Mara Seaweed ltd

Biosecurity Plan

Details

Version	Date	Description	Author(s)	Revised by
V1.0	28/10/2022	Final	Stevie Jarron	DB-C

Index

Mara Seaweed ltd – Biosecurity Plan

01 Introduction

Invasive non-native species (INNS) are one of the biggest threats to biodiversity, undermining the inherent resilience of ecosystems and causing significant economic costs for sectors such as agriculture and fisheries. Along with disease transfer, INNS cost £billions per year globally in harvest and infrastructure damage and the loss of local biodiversity presents an incalculable threat to future generations.

Mara have based this Biosecurity Plan around such publications as Nature Scots' Commissioned report - Marine biosecurity Planning. Mara will lay out each part of their proposed seaweed farm operations and then describe the actions they will ensure are undertaken to protect from transfer of INNS or disease. It is considered that the INNS as an issue is Low Risk as the main materials used for seaweed cultivation are placed in the water in October and retrieved by May the following year. No feeding barges or cages are used in seaweed cultivation and no equipment or vessels transfer to other aquaculture sites.

We do not envisage disease issues at our seaweed farm site as would be seen in animal husbandry around mussels, oysters or finfish. All Mara staff and contractors will be trained in INNS recognition via ID cards placed on vessels, shore bases and at the Mara's processing factory and an effective reporting process put in place. In the event of the positive identification of an outbreak, staff will ensure that no product affected leaves the site. Any equipment and ropes affected will be taken ashore and will be treated and Nature Scotland informed immediately. Low Risk

02 Farm Site

The proposed site of the Mara Seaweed Farm in St Andrews Bay, 5 nm offshore from the coastline of east Fife. As such the site is well away from any direct sewage or chemical outputs from direct source pollution. Diffuse pollution will be greatly diluted due to the distance from shore also. Naturally occurring or anthropogenic caused algal blooms may occur in the Fife coastal waters.

Mara will ensure that all harvest taken from the farm site will be washed ashore in fresh water at their processing facility in Glenrothes. The waste water from their processing is disposed through the areas' traditional Sewage Treatment Works, which digests any materials in a microbial process, destroying and organic contaminant. Plant waste from the processing will be taken to be composted locally. No waste material from Mara's processing facility will find its way back into the sea. Low Risk

03 Seaweed Species

Mara intends to cultivate the two large brown kelps that have a proven track record of line cultivation in Scotland - alaria esculenta (Atlantic wakame) and saccharina latissima (sugar kelp) primarily for the human food market. The third large brown kelp, laminaria digitata (oar weed), is included in the Marine Scotland licence process in readiness should market demand or technologies change to such an extent that its cultivation becomes commercially viable. Technology in cultivation of highly prized red and green seaweed species is developing.

All 3 of the above species occur naturally along the Fife coast. No seaweed stock will be brought in from outwith the Fife coastal area. All seed stock will be collected from the Fife coast. All laboratories that Mara will invest with the duty of seaweed seed production will be fully accredited and work to hygiene standards to ensure no cross contaminated of seaweed stock (or diseases) are brought back to Mara's site. Low Risk

04 In water equipment

Two different systems of farm design are currently being trialled across Scotland.

1. The 'longline system' consists of 200m anchored structures based on mussel farm longlines. Each longline unit has 5 x 200m growing lines at a spacing of 5m apart (1,000m of growing line per longline unit). To allow for anchoring and vessel space between lines, each longline is given 300m x 75m of space. The system is at an early stage in development and our intention will be to trial its design and effectiveness.

2. The 'grid system' consists of a 200m x 100m grid of subsurface ropes and anchors across which 100m long growing lines are set. From previous experience growing lines set out at 2m and 4m spacing between lines have shown to interact and twist. Our intention will be to initially trial growing lines at 10m spacing and incrementally test different spacing distances to realise optimum efficiency. We estimate that by using 10m spacing each grid unit can easily take 20 lines (2,000m of growing line per grid unit). To allow for anchoring and vessel space between lines each 200m x 100m grid unit is given 300m x 150m of space, plus additional room around them for anchoring.

No equipment or ropes based on the Mara St Andrews Bay site will be moved to another site and no equipment or ropes used on another site will be brought in. Any equipment or ropes brought ashore from the Mara farm site will treated by cleaning with fresh water above the high tide mark. All equipment stored ashore will be kept separate from equipment from any other sites. All waste plant material from the initial harvest operation will fall to the seabed at the site. Similarly, any crustaceans that accumulate on the lines or floats at site that are knocked off during maintenance or harvesting operations will fall to the seabed to be consumed in the seabed sediments or by detritivores that naturally occur there. Any equipment that has accumulated crustaceans or algae on them that is brought ashore will be washed down with fresh water and along with air exposure cause the demise of sea grown fouling. Low Risk

05 Seeding Process

Seeded stock of preferred species, most probably *alaria esculenta* (Atlantic Wakame) and *saccharina latissima* (Sugar Kelp) will be sourced from local Fife shore sites which Mara already have Crown Estate Scotland Leases on for seaweed collection. Please follow the link - https://www.crownestatescotland.com/resources/map and zoom in on the east Fife coast. The area shown in light green and notated as Aquaculture, Seaweed, Harvesting are Mara's Crown Estate Scotland Leases. It is from these rocky shores that small amount of fertile seaweed materials will be taken for stock in the seeding process.

The collection of seeding plants will be very small volumes (<10 wet kg) and by taking no more than around 25% in any given patch on a shore. The species to be farmed are all found locally near the offshore farm site. The seeds will be transported discretely, on ice in sealed polystyrene boxes. 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. Full biosecurity procedures will be followed from delivery of seeds to SAMS or alternate hatchery and on return of the seeded lines to St Andrews Bay farm site. Low Risk

06 Line Deployment and Harvesting

Deploying seeded seaweed growing lines onto the farm site will occur in October of each year. Propagated material is affixed to ropes via a seeded string medium or directly onto ropes using a binder solution. The growing lines will be deployed by existing small creel vessels or local workboat landing craft style vessels. The growing lines, narrow ropes (10mm or 12mm) are affixed to the permanent in water structure in a horizontal, or elongated zig-zag pattern (optimum growing patterns are still being assessed) at depths between 1m and 5m below the surface. The lines will be harvested of the resultant seaweed growth between late March through to Late May. The site will be cleared of all growing lines at end of each harvest period.

The vessels used to deploy the seaweed lines onto the farm site and harvest the resultant seaweed are based on the Fife coast and work locally. They will antifoul their hulls annually as a part of their own maintenance schedule. It is therefore unlikely that non-native invasive species will be brought to site (or to shore) by this route. Regular monitoring of seaweed growth will be done via visits to the seaweed farm by small vessels. These vessels will be stored out of the water when not in use, their hulls washed in fresh water each time they are retrieved. Low Risk

07 Harvesting Process

Harvesting will be undertaken by automated harvesting machines being developed which will use a simple roller frame with cutting heads that will trim the useable frond of the plant into bins or boxes while leaving the rope and growing base (stype) of the plant intact to either be redeployed for further growth (coppicing method) or collected for cleaning ashore for future years' harvest deployments.

All harvesting equipment and vessel decks will be washed down at site with seawater hoses. All equipment and ropes brought ashore will be washed thoroughly with fresh water and stored ashore. Low Risk

08 Onward Processing

To keep the seaweed to the highest standard the product needs to be brought ashore and loaded onto temperature controlled vehicles, then to be processed as soon as possible. Drying is the main processing method, essentially lowering the water content without using excessive heat (which would cook the plant) similar to herb processing. This creates a stable, storable product that can be rehydrated as an ingredient. For other processing routes, seaweed will be kept as a wet, fresh ingredient with shorter shelf life.

For either processing routes, Mara will ensure that all harvest taken from the farm site will be washed ashore in fresh water at their processing facility in Glenrothes. The waste water from their processing is disposed through the areas' traditional Sewage Treatment Works, which digests any materials in a microbial process, destroying and organic contaminant. Plant waste from the processing will be taken to be composted locally. No waste material from Mara's processing facility will find its way back into the sea. Low Risk