Mara Seaweed Ltd

St Andrews Bay Seaweed Farm Environmental Responsibility

Details

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01 Introduction

Mara Seaweed Ltd is an established Seaweed shore harvesting and processing company with a workforce in place to sustainably harvest seaweed species from the Fife coast and process in their Edinburgh factory. Mara have begun the Marine Scotland Pre-Application Process (PAC) to license a seaweed farm. The proposed site of the farm is in St Andrews Bay, roughly 6nm off the east coast of Fife.

This document attempts to set down Mara's understanding of the impacts their development will have on the site of the proposed seaweed farm, the transit route and shore base area and the wider environment.

The information in this document will compliment other documents –
Method Statement
Scotland's National Marine Plan – General Planning Principles

and other relevant documentation that accompany Mara's full Application submission. All these documents are available to be viewed and commented on by all the Statutory Consultees, but this document is more specifically aimed at Nature Scot's needs and has been heavily influenced by direct guidance from them during the Pre-Application Consultation (PAC) process.

02 Site Designations

The area of the proposed Seaweed Farm lies in the 'Outer Firth of Forth and St Andrews Bay Complex SPA' (Special Protected Area) - https://sitelink.nature.scot/site/10478. The JNCC (Joint Nature Conservation Committee) comments "The Outer Firth of Forth and St Andrews Bay Complex is an extensive SPA off the south-east coast of Scotland. It stretches from Arbroath in the North to St Abb's Head in the South and encompasses the Firth of Forth, the outer Firth of Tay and St Andrews Bay. The waters in this SPA attract one of the largest and most diverse marine bird concentrations in Scotland and the site is classified for the protection of 21 seabird and waterbird species."

The proposed farm site also lies close to (5nm), but not within, the Firth of Tay and Eden Estuary SPA - https://sitelink.nature.scot/site/8501 and the Firth of Tay and Eden Estuary SAC (Special Area of Conservation) - https://sitelink.nature.scot/site/8257. These designations protect the estuarine habitats of shifting sandbanks, mudflats and reedbeds that are home to large numbers of resident, passage and seasonal nesting or roosting wetland birds and home to harbour seals. The Eden Estuary is also a Local Nature Reserve.

The Abertay Sands, a sandy spit that is formed at the southern entrance to the Firth of Tay from Tentsmuir Point is a Geological Conservation Review Site and a National Nature Reserve - https://sitelink.nature.scot/site/9203. None of Mara's activities will affect these designations.

Mara has been closely consulting with all the diverse stakeholder groups from the earliest concept phases of this project. The proposed site in St Andrews Bay was chosen for this Seaweed Cultivation farm project as it is away from rocky reefs and muddy seabed, the favoured location for lobster and nephrop creel and trawl fisheries.

There are no biogenic reefs recorded at the site (eg *Sabellaria spinulosa*) with the substrate fine shifting sand. EUNIS habitat classification A5.1 sublittoral coarse sand & A5.2 sublittoral sand (depending on the detail level of the map): BGS Offshore, Marine Sediment, Sand – anchors and subsurface structures will be set on soft sediment, clear of any rocky reefs. A helical screw anchor system will require shorter lines, have a smaller area footprint and less seabed than conventional heavy block anchor systems.

03 Phased deployment

Mara's desire is to have a substantial seaweed farm at the site. To do this, the aim is to deploy some lines of the 1st phase in Nov/Dec 2022 to begin seaweed cultivation for a first harvest in April/May 2023 (Fig 1). The 1st phase may not all be deployed in one year.

A 2nd phase is envisaged for the years 2024 or 2025. This will see Mara potentially double the size of the farm. As the seaweed farm begins to provide harvests for Mara's new processing facility in Glenrothes, Mara will evaluate the timing of the 2nd phase of development. If required a review of the impacts of the 1st Phase of the farm can be undertaken before deployment of the 2nd phase.

A 3rd phase in the years 2027 or 2028 will depend on how the market and business grows and these dates are a guide only. If the scale of the farm is a concern to the Statutory Consultees, then Mara may separate the 3rd phase into a further license application so full scrutiny can be given to the expansion of the farm.

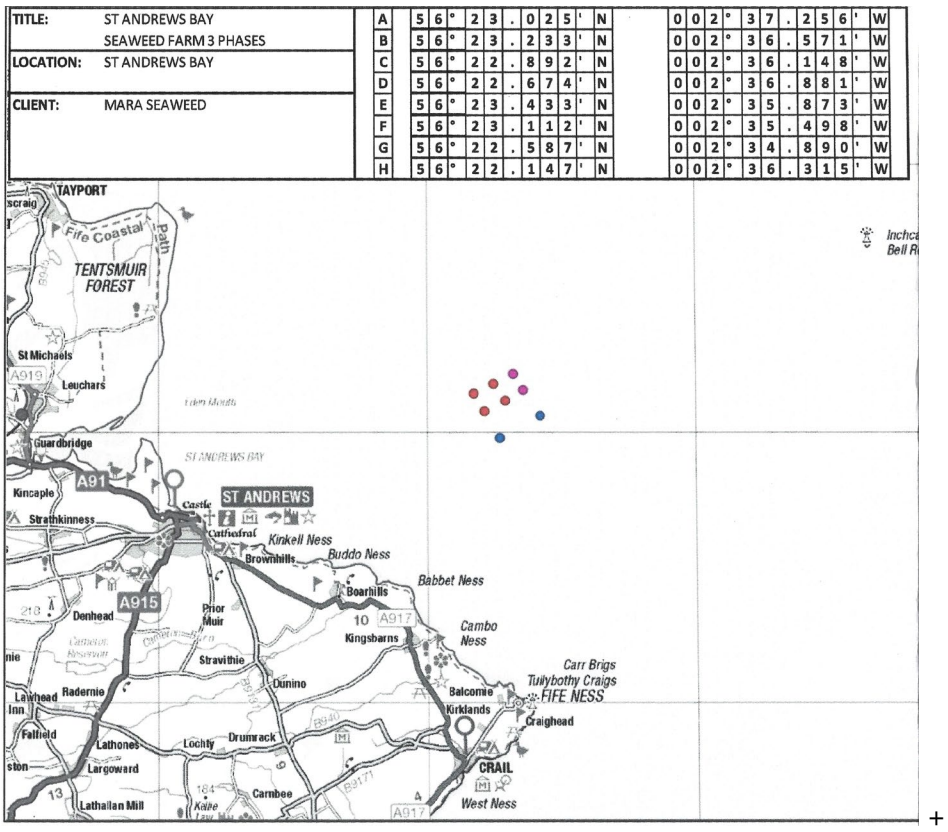

Fig 1 - St Andrews Bay map and Mara seaweed farm coordinates of the 3 phases of the farm.

04 Vessel use - Construction and operational cycle

During the deployment phases, Dynamic Positioning (DP) work vessels will be brought in to accurately lay anchor blocks or heliacal screws on the seabed. The work time on site of these vessels should be no more than a week in the 1st and 2nd phases and 2 weeks for the 3rd larger phase. The initial 1st phase of deployment will hopefully be completed during the winter 22 – 23. Future deployment phases can be timed, in discussion with Nature Scot, to cause the least possibility of disturbance to feeding birds in the area.

At all other parts of the operational cycle of the farm, Mara will contract the services of small local vessels already working the area and use the existing shoreside resources from St Andrews harbour or other Fife ports (Pittenween, Anstruther or Dundee).

Seaweed Cultivation is a winter crop with the deployment of seaweed lines (Oct/Nov) and (Jan/Feb) and the harvesting of the matured seaweed plants (late Mar to late May). This may see quite intense vessel and shoreside activity at these periods. 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.

05 Visual Impact and other marine users

The farm site is sufficiently far from shore to mitigate almost entirely any negative aesthetic impact of the Fife coast as well as being at a distance beyond the usual travel of pleasure craft, windsurfers and other watersport enthusiasts. The commercial transit lanes from the major port of Dundee to construct and service new windfarms being built off the Firth of Forth to the south are clear to the east of the site.

The proposed Seaweed Farm will have the lowest possible profile and will be situated in remote waters away from the coast. Visual impact is kept to a minimum by the Seaweed Farm's low profile; indeed the most visible indicator of the farm will be Special Mark buoys placed to clearly mark the outer limits of the site for mariners. The Special Mark buoys are yellow buoys with yellow flashing lights at night. Any other special arrangement for lights will be recommended by NLB and MCGA during this application process and will form part of the license conditions of the site. Discussion with NLB and RYAS are covered in detail in the PAC Report submitted along with the full application package.

The site is within reach of the ports and harbours of the East Neuk of Fife and Mara intend to use the locally available crews, vessels and shore facilities to operate their proposed farm. This will bring economic and social benefits to the communities of the area.

Fig 2 - Shore view of a seaweed farm on Loch Scridain, Mull.

Whilst Mara will use a different structure, (fig 2) exemplifies the low visual impact of the farm as most of the structure and growing lines are sub-surface. The farm in the photo has 9km of growing lines in the water (max of site 30km). The farm is in the foreground. The ripples in the distance are from a passing creel boat, who's creel buoy can be seen in the middle foreground. The local vessels support work at the site and are still able to fish the rocky shore side as they did before.

06 Wildlife Entanglement

06.01 Cetacean Entanglement - Whilst there have been no reported cases of entanglement of cetaceans in kelp longline farming (Kraus et al., 2005[1]; NOAA, 2016[2]), Mara Seaweed Ltd are designing their Seaweed Farm with wildlife safety in mind. Most cases of cetacean entanglement seem to be from discarded fishing gear (ghost fishing) or from loose mooring lines or creel ropes. The farm design at St Andrews Bay will ensure that lines are taut and well-spaced to allow cetaceans to safely pass through the site.

As part of the Application process, Marine Scotland, MCGA and NLB ask for a navigational risk assessment, which includes emergency contact details to various organisations. BDMLR and the Scottish Entanglement Alliance will be there as contact numbers if there is any concern over a cetacean in our farm lines.

06.02 Bird and Pinniped Entanglement – unlike mussel farms and finfish farms, seaweed farms do not deploy anti predator netting that can cause entanglement of seals and diving birds. As the first major aquaculture site on the East Coast of Scotland in what is still a relatively novel industry, Mara is aware that this may be a new experience to Statutory Bodies and Stakeholders alike. Mara has been closely consulting with all the diverse stakeholder groups from the earliest concept phases of this project.

Nature Scot will be interested in the potential impact on wildlife, most notably seabirds, which the area is designated as a SPA for. As the photograph earlier in this document shows, virtually all the structure and growing lines are held subsurface (2m to 5m depth). The ropes are kept tensioned to avoid crossing or rubbing. There are no nets to tangle birds underwater in and diving gannets will see the weeded lines and avoid them. There will be extensive ornithology reports created by the windfarm companies that are constructing huge wind farms from Montrose Bank down to the Firth of Forth. These huge windfarms sit on the edge of or are within the SPA and have been given consent to operate, so it is hoped that the evidence they provided can be used by Nature Scot to allay fears over the impact of Mara's seaweed farm and speed up any decision making to not delay the Application process. There have been

[1] https://www.researchgate.net/publication/7704221_North_Atlantic_Right_Whales_in_Crisis
[2] https://media.fisheries.noaa.gov/dam-migration/wcr_2016_whale_entanglements_3-26-17_final.pdf

various farm designs and line layouts trialled to cultivate seaweed, mostly in Argyll. There have been no reports of bird entanglement in farm ropes.

07 Disturbance, resting and foraging birds

07.01 Breeding Birds

At 6nm from shore the proposed farm site will be well away from any nest sites, so breeding birds will not be disturbed by the farm.

Birds are often seen roosting on the buoys of similar seaweed and mussel lines on the west coast and northern isles. In recent harvesting operations on the Mull farm, cormorants, shags and various gulls were perched on the surface floats of the farm. Diving birds of various species are often seen swimming down below the seaweed lines to hunt. The seaweed attract many small fish (particularly juvenile lumpsuckers), crustaceans and other arthropods, molluscs and various Annelida.

Vessel movements around the farm site did not dislodge the birds, which is a common occurrence at mussel and finfish farms in the area. Birds very quickly become tolerant of the human activity at the sites. The structures become useful platforms for birds to rest on.

07.02 Other factors

07.02.01 Vessel operations will always be conducted in daylight during operational phases, utilising the existing vessels that fish the local waters. Harvesting of the seaweed lines involves clear cutting the seaweed away from the rope and both are brought ashore for onward processing or cleaning respectively.

07.02.02 Shading – Seaweed cultivation lines are placed out at sea on the farm in late autumn and the lines over-winter there with little or no growth on the lines until spring. The seaweed on the lines grows rapidly February through to April and is all harvested out by end of May. The seaweed lines are well spaced apart to prevent them rubbing and with the low angles of the sun in the spring months the estimate of shading of the seabed and water column is less than 1% in Dec, less than 4% in Jan, less than 7% in Feb, less than 10% in Mar, less than 15% by end of April and the seaweed is harvested out by end of May. The chosen site of the seaweed farm is light sand seabed which does not hold wild seaweed plants that require sunlight for photosynthesis. It is therefore hoped that the seaweed farm will have a negligeable effect from shading on the wider marine environment.

07.02.03 Nutrients – seaweed cultivation does not require the input of feed or conditioning chemicals. All the plants require to grow is sunlight. Seaweed draws in nutrients and minerals essential for its growth. These are the available to us when we consume the plants. Mara's farm

site is in open sea, with strong tides replenishing the nutrients constantly preventing nutrient depletion in the surrounding waters.

08 Seed Stock and INNS monitoring and reporting

Mara currently hold licenses for shore harvesting along the Fife coasts. Any seaweed required for seed stock will be sustainably harvested as part of their usual harvesting operations. Seaweeds produce millions of spores per plant, so a very small amount of seaweed, say a wheelbarrow worth, can feasibly seed a hundred kilometres of growing lines. Only native species will ever be grown on Mara's farm and seed stock taken from the east Fife shore only.

Mara are applying for consent to cultivate several Seaweed species – *alaria esculenta, laminaria digitata* and *saccharina latissima* as these are species for which seeding techniques have already been developed for cultivation. Mara will also apply for consent to farm *palmaria palmata* but at this time, the seeding technique for this species is not available.

Under the Minute of Agreement, file ref FI-28-5, between the Crown Estate and Mara (formerly Celtic Sea Spice Company) Mara has the wild harvest license for an approximately 32km stretch of the East Neuk of Fife coastline with the following quotas for the species mentioned above:

- 22,773kg pa of Palmaria palmata
- 64,298kg pa of Laminaria digitata
- 5,972kg pa of Alaria esculenta
- 6,569kg pa of Saccharina latissima

All samples required to be harvested for seedstock will be taken as, and represent a tiny proportion of, these quotas.

Other species, such as *laminaria hyperborea, himanthalia elongata, porphyra species, osmundea pinnatifida* and *ulva lactuca* may be applied for in future, but at this time there is no technique for their culturing. These are all native species and are found growing wild locally.

While the target seaweed species are locally sourced, native species, there will be biofouling of other species occurring on the seaweed growing lines. All seaweed harvested will be brought ashore and processed at Mara's premises in Glenrothes. Any INNS, non-target or fouled plants will be disposed of into landfill or composted ashore.

All growing lines at the farm site will be deployed in late autumn and removed as the seaweed is harvested out by end of May. The lines will be brought ashore and cleaned for reuse or disposed of through normal commercial waste routes.

Mara may consider the addition of further consent towards IMTA (Integrated Multi-Trophic Aquaculture) such as mussels, scallops or oysters, perhaps at sites on the West Coast of Scotland. But Mara's main focus will continue to be algae at this site for the foreseeable future.

09 Farm Structure and operational seaweed growing lines

An ADCP (acoustic Doppler current profiler) was deployed at the proposed site for a full lunar cycle over December 2021 into January 2022; these readings were combined with longer term wave, tide and storm data for the location to build a detailed understanding of the maximum wave height, current speeds and other stresses the farm can be expected to be subject to.

The farm has been modelled with appropriate hydrodynamic software to ensure the design will be sufficiently robust that the most extreme possible conditions to be found in the area will remain well within the tolerances of the structure. Indeed, an unrealistic combination of the worst factors (i.e. the effect of the worst midwinter storms impacting the farm when it is most heavily laden with seaweed biomass in midsummer) was modelled and found to be within tolerance.

The farm structure is essentially modular units, consisting each of 2 mooring point on the seabed, each with risers to a float on the surface. Then 20m plastic poles are used to separate 5 growing lines 5m apart. At each 50m length, another 20m pole keeps the growing lines apart along the 204m long growing lines. This gives 1km of growing line per modular unit. Some other surface floats may be used to keep the growing lines at their optimum growing depth of 3m to 5m.

The water depth at the site averages around 22m OD. The seabed EUNIS habitat classification is A5.1 sublittoral coarse sand & A5.2 sublittoral sand (depending on the detail level of the map): BGS Offshore, Marine Sediment, Sand – anchors and subsurface structures will be set on soft sediment, clear of any rocky reefs.

The proposed longline design (Fig 3) has already been used and proven in licensed farms on the west coast (e.g. Aird na Cuille, south end Sound of Kererra near Oban).

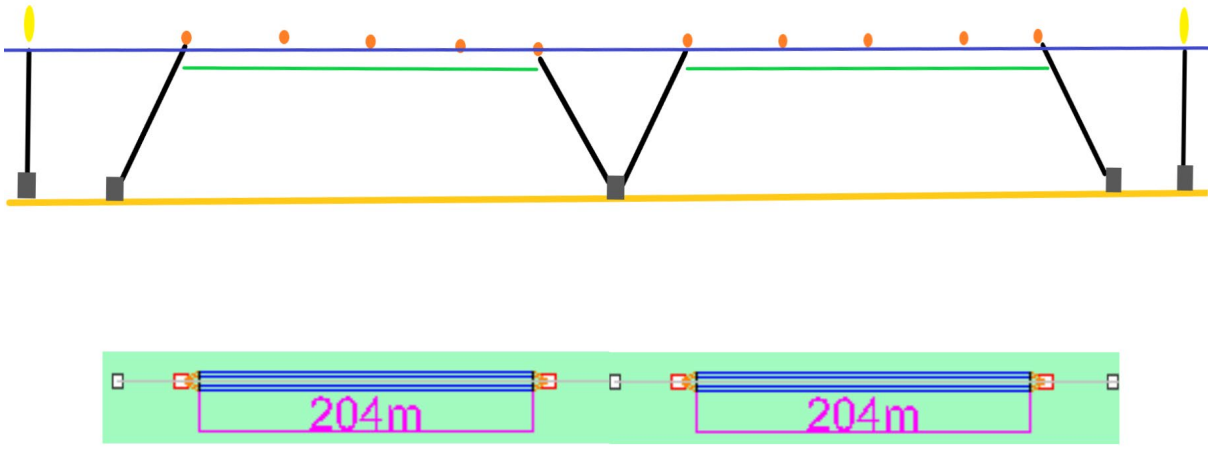

Fig 3 - Side and top view plan of longline system of seaweed farm

10 Lost Lines and Site Waste

The seaweed farm will be visited on a weekly basis throughout the year to ensure the structure and any growing lines deployed (Oct to May) are fixed and tensioned appropriately. Any broken lines will hopefully still be attached at one end and so can be recovered and either reattached or removed.

During fallow periods (June to Oct), the visits will be a simple passing visit by a local creel boat to ensure all floats are present and that all is well with the site.

There are no chemicals or cleaner additions to the water column at the site from any of Mara's activities. The seaweed are plants and require only sunlight and the seawater to flourish.

Any waste generated from the project will be disposed of ashore through local, certified commercial waste disposal. All ropes and equipment will be stored ashore during fallow periods of the farm (May to Oct). And all cleaning of ropes and equipment will be done ashore. There are no Special Waste requirements envisaged.

Work is underway to find the perfect growing medium for the seaweed lines to reduce the waste rope volumes to an absolute minimum. This will take time to assess as we check for the ability of different ropes to be cleaned and reused without losing structural strength or foul the new seeded seaweed of the next harvest. We will also be very watchful for plastic particulates being passed from older ropes into the growing products. Samples will be taken throughout each growing season to determine a whole range of factors of the seaweeds development.