



**GLENELG SEA FOREST SEAWEED FARM:
NOSTIE BANK, LOCH ALSH**

**APPENDIX 8:
BIOSECURITY PLAN**

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1 Introduction

In accordance with the Marine Biosecurity Planning guidance document, February 2014, produced by Scottish Natural Heritage (NatureScot), this document aims to detail the site/ operation activities and actions that will be undertaken to minimise the introduction or spread of non-native species (NNS) or disease from the proposed seaweed farm.

This is a live document and, as such, should be reviewed and updated on a regular basis.

2 Site Contact Details

Site/ Emergency Contact: [Redacted]

3 Site Description

3.1 Site Location and Overview

The proposed seaweed farm location is defined as Nostie Bank, Loch Alsh, Wester Ross, Highlands (Fig.1). The site lies within/adjacent to two Special Areas of Conservation (SACs) for Rocky Reefs, and Harbour Porpoises; and a Marine Protected Area (MPA)¹. The farm is set back from the coastline in rapidly deepening water to beyond 40m below water level; and thus will not have an impact on these features.

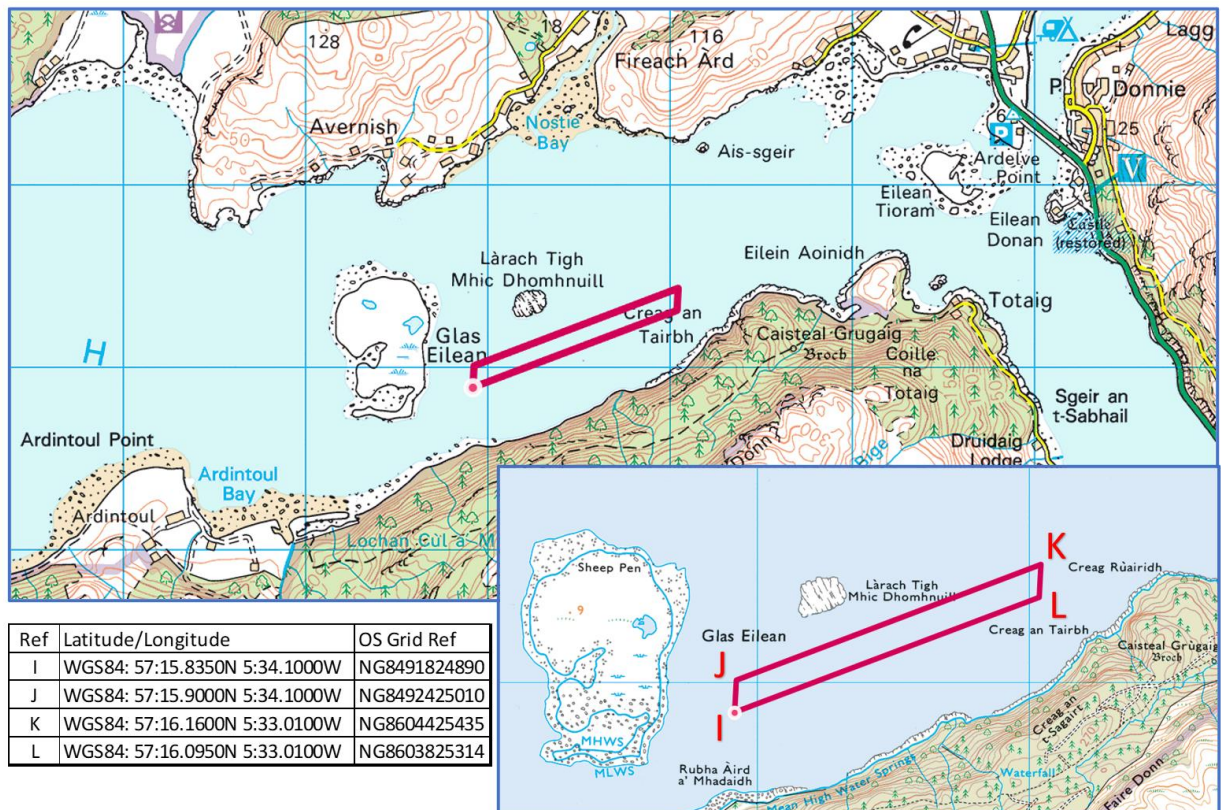


Figure 1: Nostie Bank Seaweed Farm Location and Coordinates

¹ Refer to Appendix 2 – Impacts and Proposed Mitigations for further information

3.2 Seaweed Species

Initially, the main target species will be *Alaria Esculenta* (Atlantic Wakame) and *Saccharina Latissima* (Sugar Kelp); with *Laminaria Digitata* (Oarweed) seeded later. All these are found growing wild locally. The details of the cultivation process described below is for *Alaria*, and this is also close to the process of the other species.

3.3 In-water Equipment

A subsurface grid will be used similar to that used by finfish farming, but with no surface cages; and will be secured to the seabed with a robust anchoring system (design to be finalised). 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. The buoys will be anti-fouled and maintained on a regular basis.

The farm will be set out as a five 400m longlines, held roughly 1.5m below the surface. This will provide a growing length of 4km at full capacity (all grids). 2km (5 long lines) will be seeded in year 1, 1km (remaining grid lines) in year 2, and the remaining 1km (1 other grid) in year 3. No equipment or ropes based on the Nostie Bank site will be moved to another site, and no equipment or ropes used on another site will be brought to Nostie Bank. Any equipment or ropes brought ashore from the farm will be treated by cleaning with fresh water above the high tide mark.

All in water equipment will be removable.

3.4 Seeding Process

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.

There are no chemical additions or treatments used for the seaweed growing process. The small amounts collected are propagated in laboratory conditions into huge amounts of fertile material. This can be stored for long periods to suit operational needs.

3.5 Line Deployment Process

Deploying seaweed on string will be the main deployment method for seaweed cultivation, with the method outlined below:

- fertile seaweed material is allowed to settle onto thin string wound round spools in 100m lengths, in a controlled environment e.g., an aquarium.
- spools are laced onto seaweed (culture growth) lines to be grown in the sea on the farm.
- lines are then deployed by small local (>8m LOA) work vessels. 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) four underwater longline structure based on a 400m length will be installed. Then in stage/year 2, the additional 200m long lines will be installed as part of a grid system and the remaining lines for trial 1 will remain installed. In stage/year 3 the other grids will be installed.

Line 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.

The vessels used to deploy the seaweed lines onto the farm site are based around Kyle of Lochalsh and work locally. It is therefore unlikely that non-native invasive species will be brought to site by this route.

3.6 Harvesting Process

Regular monitoring of seaweed growth will be done via visits to the seaweed farm by small vessels, that work locally within the vicinity of the farm and will not be brought in from external areas. This will decide the optimum harvest periods (expected between May and July).

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. Other cultivation operations where these can be returned to the water and coppiced again to create a second crop are being considered, but this will be dependent on the level of fouling.

All vessels and equipment will be washed thoroughly and equipment, ropes etc will be brought ashore, washed and stored ashore.

3.7 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. For either processing routes, any surplus or waste product will be disposed of via controlled waste routes as per normal commercial waste procedures.

3.8 Contingency Plan, Monitoring and Review

Disease issues are not envisaged at the farm site, as would be seen in animal husbandry around mussels, oysters, or finfish; but GSF recognise that should diseases be present on the site that it can have serious negative impacts on the whole ecosystem and a contingency plan should be implemented. Therefore, to ensure that all eventualities are covered, the following procedures shall be implemented:

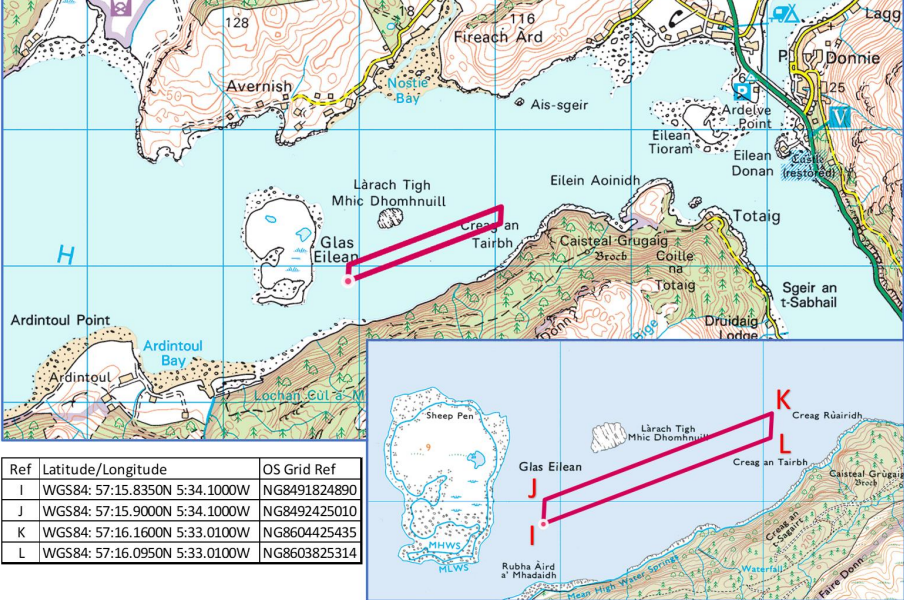
- staff working at the farm:
 - o will be trained in identifying invasive non-native species (INNS).
 - o shall undertake a thorough check of the farm site on every visit, recording details as required in section 4.
- In the event of the positive identification of an outbreak, staff will ensure that no product leaves the site; with any equipment and ropes taken ashore will be treated; and Nature Scotland will be informed immediately.

4 Site Visits – Biosecurity Information

Information for each site visit and the operations undertaken during them, should be recorded in the format set out within this section.

4.1 General Information

4.2 Site Details

Date	10.01.2023															
Farm Site & Location	<p>Nostie Bank, Loch Alsh, Wester Ross, Highlands</p>  <table border="1" data-bbox="515 1066 874 1171"> <thead> <tr> <th>Ref</th> <th>Latitude/Longitude</th> <th>OS Grid Ref</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>WGS84: 57:15.8350N 5:34.1000W</td> <td>NG8491824890</td> </tr> <tr> <td>J</td> <td>WGS84: 57:15.9000N 5:34.1000W</td> <td>NG8492425010</td> </tr> <tr> <td>K</td> <td>WGS84: 57:16.1600N 5:33.0100W</td> <td>NG8604425435</td> </tr> <tr> <td>L</td> <td>WGS84: 57:16.0950N 5:33.0100W</td> <td>NG8603825314</td> </tr> </tbody> </table>	Ref	Latitude/Longitude	OS Grid Ref	I	WGS84: 57:15.8350N 5:34.1000W	NG8491824890	J	WGS84: 57:15.9000N 5:34.1000W	NG8492425010	K	WGS84: 57:16.1600N 5:33.0100W	NG8604425435	L	WGS84: 57:16.0950N 5:33.0100W	NG8603825314
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L	WGS84: 57:16.0950N 5:33.0100W	NG8603825314														
Site Biosecurity Manager & Contact Details	[Redacted]															
Information on person(s) visiting the site:																
<ol style="list-style-type: none"> 1. Company 2. Individual Name 3. Contact Details 4. Reason for Visit 																

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4.2.1 Site Features Affecting Biosecurity

Weather during visit	
Salinity	
Submerged structures	<p>A subsurface grid. Low risk. The grid used will be similar to that used by finfish farming, but with no surface cages; and will be secured to the seabed with a robust anchoring system (design to be finalised). 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.</p> <p>The buoys will be anti-fouled and maintained on a regular basis.</p>
NNS/INNS Present?	<p>Low risk. The species cultivated at the farm will be Alaria Esculenta (Atlantic Wakame) and Saccharina Latissima (Sugar Kelp); with Laminaria Digitata (Oarweed) seeded later. All these species are found local to the site growing wild. Therefore, there are no NNS/INNS present.</p> <p>Seeded stock is cultured from locally sourced reproductive material. No more than 25% of any given patch to ensure the wild stock is not affected. The stock is propagated in laboratory conditions.</p> <p>There are no chemicals or treatments used during the seaweed growing process.</p>

4.3 Vessels Type using the Site/ Involved in Operation(s)

The following table should be filled out for every vessel or piece of equipment visiting the site. Should any of the responses return a risk where it should be further investigated or reported to NatureScot then details of this should be recorded in section 4.6.

Nostie Bank, Appendix 8 – Biosecurity Plan

Vessel and/or equipment details e.g., name, type, registered			
On site equipment: ropes, buoys, chains.			
Ref	Question	Response	Risk (H/M/L)
1	Will the equipment be used out with the local area?	No equipment or ropes based on the Nostie Bank site will be moved to another site, and no equipment or ropes used on another site will be brought to Nostie Bank. All in water equipment will be removable.	L
2	Will the equipment have an anti-fouling coating applied to submerged structures every 12 months (or time recommended by manufacturer)?	The cushion (outer) and dropper line (intermittent) buoys will be visible on the surface, as will appropriate special marks demonstrating the site outer limits. The buoys will be anti-fouled and maintained on a regular basis.	L
Ref	Question	Response	Risk (H/M/L)
3	Will all the visible submerged surfaces be free of bio-fouling (a green 'slime' is OK)?	All equipment and ropes brought ashore from the farm will be treated by cleaning with fresh water above the high tide mark. The visible buoys will be anti-fouled and maintained on a regular basis	L
4	Will the visible submerged surfaces have more than a green 'slime' coating?	N/a	L
6	Will the equipment move between countries, regions or water bodies with similar environmental conditions e.g., seawater temperatures?	No, No equipment or ropes based on the Nostie Bank site will be moved to another site, and no equipment or ropes used on another site will be brought to Nostie Bank	L

Nostie Bank, Appendix 8 – Biosecurity Plan

7	Will the equipment have been in a water body known to have NNS present?	No, as above	L
8	Will the equipment spend long periods of time stationary at sites in between anti-fouling treatments?	No, not applicable.	-
9	Is the vessel 'slow moving', such as a construction barge or drilling rig?	No, not applicable	-

Vessel and/or equipment details e.g., name, type, registered			
Vessels: Inspection and harvesting			
Ref	Question	Response	Risk (H/M/L)
1	Will the vessel move out with the local area?	Inspection vessel: small vessel will be used, local to site. Harvesting vessel may be used at other sites. In this case, the vessel will be cleaned before and after its use at this site.	L
2	Will the vessel have an anti-fouling coating applied to submerged structures every 12 months (or time recommended by manufacturer)?	All vessels will be washed thoroughly on a regular basis.	L
Ref	Question	Response	Risk (H/M/L)

Nostie Bank, Appendix 8 – Biosecurity Plan

3	Will all the visible submerged surfaces free of bio-fouling (a green 'slime' is OK)?	As above - All vessels will be washed thoroughly on a regular basis.	L
4	Will the visible submerged surfaces have more than a green 'slime' coating?	As above - All vessels will be washed thoroughly on a regular basis.	L
5	Will the vessel have noticeable clumps of algae and/or animals clinging to the visible parts of the hull/rudder/propeller?	Inspection vessel local to site. De-fouled regularly. Harvesting vessel will be washed thoroughly before and after use.	L
6	Will the vessel move between countries, regions or water bodys with similar environmental conditions e.g., seawater temperatures??	No, Regular monitoring of seaweed growth will be done via visits to the seaweed farm by small vessels, that work locally within the vicinity of the farm, not be brought in from external areas.	L
7	Will the vessel have been in a water body known to have NNS present?	No, as above	L
8	Will the vessel/equipment spend long periods of time stationary at sites in between anti-fouling treatments?	The harvesting vessel will be washed thoroughly before and after use.	L
9	Is the vessel 'slow moving', such as a construction barge or drilling rig?	No, not applicable	-

4.4 Site Activities which have a significant risk of introducing or spreading INNS

Ref	Activity Description & Response Required
	Harvesting vessel, expected to be used by other site(s). Precaution/Mitigation: The harvesting vessel will be washed thoroughly before and after use.
	Inspection vessel. Precaution/Mitigation: Regular monitoring of seaweed growth will be done via visits to the seaweed farm by small vessels, that work locally within the vicinity of the farm.

4.5 Contingency Plan

In the event of an emergency, the procedure as set out in the contingency plan should be followed; with details noted as detailed in the table below.

Action Required	Responsibility (Person/Company)	Follow up e.g., date
Disease issues are not envisaged at the farm site, but GSF recognise that should diseases be present on the site that it can have serious negative impacts on the whole ecosystem. Therefore, to ensure that all eventualities are covered, the following procedures shall be implemented:		
Staff working at the farm will be trained in identifying invasive non-native species (INNS).	GSF	
Staff working at the farm shall undertake a thorough check of the farm site on every visit, recording details as required in section 4.	Staff on site, GSF	
In the event of the positive identification of an outbreak, staff will ensure that no product leaves the site; with any equipment and ropes taken ashore will be treated; and Nature Scotland will be informed immediately.	Staff on site, GSF	