

Seaweed Cultivation Questions & Answers

1. What is seaweed cultivation?

Seaweed cultivation is the intentional farming of certain species of seaweed (macroalgae) that already occur naturally in a particular area. This is accomplished by installing seaweed farms in the sea comprised of long lines arranged horizontally placed a metre or so below the surface of the water. The lines are suspended via buoys and anchored to the seabed. During the growing season (in our case from October-May), twine seeded with seaweed spores are placed along the lines and left to grow below the surface with regular monitoring. At harvest, the lines are raised and the seaweed on the lines is cut off and brought to shore on boats for processing and onward sale.

This can be contrasted with the predominant means of harvesting seaweed in Scotland currently, shore harvesting, where naturally occurring seaweed in shallow waters is cut and/or raked by hand and gathered.

2. What are the proposed methods of anchoring the farm infrastructure in place?

We propose use of 57 steel anchors. We will look into other methods as they become available. Alternative anchors are predominantly concrete blocks, but these have a significant carbon footprint. We hope to find a limecrete equivalent, but the marine nature of their use will require further investigation into this alternative.

3. What consideration has been given to the impacts on seabed habitats?

We have looked at information from Marine Scotland and EUNIS classification of the proposed farm site. The seabed here is soft sand/mud, suitable for anchoring the structure. Once deployed the anchors will bury into the substrate and wildlife communities will re-establish around them.

4. How regularly will the anchoring structures be checked and how?

Within a few months of first deployment of a new farm. Then annually by divers every summer. Surface structures will be inspected weekly by boat or drone visits.

5. How has the location and design of a site taken into account the potential impacts on marine species known to be present in the local area?

We have sited the farm to ensure it is away from rocky reefs, seal haul out intertidal rocks and from shorelines where birds and otters may feed or shelter. This knowledge has come from environmental studies we have commissioned as well as local observations of wildlife in the area.

6. Is there a designated Marine Protected Area in existence in the local area, and, if so, what are the Priority Marine Features the site(s) is designated for?

The farm site overlaps the water area of the edge of a SAC (Special Area of Conservation). This designation is for the protection of harbour seals. There are PMFs in the Loch Bay area but the farm structure and our activities will not adversely affect these.

7. What is the on-going maintenance schedule for a site and what impacts might it have over time?

Once the site is deployed there will be a weekly inspection as a minimum as per licensing conditions. Any required maintenance will be undertaken immediately as soon as safe conditions allow.

8. To what extent have the proposal's impacts on tidal currents and water movements been assessed?

We do not anticipate our activities to have any effect on tidal currents or water movement. We undertook studies to estimate tidal currents and wave direction, height and frequency as part of the determination of suitability for seaweed cultivation. Nothing in these studies indicated that our activities would change local tidal conditions.

9. What protocols have been established for sourcing seedstock for the seaweed farm?

We have produced a Biosecurity Report with guidelines and templates taken from best practice biosecurity planning by NatureScot (formally SNH) commissioned report 748. All seed to be used at the site will be sourced from wild fertile native stock within the area of the Bay. These will be submitted with our Application.

10. What biosecurity measures will be put in place in order to ensure that non-local variants are not inadvertently introduced?

We have produced a Biosecurity Report with guidelines and templates taken from best practice biosecurity planning by NatureScot (formally SNH) commissioned report 748. All seed to be used at the site will be sourced from wild fertile native stock within the area of the Bay. These will be submitted with our Application.

11. What protocols have been established to minimise the risk of pathogens?

We have produced a Biosecurity Report with guidelines and templates taken from best practice biosecurity planning by NatureScot (formally SNH) [commissioned report 748](#). These will be submitted with our Application.

12. How regularly will growing stock be inspected for signs of disease and how?

Once the site is deployed there will be a weekly inspection as a minimum as per licensing conditions. During the seeded phase of the site, the growing stock will be continually assessed/inspected. This will be at minimum of weekly (weather permitting), but increasing as required as the crop nears harvest and throughout the harvest period.

13. What biosecurity plans or measures are in place to minimise risks posed by alien invasive species?

Our staff and vessels will follow the [Scottish Marine Wildlife Watching Code](#) and the [Guide to Best Practice for Watching Marine Wildlife](#). We have also written in to our Vessel Management Plan the risk and mitigation measures to avoid wildlife disturbance of development and operational phases of our site. We have produced a significant Method Statement and Environmental Report that reflect our study of and commitment to the protection of the wild environment of our farm site. These will be submitted with our Application.

14. What assessment has been undertaken of the potential impact of seaweed detritus on the surrounding seabed?

Our seaweed cultivation can only be seen as “at scale” when in the context of Scottish seaweed industry comparisons. This farm will grow up to 300 tonnes of seaweed at which point we will clear harvest the site, taking the vast proportion of this ashore for processing. To give perspective, a study on error calculation (error of 3% – 6%) in seaweed biomass prediction in the wild found 12kg per m² on rocky shores similar to the shoreline 100m from the seaweed farm. This area is 1,500m wide x 50m deep and is carpeted with seaweeds (*fucus* sp). Using the figures above, we can estimate that there is around 900 tonnes of seaweed along that shoreline, which breaks down and is absorbed into the local seabed and shoreline over the plants lifecycle (2 years).

15. What is the nature of the materials that will be used in the proposed facility?

To begin production, we will be using proven materials such as plastic ropes and buoys. We are actively seeking new materials and talking with suppliers to source more environmentally sustainable options (such as biodegradable ropes and natural fibres).

16. How will accidental loss or damage be avoided?

Our farms are designed and constructed using proven aquaculture methods and materials. They are designed to withstand forces far beyond those expected to be experienced at the site. The site will be inspected regularly (at least once a week weather permitting) and any required maintenance performed immediately.

17. How will seedlings be attached to the mooring system?

In Oct/Nov seeded growing lines will be deployed across the permanent farm structure. These will either use impregnated string, wound around the lines or via direct seeding methods being developed. Both methods are similar in nature, the latter more suited to a scaled industry.

18. What local wildlife may be affected by increased activity around a seaweed farm, particularly during seeding and harvesting?

Our activities are designed for minimal impacts on the local wildlife. The island 1km to the north of our proposed farm site is designated as a SPA for harbour seals. We have taken measures to ensure our activities are mainly restricted outwith sensitive time periods and mitigated our activities where we overlap.

19. What measures have been taken to avoid or minimise disturbance?

Our staff and vessels will follow the Scottish Marine Wildlife Watching Code and the Guide to Best Practice for Watching Marine Wildlife. We have also written in to our Vessel Management Plan the risk and mitigation measures to avoid wildlife disturbance of development and operational phases of our site. We have produced a significant Method Statement and Environmental Report that reflect our study of and commitment to the protection of the wild environment of our farm site.

20. How has seabed shading been taken into account in the selection of the site?

Seabed shading has been calculated and is incorporated into our Application documentation. Shading is minimal impact with less than 1% in Dec through to less than 15% by May at maximum growth before harvest.

21. Are there any known marine species or habitats at the proposed location which could be negatively affected by reduced light in the water column?

We have checked maps available through Marine Scotland and cannot see anything on them that would be affected.

22. What information is available relating to nutrient levels at the proposed site?

The site comprises of an open bay to the wider Minch system of the Atlantic. The nutrient figures for the wider area [are/are not?] available to us. We will install monitoring devices at the farm to build up a picture of the site's nutrient regime over time. This will build our knowledge of the important relationship between available nutrients and the optimum timing of line deployment, growth patterns and harvesting of seaweed.

23. What assessment has been made of the impacts of cultivation on nutrient levels at the site, and of the cumulative impact of other sites in the area?

We will install monitoring devices at the farm to build up a picture of the site's nutrient regime over time. This will build our knowledge of the important relationship between available nutrients and the optimum timing of line deployment, growth patterns and harvesting of seaweed. Any future proposed sites are not physically close to one another and will have no measurable interactions. There are no other aquaculture sites in close proximity to ours.

24. Has current/flow modelling been developed to understand in-water movement of nutrients?

The site was assessed as having a strong tidal flow and be near to open ocean water beyond the open embayment of the site. No ADCP has been deployed to measure current flow in finer detail. This is not a requirement of seaweed cultivation, as it is with fin-fish developments.

25. What number, size and colour of buoys and other features which may be visible at the water surface are proposed?

2 x Yellow special marks with light, 32 end floats, 304 headline floats (1.2mx .7mx .6m), 400 growing line floats (A0 size of a football, Grey)

26. What VIA methodologies, including verifiable visualisations of the site, have been provided?

We have commissioned a visualisation report that employs the same techniques used in LVIA assessments of major land or aquaculture developments. The results show the seaweed farm almost invisible in the landscape from all points of visibility in the nearby settlement of Stein. These will be submitted with our Application.

27. How have the potential displacement effects of the farm, as a consequence of its size, design and seasonal use been assessed?

The farm site was chosen to ensure it is away from local fishing efforts. The farm is also away from local moorings and visiting pleasure vessel anchorages. There is adequate passage between the site and other marine hazards as assessed by Northern Lighthouse Board (NLB) and will be marked (2 x Special Marks) as per their recommendation.

28. What plans are there to expand production over time?

Kaly anticipates a gradual expansion of production over multiple years to eventually have about 80% of the total farm area under cultivation. However, in year one, less than half of the site will be cultivated and both in the initial years as well as going forward, it is intended that the Loch Bay farm serve as a research and development hub to test different aspects of farm and grid design, seeding and harvesting techniques and timing, to eventually optimise growing conditions for the site.

29. How will the cumulative impacts from multiple sites be assessed?

Future proposed sites are not physically close to one another and will have no measurable interactions. There are no other aquaculture sites in close proximity to ours.

30. What level of marine traffic associated with the site is projected?

A 22m multi cat will install infrastructure. Our 7m workboat will tend the site weekly as required by license condition. A 18-22m craft will be used for seeding and harvesting.

31. What land-based impacts – including odour, effluent treatment, noise and vehicle traffic - associated with the site are projected?

Our production “Hub”, will be a fully organised and professionally run industrial unit, which will comply with all legislation, including that around nuisance. Our vehicle use has been calculated and will be submitted in that part of our planning application to local authorities.

32. What is the expected market for the harvest?

There are multiple industries that use processed seaweed in their product development, from human food to animal feed and bio stimulants (fertiliser). The demand for seaweed from these industries in some sectors is increasing beyond the capacity of wild harvested stocks from which they typically draw their supply. However, we are increasingly excited about higher-value uses of seaweed that are currently being commercialised by downstream companies such as functional food ingredients, bioplastics, cosmetics, nutraceuticals and many others. We initially intend to sell our seaweed business-to-business (B2B) as a bulk product for further refinement and integration into supply chains but will certainly explore opportunities for further vertical integration as markets and refining technologies develop.

We are currently negotiating a Letter of Intent with a buyer to offtake all the seaweed we could possibly produce over the next five years, but we will continue to develop relationships with potential buyers to ensure a consistent and growing market for our seaweed.

33. What product will be created and how much of this will be done locally?

Kaly intends to develop a processing Hub in the Dunvegan area to receive the harvested seaweed from the farm and stabilise it for onward sale into different industries. Kelp is roughly 90% water when it is harvested and quickly spoils on land, making it imperative that it is quickly stabilised in our own facilities to ensure quality to the buyer. The methods of stabilisation include freezing, drying and ensiling after the seaweed is washed and chopped. Each method has its pros and cons and certain customers prefer receiving their seaweed in different forms. If dried, Kaly will then mill the resultant product to produce a granulated form which is much easier and cheaper to transport.

34. What is Crown Estate Scotland (CES)?

The CES is a public corporation of the Scottish Government established to manage the land and property of the monarch in Scotland. This includes 87,880 acres of land in rural Scotland and significant holdings in the coastal and marine environment, including almost all of the seabed to 12 nautical miles out from the shoreline and almost half of the Scottish foreshore. The monarch is the legal owner of this property, but it is not private property and cannot be sold by the Crown. Profits from leasing the property is paid to the Scottish Consolidated Fund, which finances Scottish Government.

As such, Kaly has worked with CES to establish a site for the Loch Bay farm and obtain a Lease Option Agreement on the seabed subject to completing the marine licencing process, which is through Marine Scotland. Once Marine Scotland consent a licence for a seaweed farm at Loch Bay, CES will issue a Lease for the site on a 5-year basis for a fee based on the amount of seeded line deployed in a given year.