Statutory Consultees to ensure ongoing consent of this Marine Scotland licence can be granted before the 01/10/2024 expiry date.

This document "1 - AnC Re-application - Method Statement v3.0" details Samudra's commitment to adhere to best practice when considering other users of the environment, both human and wildlife alike. This also contains a "Decommissioning Plan".

The attachment, "2 - AnC Re-application - Seaweed Farm Application v3.0" & "2 - Algae farm Re-application - additional coordinates - Aird Na Cuile - Samudra v3.0" are the official application forms for MS-LOT. Further updates on anchoring systems will be detailed in future communication to Marine Directorate and Crown Estate Scotland through Attestation forms.



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Samudra's commitment to wildlife and environmental preservation and wellbeing can be found in the attachment "3 - AnC Re-application - Environmental Responsibilities v3.0" and "AnC Re-application - Vessel Management Plan", which also includes a Biosecurity Plan.

Samudra's commitment to "Scotland's National Marine Plan" and "Scotland's Seaweed Cultivation Policy" can be seen in attachment "4 - AnC Re-application - Scotland's Marine Planning considerations v3.0".

The document "5 - AnC Re-application - Navigational Risk Assessment and MEAC v3.0", gives the site description, risks involved and navigation buoys and lights marking the site. Also included is a Marine Emergency Action Card, in preparation for deployment of the equipment. At this point, contractors have not been finalised or dates of deployment set.

02 Previous plans and new plans

The former site owners New Wave Foods had planned (in 2018) to develop a scaled seaweed farm that consisted of 2 large grids (2 x 600m x 100m, consisting of 24 cells (50m x 50m), filling the site. These were based on the sub-surface structure similar to fish farming technology. The predicted growing line capacity for each of these 50m x 50m cells was 2.5km, giving a total line capability of 60km.

With advancements in seaweed farming knowledge and ideas a similar, but improved set of farm structures are proposed. This newer design was deployed by Argyll Aquaculture in 2021 for South West Mull and Iona Development (SWMID) at their Aird Fada site on Mull and has been operated safely and productively for 3 seasons now. These grids are more robust and safer in the farm site sea conditions. They are also easier and safer for operators to manoeuvre vessel to key areas of the farm structure for farm operations and maintenance. The newer designs allow for more flexibility in Growing line spacing than the original plans. This comes from experience of interaction between lines at the original proposed densities.

As part of the original seaweed farm licensing process New Wave Foods undertook early consultation with Nature Scot (then SNH), Crown Estate Scotland, Royal Yachting Association Scotland, Northern Lighthouse Board (on marine buoyage and lighting), local fishermen and their representative bodies over spacial needs, local residents on visual impacts and local marine business operators on impacts on their access and other activities. The recommended new structures will have the same low visual and a lower environmental impact than the original structures. We foresee no indication of risk of wildlife or other marine user interactions. The proposed new structures and all farming activity will still be undertaken wholly within the existing licensed area boundary.

In summary - The site chosen for the seaweed farm has provided good seaweed growth in previous harvest years. It is located off the main fishing grounds; is not a detriment to sensitive wildlife habitats, creates minimal visual impact to area; and is not a barrier to free movement of commercial or pleasure vessel traffic in and out of local harbours and anchorages.



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03 Seeding Process

Samudra intend to cultivate several native species. At this time, the three main seaweed cultivation species will be Atlantic wakame (*alaria esculenta*), Sugar Kelp (*saccharina latissima*) and Oar Weed (*laminaria digitata*). These large brown seaweeds or “kelps” are found on lower littoral and sub-littoral rocks exposed to strong wave action upon the local coast. Other large brown seaweeds (or Kelps) may also be trialled to test for natural self-seeding of lines and for their chemical and nutrient content.

The Kelps have similar seeding seasons and scatter seeds into the water in late November through to early January. Fruiting bodies develop on varying parts of the seaweeds, near the base of the plants in the case of *alaria*, or along the fronds in the other species. Fertile seeded stock will be collected from local shore sites and will be cultured onto growing medium at a commercial hatchery.

Dulse (*palmaria palmata*) and Pepper Dulse (*osmundea pinnatifida*) are valuable, small red seaweeds and Sea Lettuce (*ulva lactuca*) a valuable, small green seaweed that are native to the area. At the moment they are mostly hand harvested but the technology to cultivate them is under development. Samudra are including these species in their application in anticipation of the technology to viably farm them becoming available at a future date.

The volumes of seeding plants required to be collected will be very small, a standard bucket of fertile seaweed could nurture 20km worth of seeded farm growing line which could produce over 150 tonnes of mature seaweeds.

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04 String method versus direct seeding deployment

Two main methods are used to deploy seaweed cultivation lines - string and direct seeding. Both methods are constantly being developed and tested and will be used at the farm site.

04.1 String deployment method

Deploying seaweed on string is a tried and tested method for seeding seaweed and is currently the main technique used by most farms in Europe and beyond. Fertile seaweed spores are sprayed and allowed to settle on spools that have thin string wound round them. This exercise is undertaken in controlled laboratory conditions in an aquarium/nursery.

Once the seeded spools are ready for deployment, they are taken to the farm site on small (12m to 24m) workboats. At the farm site, narrow ropes (10mm to 14mm) are passed through the seeded spools and the two are laced together. Seaweed Growing line deployment is undertaken by existing local creel vessels or landing craft style workboats. String seeding is an effective growing method, but can be slow and requires careful deployment, time consuming, and labour intensive.

04.2 Direct Seeding method

Direct seeding is where propagated material is affixed to ropes directly instead of the string spools as a medium. This method is a relatively new development with several advantages over the string method and will become the industry's preferred option. With this method, the pre-seeded ropes are run directly into the water, avoiding the time consuming and delicate task of the string method. Without the need to propagate the string spools, there is also an advantage in the amount of required aquariums/nursery space, lowering seeding £/m.

There are still barriers to be overcome in this method's development. Direct seeding requires a binder (a clear paste like substance) to hold the young seeds on the lines until a holdfast (the primitive root of seaweeds) develop and grips the rope. Any adverse weather during this early phase can wash off the seeded media. This has led to loss of biomass expected in numerous scaled deployments across Europe. Until a guaranteed direct seeding binder is available, string will continue to be used and operators will be wary of direct seeding.

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05 Line Deployment

Growing lines are strung out across the sea farm structure by pulling ropes from one vessel over to another on opposite sides of the sea farm. These lines are intended to be held horizontally in the water to maintain the optimum light and nutrient condition for the growing of seaweed. There are no chemical additions or treatments used for the seaweed growing process and no feeds introduced to the water.

The farm structure is designed to maintain a tension on the Growing Lines keeping them below the surface to a maximum of 5m. Growing Line deployment is done between mid October and early November, or late January to early February. Growth of juvenile plants rapidly starts in late February as the days lengthen. Plants are ready to harvest as early as late March through into late May.

06 Site Monitoring

Regular monitoring of seaweed growth will be done via visits to the sea farm by small vessels from nearby sheltered piers. These visits will also act as means of checking the integrity of the sea farm structure, floats and Growing Lines. Samples of seaweed will be taken and the quality tested.

The seaweed grows rapidly through March and April and into May. This natural cycle of growth similarly promotes a rapid growth in other organisms. Some of these organisms settle on the seaweed and can begin a process of biofouling (the build up of none target species of other algae and other sealife). This process reaches a critical level in Scottish waters, typically around the early weeks of May and negatively impacts the quality of the seaweed. Regular monitoring of the sea farm will dictate the optimum point of harvest to avoid biofouling.

07 Harvesting Process

Environmental factors alter the crop yields from year to year. Samudra estimate an average growth rate will produce harvest weights of 8.6kg per linear metre of line. Weights in excess of 12kg per metre have been recorded for Sugar Kelp in late April and in to early May. These higher yields can be achieved by allowing the plants to grow longer, but they will begin to suffer from biofouling. Therefore harvesting season as early as March, through all of April and into early May. The intention will be to remove the last Growing Lines from the water before the seaweed is spoiled by biofouling; roughly a 50 day harvest period.

Automated harvesting machines are being developed which will use a simple frame with rollers and guides to channel seaweed past cutting heads. These will trim the useable frond of the plant into bins or boxes while leaving the rope and growing base (stipe and holdfast) of the plant intact. This coppicing capability may be used to allow multiple harvests from these rapidly growing plants. At the end of the growth cycle the Growing Lines will be scraped of plant matter and taken ashore for further cleaning for future reuse.



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08 Vessel use and operational cycle

During the initial seaweed farm grid structure development phase, Dynamic Positioning (DP) work vessels will be brought in to accurately lay anchor blocks on the seabed. The estimated on-site time of these vessels should be no more than two weeks. The surface floats and lines can then be towed into place and the sea farm tensioned to hold the structure taught and in place. At all other parts of the operational cycle of the farm, Samudra will use small local vessels and local shoreside resources.

Seaweed Cultivation is a winter crop with deployment of seaweed lines in mid Oct to mid Nov and a possible window of opportunity in late Jan to early Feb. The harvesting of the matured seaweed plants can begin in early Mar through to end of May. During these periods there will be vessel and shoreside activity to harvest and land the seaweed. During the rest of the year the seaweed farm will either be fallow or largely left unattended while the seaweed grows.

Vessels will visit the farm weekly to inspect the site to check on the structures (part of the license conditions) and to check on plant growth and crop quality. A register of vessel movements and observations will be kept and available upon request from relevant authorities.

A full description of all activities at the farm site including vessels and their timings of use, to consider the wider impacts on the environment, can be seen in "4 - AnC Re-application - Navigational Risk Assessment, MEAC & Decom Plan v1.1".

09 Onward Processing

To ensure the seaweed retains its quality it will be landed locally and loaded onto temperature controlled vehicles for onward delivery to be processed.

Drying will be the main processing method. Water content will be reduced through compressing or spinning equipment before chopping then drying at low temperatures. This creates a stable, storable product that can be rehydrated as a future new ingredient.

Samudra may begin operations by supplying seaweed to other companies for processing, but there is discussion underway for the creation of an Oban processing hub, to suit pre-agreed buyer specifications.



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10 Farm Structures

'Grid systems' consist of a 200m x 100m grid of subsurface ropes and anchors across which 100m long Growing Lines are set. Growing Lines can be set out as low as 2m spacing, but in active sea conditions this can allow lines to interact and twist. Our intention will be to initially trial growing lines at 5m average spacing with new technological improvements to avoid interaction of lines. From there, we will incrementally test different spacing distances to realise optimum efficiency. We estimate that by using average 5m spacing each grid unit can take 40 lines (4,000m of growing line per grid unit). To allow for anchoring and vessel space between grids each 200m x 100m grid unit is given 300m x 150m of clearance space (Fig 1).

From our desktop studies and experience we believe that the grid systems (with technological enhancements) produce superior growing line length for the sea area they take up when compared to longline systems.

Each seaweed Growing Line is 100m long and with an 8.6kg average growth per linear metre (average between species and over growing peak) each Growing Line will hold and expected yield of 860kg of seaweed by harvest time. Each seaweed grid holds 40 x 100m of Growing Lines, so each Grid could hold 34.4 tonnes of seaweed by mid to late April.

The farm design is sufficiently robust to withstand the most extreme weather conditions to be found at site and be well within the tolerances of the structures. Factors tested are the worst case scenarios (i.e. the effect of the worst winter storms impacting the farm when it is most heavily laden with seaweed biomass in late spring).

The design has already been used and proven in licensed farms on the west coast (e.g. South West Mull and Iona Development, Mull). This farm is now completed its third winter without issues.

The anchoring system used will be robust to ensure farm's stability but use the minimum amount of infrastructure possible to reduce the footprint of the site and reduce seabed impact. The anchoring system will be removeable if required as is all the in-water equipment being used. A Decommissioning Plan is set out at the end of this document.



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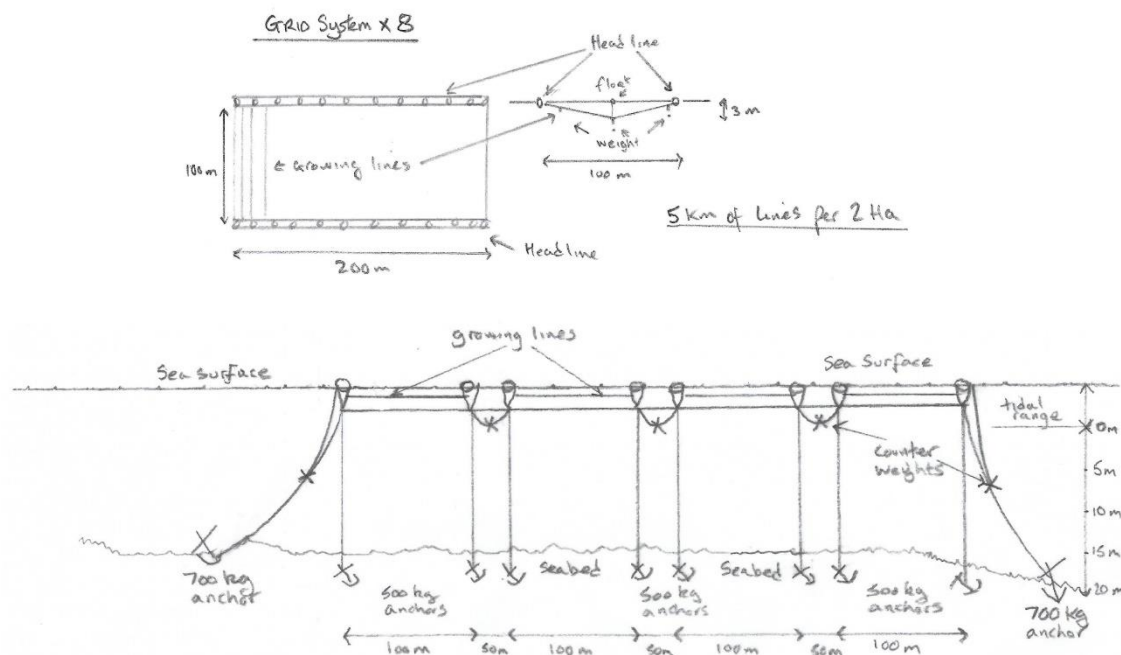


Fig 1 – Grid system seaweed farm layout.

The original Lease Option Agreement (LOA) consent area secured from Crown Estate Scotland (CES) is much larger than the actual sea area that will be taken up by farm structures. This allows for flexibility in the setting of anchors to meet local subsea topography, and to ensure that structure stay clear of rocky reefs and intertidal rock areas which hold many important sea-life habitats.

In 2018, Northern Lighthouse Board set the navigational buoyage for the farm site for the outer corners of the sea farm area to be delimited by the conventional system for marking aquaculture sites of 3 x Special Mark buoys.

These large, yellow-coloured floating buoys are each marked by a top piece with a yellow St Andrews Cross. A solar panel charged, battery powered light unit on each flash yellow at night. These will allow local and visitor marine users to keep a safe distance from surface and submerged structures within the consented area. The light pattern is a conventional Yellow Flash every 5 seconds (Y Fl 5s).

The initial expected cost of the Seaweed Farm will be in the region of £400k, which is similar to the costs expectation of the original farm application, for which New Wave Foods paid the marine licence application fee of £2,520. So, the new license holder and site owners, need not repay the same fee, but the minimum required of £58, which they will pay immediately by BACS to begin the process.

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11 Economic and Social Case for approval

Samudra are making a commitment to provide local employment; building on the talent and skillsets to be found in the Oban area.

They envisage 2 full time equivalent (FTE) staff to run their marine operations, increasing to 6 FTE as the site expands to full capacity. These jobs are likely to be taken by local fishermen or members of the community already experienced in marine activities.

An Oban processing and administration hub will employ up to 6 FTE staff, as Samudra and other partners' seaweed farming operations grow. There may be overlap between staff that work at the sea farm and at the Hub, providing year round as well as seasonal opportunities for local residents.

12 Decommissioning Plan

Samudra have in place a Lease with Crown Estate Scotland for the existing seaweed farm site at Aird na Cuile granted in May 2024 when the site was bought from New Wave Foods.

Part of that agreement includes the financial arrangements agreed between Samudra and Crown Estate Scotland on a 'Site Decommissioning Plan' in the event that Samudra choose to relinquish the site, or in the event that Crown Estate Scotland revoke their Lease, or where Samudra become insolvent.

We propose to mirror this arrangement with Marine Directorate as part of the Re-licensing process through MD-LOT; as with the conditions of receiving the CES Lease; Samudra will ensure it retains sufficient funds to decommission the seaweed farm in proportion to the number of farm units installed.

Samudra agree to use local vessels, where possible, to remove all surface structures. These are light floats and longlines and would not require specialist vessels. Materials removed would be stored or disposed of ashore once all waste and environmental conditions have been complied with.

Subsurface anchors would be lifted by a chartered specialist vessel. Costs would be born by Samudra to mobilise suitable vessel to site, lift risers and recover anchors. Navigation marks, risers and anchors would be removed from site. Materials removed would be stored or disposed of ashore once all waste and environmental conditions have been complied with.

