KelpCrofting

Marine Licence Application for an algal farm in

waters south of Pabay, Isle of Skye

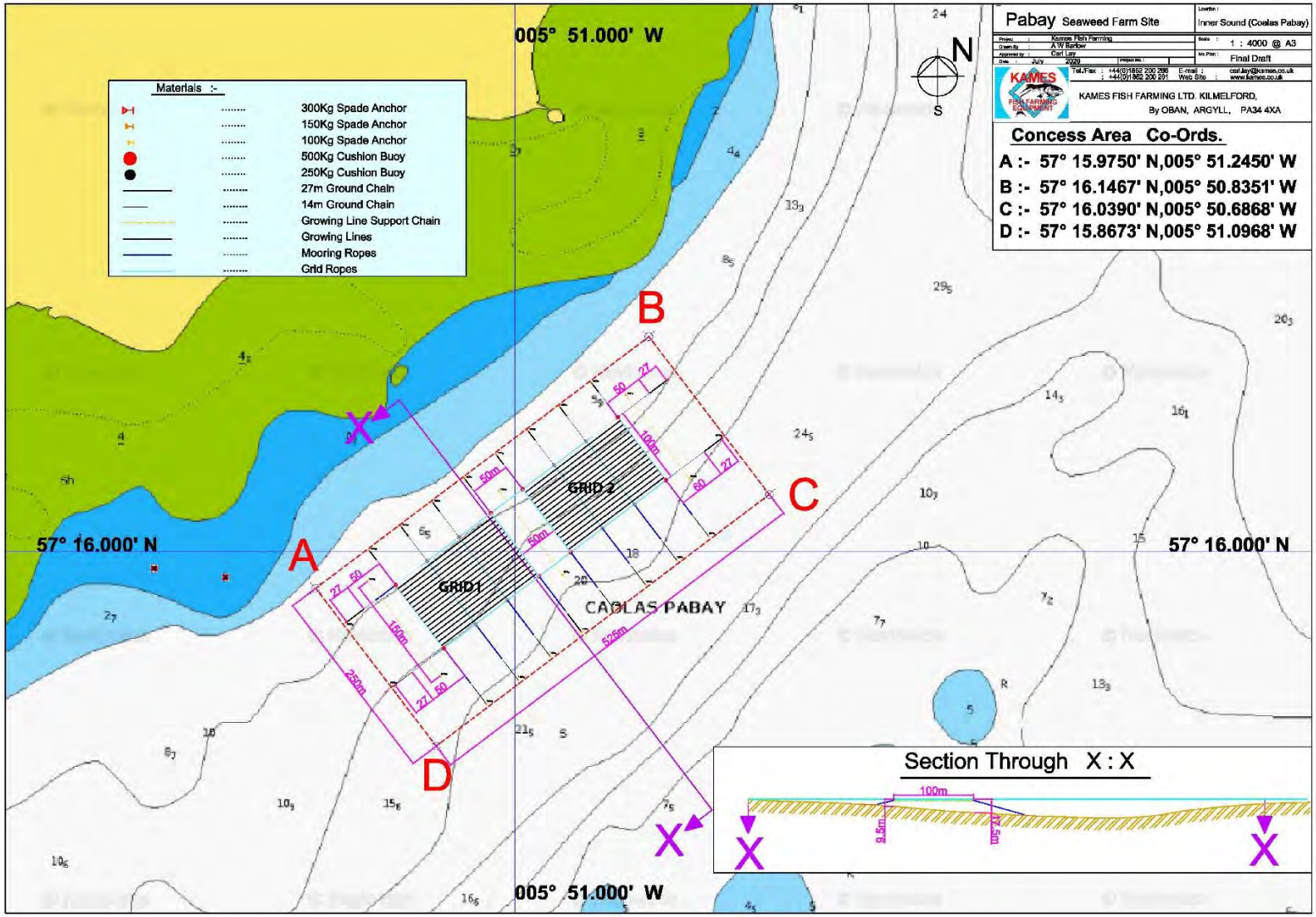
Supplementary Material

This Supplementary Material has been prepared to accompany the Marine Licence Applications (MLA) to Marine Scotland Licensing Operations Team (MS-LOT) by the Applicant (KelpCrofting Ltd.) for the installation of an algal farm in the waters south of Pabay, Isle of Skye (hereafter referred to as 'the Proposed Development').

Contents

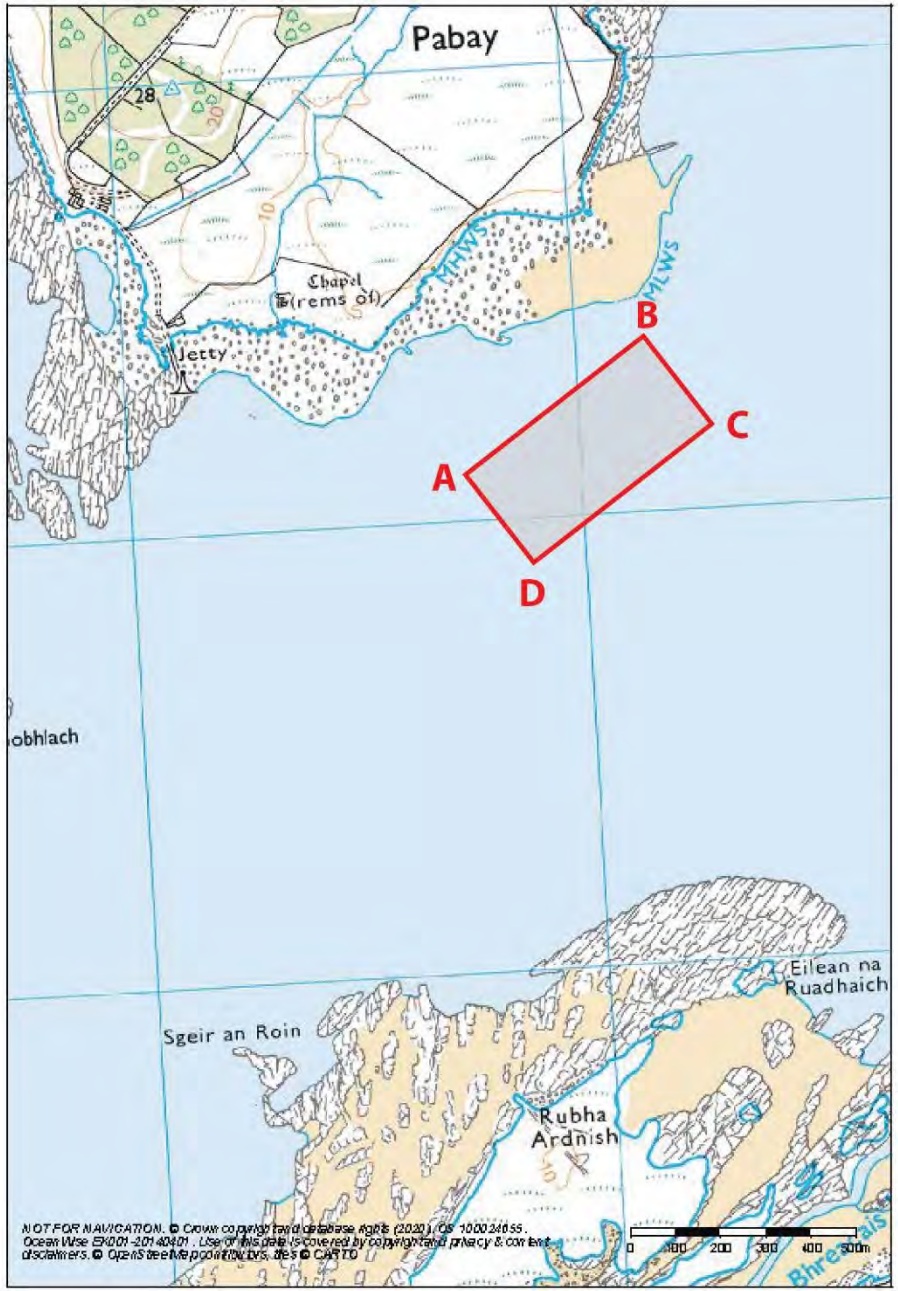
1 Project Drawings and Maps.

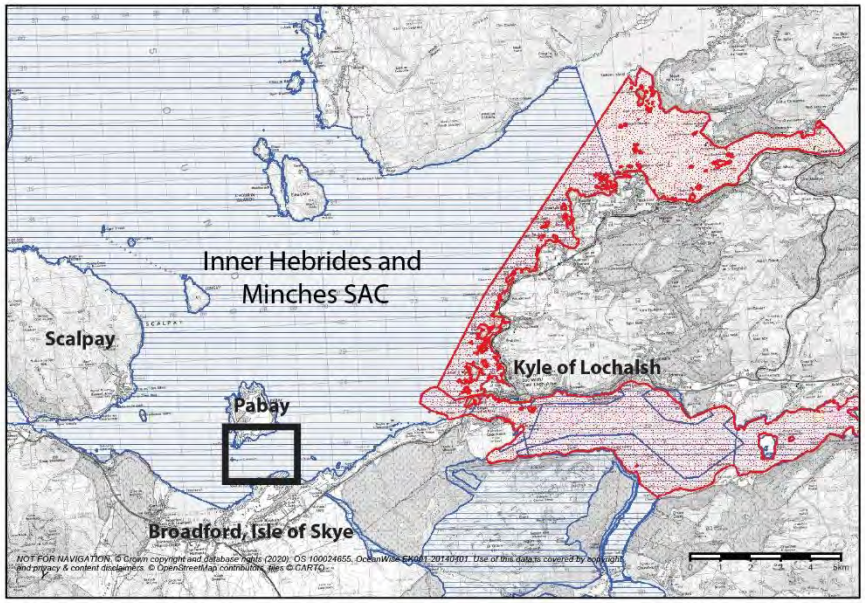
1.1 Project Site Drawing:



(Above): Drawing of Proposed Development, showing outer mooring boundary area (concession area), within which are two grids of longlines (upon which kelp is grown). Each grid would comprise a maximum of 20 longlines, measuring 150 m each in length, spaced 5-8 meters apart (maximum of 40 longlines at the Proposed Development).

1.2 Location of Proposed Development:



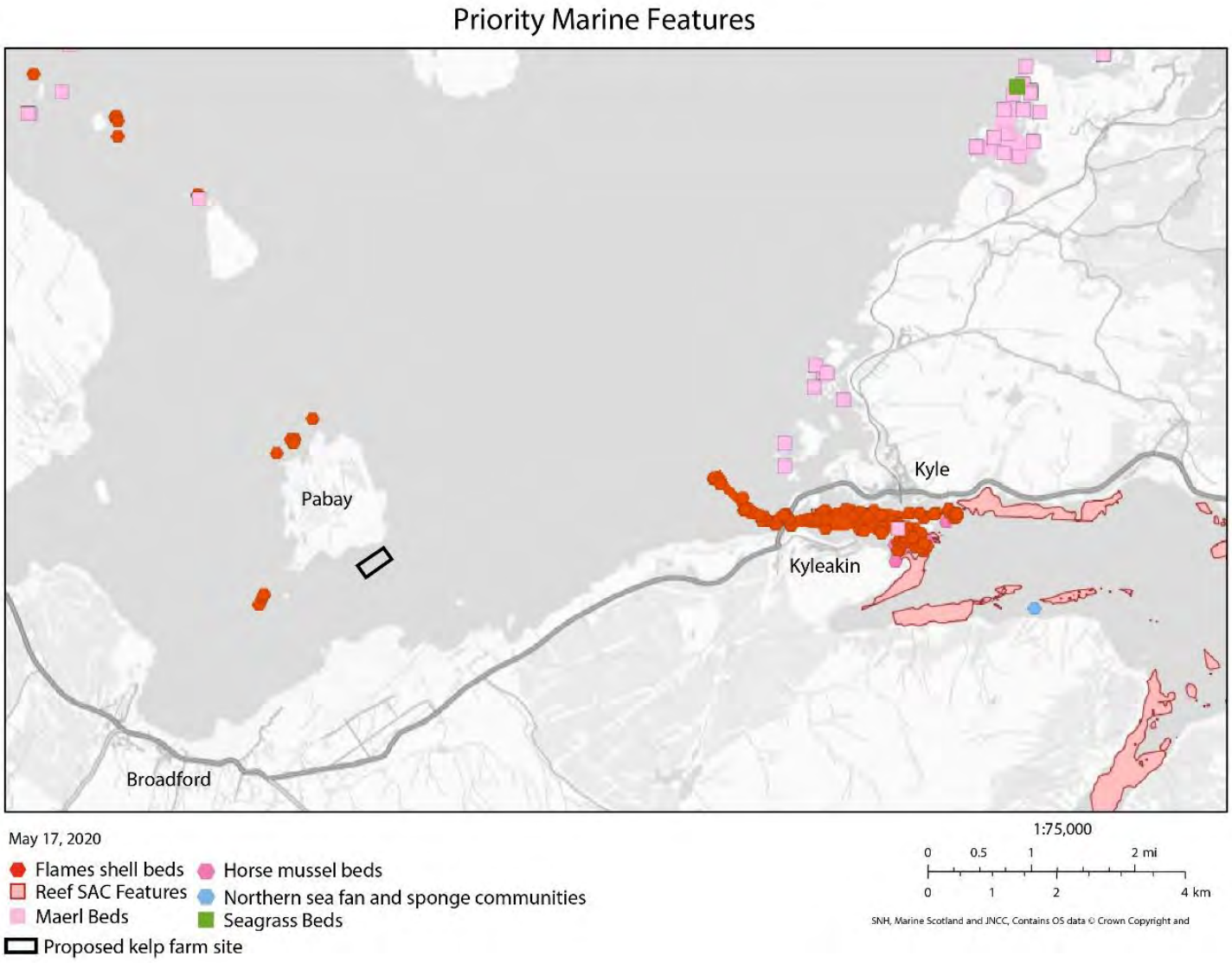


(LEFT): Location of Proposed Development shown by red rectangle, scale 1:10,000.
(ABOVE): Wider geographic area (at 1: 100, 000 scale), shows boundaries of adjacent MPA's and SAC's. The proposed Development is not within a conservation Marine Protected Area (MPA), a Site of Special Scientific Interest (SSSI), a Special Protection Area (SPA) or a historic MPA. However, the Proposed Development is within the Inner Hebrides and Minches SAC, which is designated for protection of harbour porpoise.

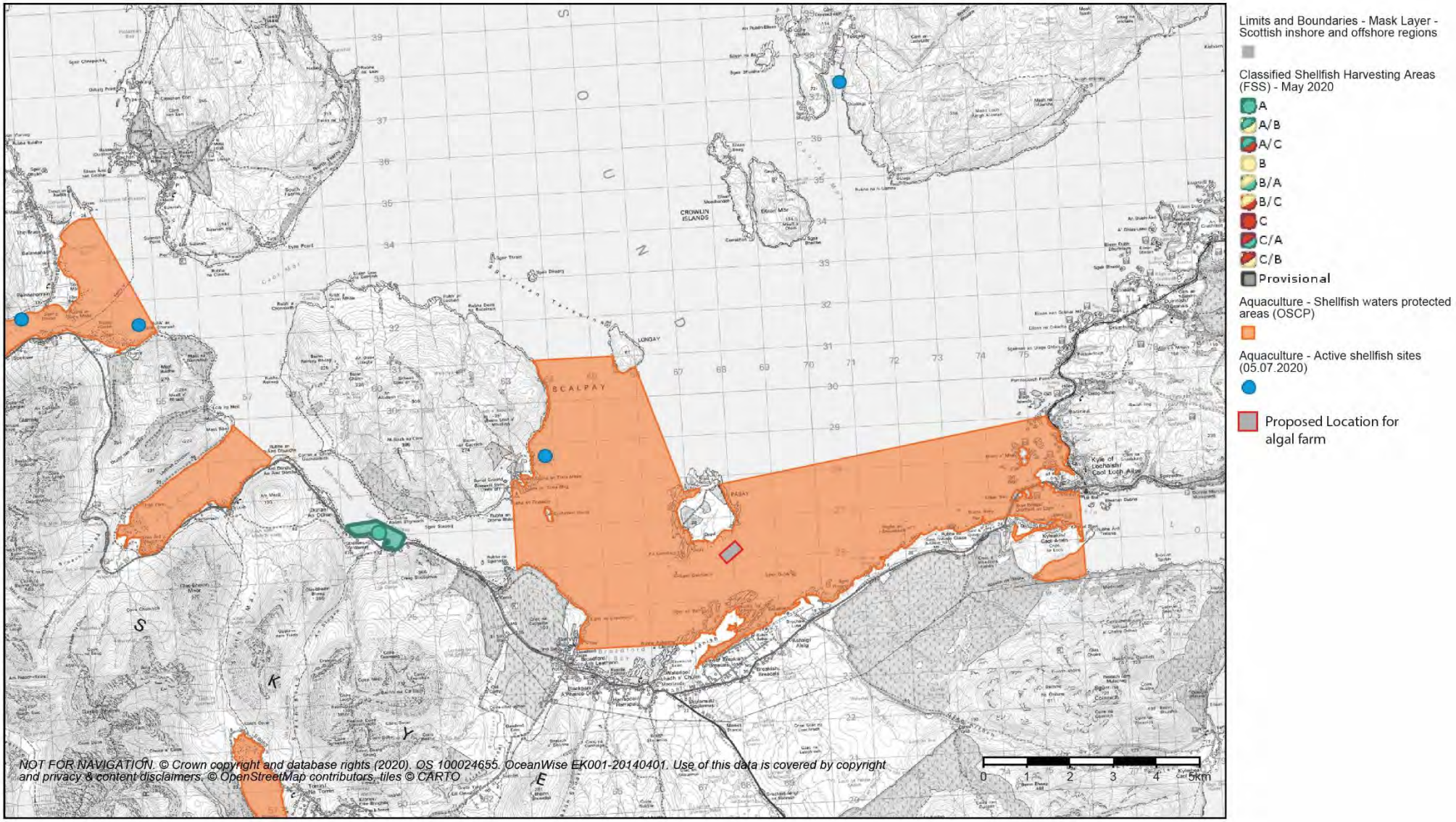
Special Area of Conservation (SAC)

Nature Conservation Marine Protected Area (MPA)

Proposed site location



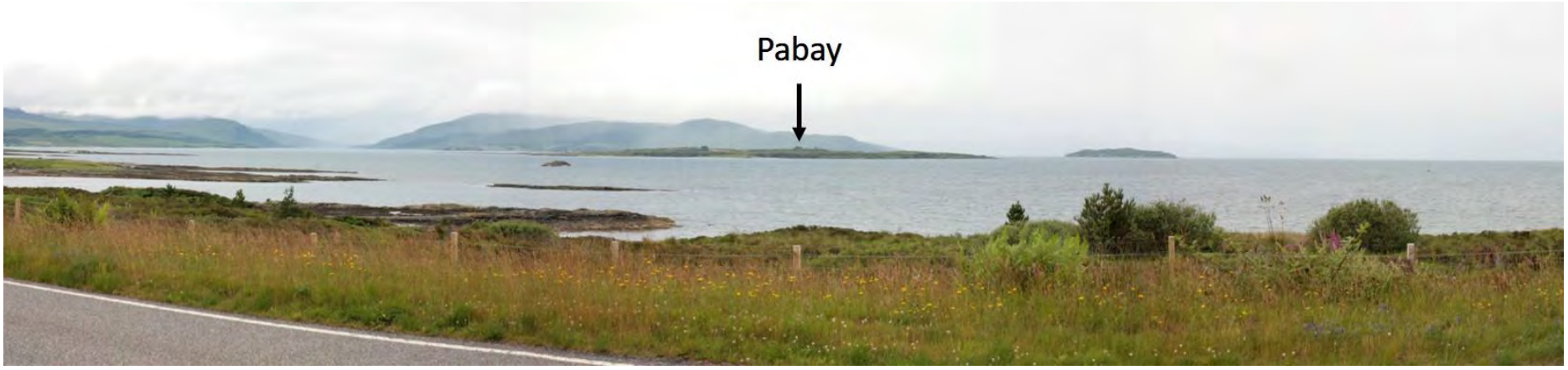
(Above): Location of benthic Priority Marine Features that are potentially sensitive to impact by aquaculture developments (obtained from National Marine Planning Interactive). It is clear from this data that the Proposed Development is not above sensitive PMFs, as was confirmed by Applicants dive survey.



(Above): Location of proposed algal farm site in relation to classified shellfish harvesting areas, shellfish protected waters, and current active shellfish sites.

1.3 Site Photographs:

(Above): View from the proposed South Pabay farm site, looking south to the northern coastline of Skye. Red dots indicate locations of following photographs:



(Above): View 1, taken from the A87, near the Kylerhea junction, looking north west towards Pabay, with Scalpay beyond.

(Above): View 2, looking north to Pabay from above the Ashaig cemetery and beach carpark.

(Above): View 3, taken from the western end of the Lower Breakish road.

2 Method Statement

KelpCrofting Ltd, hereafter referred to as the Applicant, are an environmental startup that would like to establish a small-medium scale algal farm in the waters south of Pabay, Isle of Skye, to grow seaweed for various markets.

Site Selection: A rigorous site selection process was undertaken to identify a suitable location for the proposed seaweed farm, which was based on available evidence, local knowledge. The following criteria were used in the site selection process. The site should be: away from main fishing grounds; have minimal or no conflict with other marine users or developments; be in an area with good water flow, intermediate exposure, and full salinity; have good to high water quality status; be located in waters deeper than 8m (this is because the maximum tidal range is 6m, and the seaweed will be grown at 2.5m below the surface at all times); preferably soft seabed for moorings, but not situated above sensitive or protected marine life (e.g. flame shells); and, located close to a harbour or slipway for landing / transport of seaweed, but not in busy shipping channel/vessel traffic area. Both Scottish Natural Heritage (SNH) and the Scottish Environmental Protection Agency (SEPA) were consulted during the site selection process, and it is believed that all the above criteria have been met at the proposed south Pabay farm site. In addition, it should be noted that the site is located away from sewage outfall and pollution areas, and is within a Shellfish Water Protected Area (SWPAs), which SEPA recommends is necessary if the seaweed is to be sold for human consumption/and or medical use[1]. This also aligns with Policy 3 of the Scottish Governments Seaweed Cultivation Policy[2] – "*Where seaweed is grown for human consumption, cultivators should site farms away from sewage outfalls and other potential sources of pollution"*.

Design: Kames Fish Farming Ltd were contracted to assist with design of the proposed seaweed farm (see drawings of Proposed Development above). The Proposed Development would comprise 2# grids of 20 'longlines' each, resulting in a maximum of 40 longlines in total. Each longline will be 150 metres in length and spaced 5-8 meters apart, giving a total maximum growing length of 6000m linear meters (150m x 40 lines). The 2 grids will be cross-tensioned, with spade embedment anchors and ground chain, making the system high strength and durable. This aligns with Policy 4 of the Scottish Governments Seaweed Cultivation Policy – "*Equipment used in seaweed cultivation should be fit for purpose to withstand damage from adverse weather conditions*". In addition, **the scale of the Proposed Development fits within the Scottish Governments definition of a small-medium scale algal farm (0-50 x 200m lines)[2].**

The total area of the Proposed Development is 13.12 hectares, within which the growing area is 3.5 hectares (the mooring area takes up the majority of the space). It is anticipated that the farm will require large grey cushion buoys at the 4 corners of each grid of longlines, and smaller cushion buoys at 50m intervals around the perimeter of the grids (see drawing of Proposed Development). The site will likely be identified with yellow Special Mark buoys (with an X at the top and a flashing light) to ensure safe marine navigation. The Applicant anticipates these will be required at the two southern site corners, but the Northern Lighthouse Board is to advise as part of the Marine License Application.

[1] Land Use Planning System SEPA Guidance Note 13, 08/06/2017, page 18
[2] Scottish Government, SEAWEED CULTIVATION POLICY STATEMENT.
https://www.gov.scot/publications/seaweed-cultivation-policy-statement-2017/pages/2/

Deployment and Operation: If given consent, a suitably qualified Work Boat will be contracted by the Applicant for installation of the grid moorings. It is anticipated that the first half of the Proposed Development will be installed in the winter of 2020, and the remainder between 2021-2022.

The cultivation or 'farming' of kelp will take place in the following (simplified) stages: (1) firstly, kelp spores or reproductive material will be collected from *local* kelp fronds in the wild during later summer and autumn (not more than 25 km from the farm site); (2) juvenile/small kelp plants will then reared in at KelpCrofting's own laboratory/hatchery in Plockton for a period of 6 to 8 weeks; (3) once the sporophytes are a few millimeters long they will be deployed to longlines at the proposed south Pabay seaweed farm, where they continue to grow for a further 6 to 9 months; (4) the large kelp fronds will then be harvested in summer the following year. The Applicant aim to grow several native species of seaweed on longlines at the site, including *Saccharina latissima* (sugar kelp), *Laminaria digitata* (oarweed / sea tangle), *Palmaria palmata* (dulse) and *Alaria esculenta* (dabberlocks). This aligns with Policy 2 of the the Scottish Governments Seaweed Cultivation Policy – *"Only species native to the area where seaweed cultivation will take place should be cultivated, to minimise the risk from non-native species".*

It is anticipated that the seaweed will be harvested using fishing vessels and/or a mussel landing craft, and the harvesting period would typically take place over 4-6 weeks from May – June. However, we will run trials to extend this harvesting period. The maximum annual yield from the site is likely to range from of 50-70 tonnes wet weight (dependent on species grown), and the seaweed would to be landed to Broadford, Kyle or Kyleakin pier using existing harbour infrastructure. The seaweed would then be transported via road for further processing. A diversity of markets exist for seaweed products and derivatives, which the Applicant hope to supply, including but not limited to, human food and nutritional supplements, cosmetics, animal feeds, fertilizers and biopackaging.

Site maintenance: The site will be checked regularly (e.g. weekly) for any loose or floating rope, and to ensure special mark buoys are operational and still in place/visible. The anchors/moorings will be checked and maintained annually by qualified divers, and a suitably coded Work Boat will be employed to remove any unsafe or broken equipment from the site if necessary. Longlines or 'growing lines' will be removed annually for cleaning (end of summer), and redeployed by a local fishing vessel at the start of the following growing season (~October/November). Strict Health and safety protocol will be adhered to at all times.

The mooring system will have a life of minimum 15 years for anchors and ~5 years for longlines. No plans are currently in place for decommissioning. All structures are of conventional construction, and no issues are foreseen in the event that decommissioning is proposed at some future date.

3 Potential Impact works may have

3.1 Environmental considerations

The Scottish Governments SEA Environmental Report for algal farming[3] indicated that there is likely to be limited environmental impact from small-medium scale sites with up to 30 x 200m lines (6000

[3] Marine Scotland (2012). Strategic Environmental Assessment (SEA) Scoping Report. Seaweed Policy Statement, pp. 42.

linear meters). The Proposed Development fits within this scale (40 x 150m lines, totaling 6000m), and so limited impact is anticipated, however very carful consideration has been given to any potential impacts as detailed below:

Protected areas: The proposed site is not within a conservation Marine Protected Area (MPA), a Site of Special Scientific Interest (SSI), a Special Protection Area (SPA) or a historic MPA. However, the site is within the Inner Hebrides and Minches SAC, which is designated for protection of harbour porpoise (See map above), and is a very large SAC spanning the west coast of Scotland.

Little is currently known about the risk of megafauna entanglement in relation to seaweed farming in Scotland, and Europe more widely, as it is a very new industry. However, it has been suggested that risk of entanglement in small-medium scale seaweed farms is similar to that of other aquaculture developments (e.g. finfish aquaculture), where entanglements are infrequent/rare events. Factors that could increase the risk of entanglement in aquaculture developments include moorings and lines that have low tension, and that are not strong enough to withstand the force of a marine mammal encounter. Poor water visibility may also increase the risk of entanglement, as would use of nets to cultivate algae.

The Applicant will mitigate the risks of entanglement by ensuring growing and mooring lines are fully tensioned and secure, there is no loose or abraided rope at the site, and that lines are spaced wide apart (5-8 meters). The relatively shallow site and good visibility may also reduce the risk of entanglement. The Applicant will also give consent for monitoring and reporting of any entanglements, and adapt management of the site based on evidence of incidents, and has agreed to collaborate with the Scottish Entanglement Alliance (SEA) on future monitoring projects. In addition, the Applicant will be receiving disentanglement information kits from SEA, and plan to attend their upcoming disentanglement workshop in Kyle of Lochalsh (date to be confirmed).

Priority Marine Features: The Proposed Development is not located above known records of benthic priority marine features (PMFs) that are sensitive to impacts from aquaculture developments (See figure above). This was confirmed by a visual dive survey of the proposed mooring locations that was carried out on the 17th June 2020, and commissioned by the Applicant. A copy of the video footage may be obtained on request by contacting the Applicant direct.

In terms of general benthic health, shading of marine life that require light to grow (e.g. seagrass and maerl) may occur below seaweed farms. However, these habitats are not found below the Proposed Development, and so this is not considered to be an issue. A recent study concluded that since the seaweed biomass peaks during a relatively short period in summer, it is likely that the shading by a small-medium scale seaweed farm has "limited functional and ecological effect on photosynthetic benthic communities"[4]. That said, the Applicant will aim to reduce any perceived impacts of benthic shading by spacing lines 5-8m apart so that light can still reach the seabed.

Biosecurity and genetic diversity/integrity: As per SEPA guidelines, all kelp reproductive material will be sourced locally (within 25km of proposed farm location, and within the same water body) from a mix of 'plants' to ensure local genetic diversity is maintained and not threatened. In addition, a biosecurity plan will be developed to prevent spreading of invasive species and disease, and a "check, clean, dry" protocol will be followed.

[4] Visch W, Kinonets M, Hall P.O.J, Nylund G.M and Pavia H. 2020. Environmental Impacts of kelp (Saccharina latissima) aquaculture. Marine Polution Bulletin, Vol 155 (110962)

Water quality, marine litter, air and noise pollution: According to SEPA classification, the current status of water at the proposed site is "Good". In addition, the area falls within a Shellfish Water Protected Area. Seaweed cultivation requires no freshwater, no fertilizer and no chemicals, so is considered to have minimal impact on water quality and can actually improve it through absorbing excess nutrients that have been released from anthropogenic activities.

In terms of marine litter, single-use plastic will be avoided where possible, and recycled, long-lasting materials will be used. The site will also be checked regularly for any loose/ abraided/floating rope, and any waste generated will be disposed on land via the local authority. There will be some boat noise generated during setup and management of the farm; it will be visited by a small fishing vessel approximately every 1-2 weeks during the growing period, and then regularly during the 4-6 week harvesting period. However, any boat noise at the site would be similar to that generated from fishing activity in the local area, and not significantly above current background levels. The only potential air pollution would be emissions from a small vessel travelling to/from the site, however this will be insignificant/negligible relative to total emissions from all vessels and vehicles in the area.

Climate change: The Applicant will strive to minimize emissions of greenhouse gasses wherever possible, for example by using passive seaweed drying processes (e.g. in polytunnels). In addition, farming algae may help mitigate climate change through absorption of CO_2 as the seaweed grows.

3.2 Socio-economic considerations

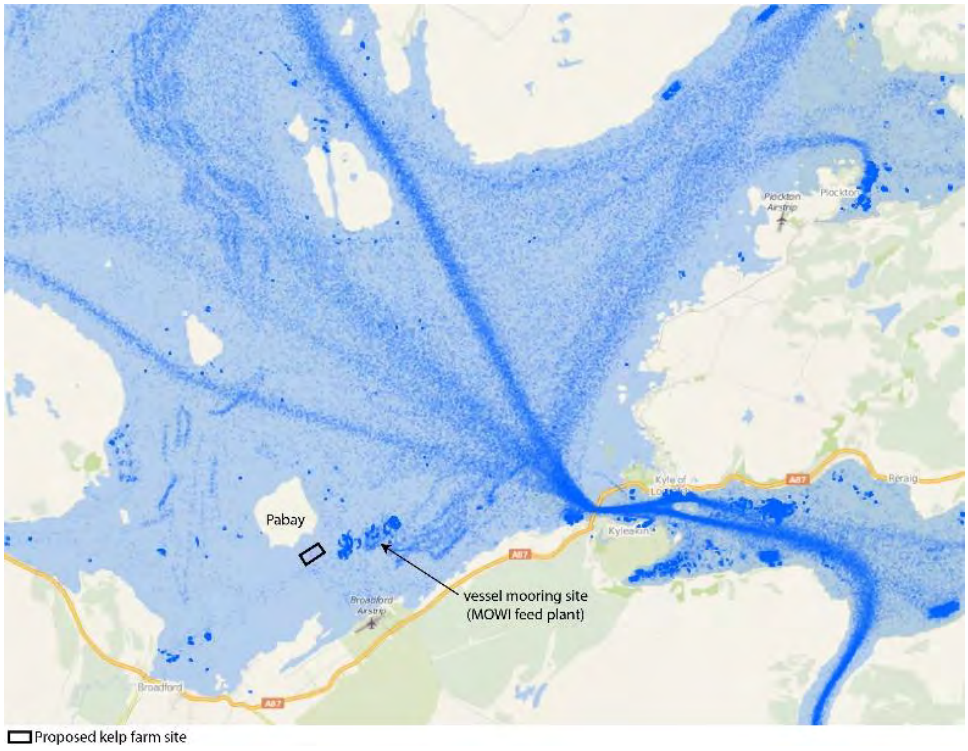
Fishing: Due to risk of snagging gear/lines, it would not be possible for certain fishing activities to take place within the boundaries of the farm (such as creeling, trawling and dredging). Therefore, the location of the Proposed Development has been selected to avoid key fishing grounds, as the Applicant aims to co-exist with fishing industry, not replace it. The Applicant have consulted with local fishermen, and this combined with local knowledge and available data (ScotMap and VMS) has informed the Applicants choice of the Proposed Development location. Data on fishing activity within the wider area was presented at the PAC meeting (see PAC report for details and maps in Appendix of this document). Members of the fishing industry have come forward and voiced their support for the project during the consultation period (see PAC report), and the Applicant does not anticipate any conflict.

The Applicant acknowledge that the wider Inner Sound area is important for prawn (*Nephrops*) fishing, by both static and mobile gear, however, the proposed site is mostly on gravelly/sandy ground, not typical prawn ground, which is muddy. There is also some fishing for velvet crabs locally, but this is on rocky ground and the site avoids main rocky crab grounds. To the best of the Applicants knowledge, and based on assessment of Scotmap and VMS data, there is very little scallop dredging and diving in proposed site area (ground not productive for scallops). The total size of the proposed site is also small relative to total fishable area in the wider Inner Sound.

Other aquaculture: The site is not within or immediately adjacent to other aquaculture developments and shellfish harvesting areas. Therefore, no impacts are perceived for these marine users.

Other legitimate use of the sea: The Applicant anticipate that it should be safe for some other activities to continue in/around the seaweed farm, such as scuba diving, kayaking, snorkeling and angling. Since the growing lines will be ~2.5m below the surface, or deeper, small shallow draft craft may be able to pass over the site, but at their own risk. The location of the site will also allow

unrestricted passage through the deep channel between Broadford and Kyle of Lochalsh / the Inner Sound. In addition, AIS vessel traffic data over a 1 year period (Jan 2019 – Jan 2020) shows that the site is not within a busy traffic area (**Error! Reference source not found.**).



(Above): AIS vessel traffic data over a 1-year period (Jan 2019 - Jan 2020), showing proposed site location is not in a busy vessel traffic area. Obtained from Vessel Finder.

3.3 Visual considerations:

A Visual Impact Assessment for the Proposed Development has been undertaken by a Landscape Architect (See Appendix), and concludes that the visual impact of the Proposed Development will be low/negligible. Surface buoys at the perimeter of the grids will be barely discernible from the nearest road-accessible public viewpoints on Skye, over 2 kilometres distant, and any perceived visual impact will be reduced by use of grey or green buoys. In addition, the visual prominence of the buoys is reduced by the relatively low elevation of the public viewpoints, resulting in a linear foreshortening of the site elements and their visually coalescing with the island of Pabay beyond.

It is anticipated that lit yellow navigational maker buoys will be required at the south eastern and south western corners of the Proposed Development. The solar powered lights on these navigation buoys generally flash yellow at 5 second intervals, and their maximum visual range tends to be in the region of 1.5nm (2.7km) in good atmospheric conditions. As such, lighting may be faintly visible at night from Breakish. Whilst fulfilling Northern Light-house Board (NLB) requirements, the visual prominence of any marking and lighting required will be minimised where possible, and the Applicant looks forward to considering this in discussion with NLB.

4 Scotland's Marine Plan

4.1 General policies:

Chapter 4 of Scotland's Marine Plan details 21 general policies, all of which have been given consideration in reference to this application.

(GEN 1) General planning principal of sustainable development: The seaweed farm will be managed in a sustainable manner that protects & enhances Scotland's natural / historic marine environment. It will provide an alternative to wild harvesting natural populations, which play an important role in coastal ecosystems. In addition, recycled materials will be sourced and used where possible.

Achieving a sustainable economy:

(Gen 2 & 3) Economic and social benefit: The seaweed farm will provide new/alternative income streams to coastal communities, help maintain population levels and economic prosperity, and bring new skills to the Highlands. The seaweed farm may enhance natural biodiversity locally, adding interest for nature lovers, kayakers, divers, bird watchers etc, and seaweed products directly enhance human health and wellbeing (e.g. as nutritional supplement/food).

(Gen 4) Co-existence: The site selected to avoid conflict with other marine users and allow co-existence, particularly with the fishing industry who may be able to assist with operations on the farm. The Applicant does not see seaweed farming as a replacement' economy, but wants to work alongside establishing fishing communities and aquaculture industries. Consultation and education with the wider community will be an ongoing process as the business develops.

Ensuring a strong, healthy, just society:

(GEN 5) Climate change: Seaweed farming is a low-energy process, and the Applicant will use renewable energy where possible in down-stream processing (e.g. in drying process). In addition, growth of seaweed absorbs CO_2, which can help mitigate climate change. The Applicants propagation laboratory and Registered Company address is carbon neutral and powered by solar PV.

(GEN 6) Historic environment: The proposed site is **not** within or near a Historic MPA, and there will be no disruption to heritage assets. In addition, there is a long history of seaweed use in Scotland, which may be 'rejuvenated' with seaweed farming.

(GEN 7) Landscape / seascape: Please see Part 4C above (consideration to visual impacts).Visual impact on the landscape will be negligible/low, and visual impact on the seascape will be limited/mitigated as far as possible as per SNH guidance. The majority of farm structure will be below the surface, and not visible, with the exception of required surface buoys and navigational marker buoys that are required for safe navigation. In addition, the proposed farm is not within a National Scenic Areas, National Park or World Heritage Sites.

(GEN 8) Coastal process and flooding: There is no known risks of flooding and coastal erosion associated with seaweed farming. Kelp farms may reduce wave energy, which could protect coasts from storm surges and erosion.

Living within environmental limits:

(GEN 9 & 10) Natural Heritage & Invasive non-native species: See Part 4(A) above. The site has been located to avoid priority marine features / sensitive habitats, and measures will be taken to reduce entanglement risk to marine mammals within the Inner Hebrides and Minches SAC. In addition, a biosecurity plan to be developed (wash, clean, dry) to reduce risk of spreading non-native species, and biological material will not be transferred between different water bodies.

(GEN 11, 12, 13 and 14) Marine litter, water quality, noise and air quality: See Part 4(A) above.

Promoting Good Governance:

(GEN 15 &16) Planning alignments (land & sea): Access to the sea from land will not be restricted by the seaweed farm (access to shore maintained), and existing infrastructure will be used on land (e.g. harbours and roads) for landing and transport of harvested seaweed (no planning permission required at time of application).

(GEN 17 & 18) Fairness and engagement: The Applicant carried out extensive engagement and consultation with with local community and wider interest groups was conducted as part of the pre-application consultation process, during which everyones views and opinions were listened to and treated with fairness. There will be ongoing communication / engagement with public through the lifecycle of business development, both via the Applicants website and direct contact.

Using sound science responsibly:

(GEN 19, 20) Sound evidence: The site selection process based of available scientific evidence, e,g. through National Marine Planning Interactive, and consultation with SEPA and SNH, as well as survey data. The Applicants understanding of the cultivation process, impacts and benefits is also drawn from scientific literature, academics, engineers, industry practitioners and other stakeholders, in addition to personal experience. Gaps in evidence will be addressed through ongoing monitoring at the site (e.g. of marine mammals), and new data and information will be used in decision making / management of farm.

(21) Cumulative Impacts: There are no other algal farms in the local area. Elsewhere seaweed fams have been shown to interact positively with other aquaculture developments, such as fish farms (e.g. through absorption of excess nutrients). Other 'beneficial' activities would not be disrupted in the local area by installation of a seaweed farm in the waters south of Pabay.

4.2 Marine Plan in relation to aquaculture activities:

Chapter 7 in the Marine Plan outlines 7 objectives and 14 policies relating to aquaculture, most of which are focused on finfish and shellfish aquaculture; however, where relevant, they have been given consideration as part of this process. Details are as follows:

(Aquaculture Policies 1 to 8): The location of the proposed site has been carefully considered and based on available evidence (e.g. through National Marine Planning Interactive Portal, nMPI), and is felt to be appropriate. Potentially sensitive areas have been identified in the local area, and avoided. In addition, surveys have been conducted of the site area to check for sensitive marine life, and determine if seabed substrate and water flow are suitable for farm infrastructure and cultivation of seaweed. The site is also located in protected shellfish waters, which SEPA advises is necessary when producing seaweed for human consumption. Any potential visual impacts on the seascape and

landscape will be limited/mitigated as far as possible as per SNH guidance. Impacts of the farm on wild seaweed populations will be mitigated by sourcing reproductive material from the local area, and developing a biosecurity plan.

(Aquaculture Policy 9): If given consent, and before installation commences, an emergency response plan will be put in place for all farm workers.

(Aquaculture Policy 10): Consultation and community engagement has been carried out as part of this application.

(Aquaculture Policy 11): Equipment specifications are based on consultation with marine engineers, and all equipment will be fit for purpose at the site. There is a continued focus on reducing greenhouse gas emissions as part of our business plan.

(Aquaculture Policy 12): Not relevant to seaweed farming.

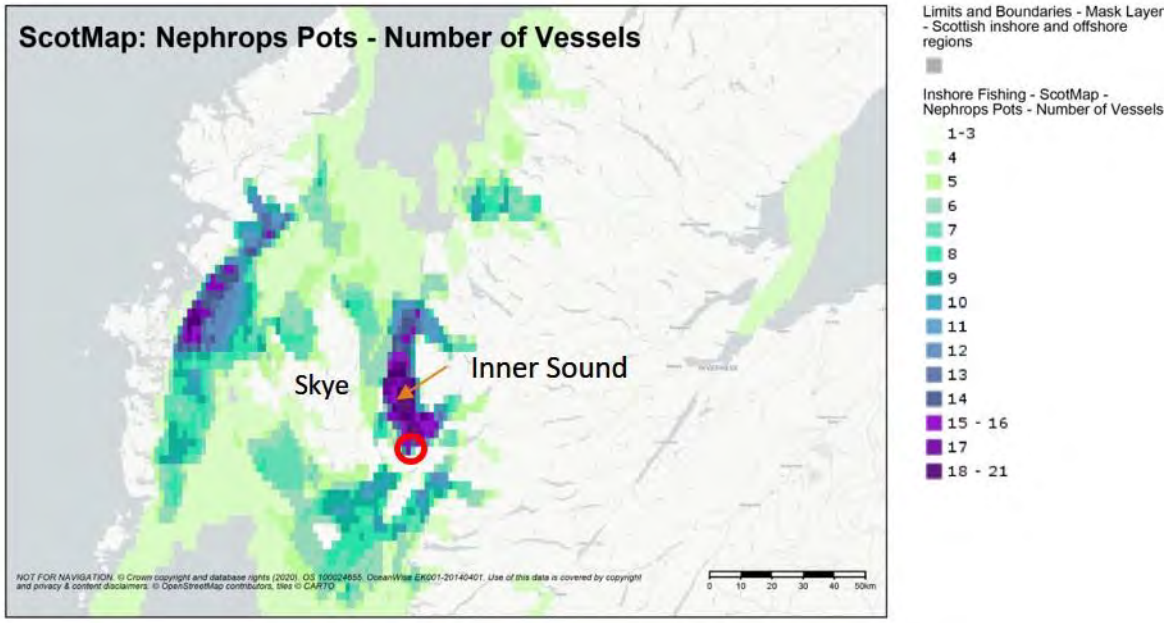
(Aquaculture Policy 13): A diversity of seaweed species will be cultivated at the proposed site. After several years of production, we may wish to cultivate other species at the site (e.g. scallops). However, shellfish are *not* included in this current licence application, and we would seek necessary statutory consent/permissions in future if we want to diversify to shellfish at the site.

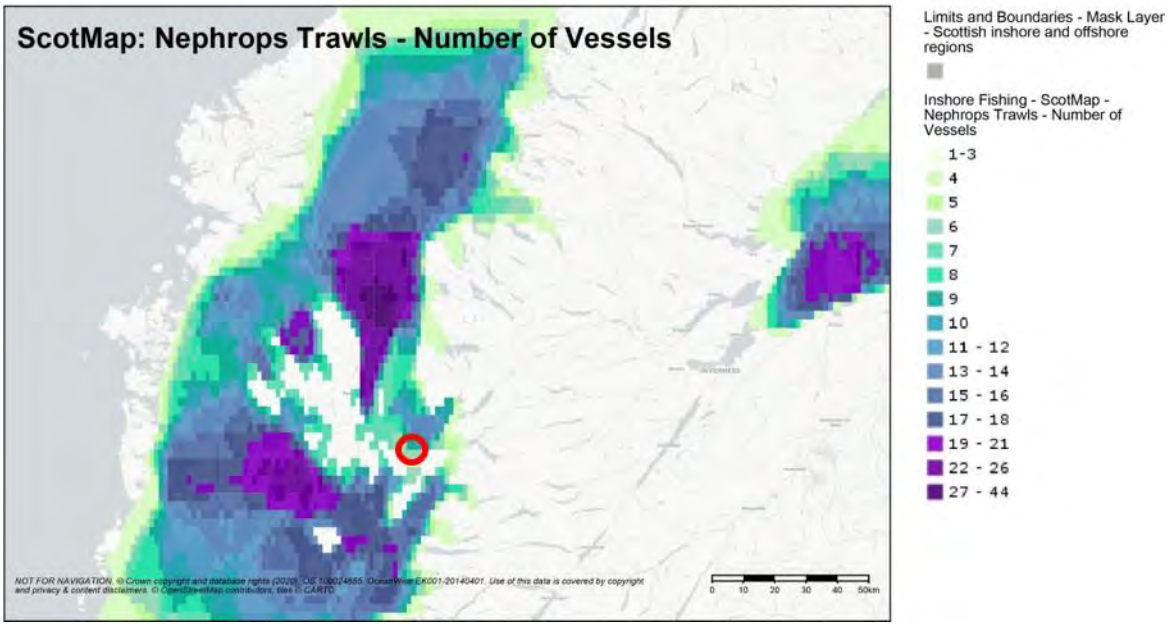
(Aquaculture Policy 14): Community benefits would be either as a direct result of job creation or as part of a wider community engagement and education program, which will be developed if the application if successful.

Appendix

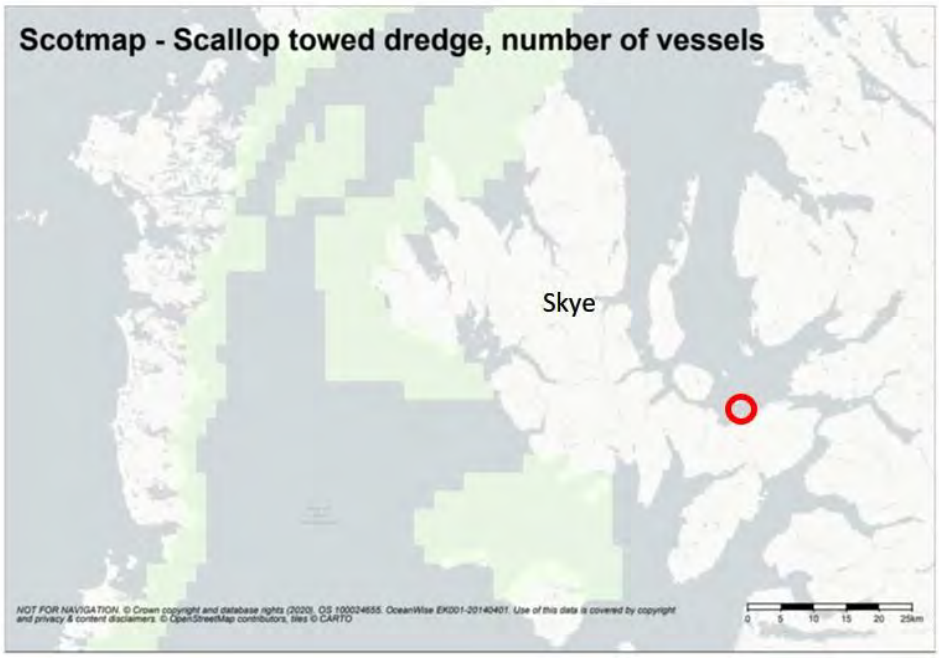
Fisheries Data:

Scotmap (Vessels 15m and under)[5]: Scotmap data can be used to broadly assess important fishing areas for vessels 15m and under, but has some major limitations at finer scale. Scotmap data was collected during face-to-face interviews with individual vessel owners and operators and relates to fishing activity for the period 2007 to 2011. The data is averaged over ~4km^2 grid squares, which is not very useful at fine scale, but gives indication of main fishing types & importance in wider area. Maps below show Scotmap dada for the North West highlands, with the wider area around South Pabay circled in red. Data downloaded from National Marine Plan interactive (NMPi)[6].





[5] For more information on Scotmap data go to: http://marine.gov.scot/node/13645 and
[6] https://marinescotland.atkinsgeospatial.com/nmpi/


Scotmap - Scallop towed dredge, number of vessels
Skye
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Limits and Boundaries - Mask Layer - Scottish inshore and offshore regions
Inshore Fishing - ScotMap - Scallop Towed Dredges - Number of Vessels
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Scotmap - Scallop Divers, number of vessels
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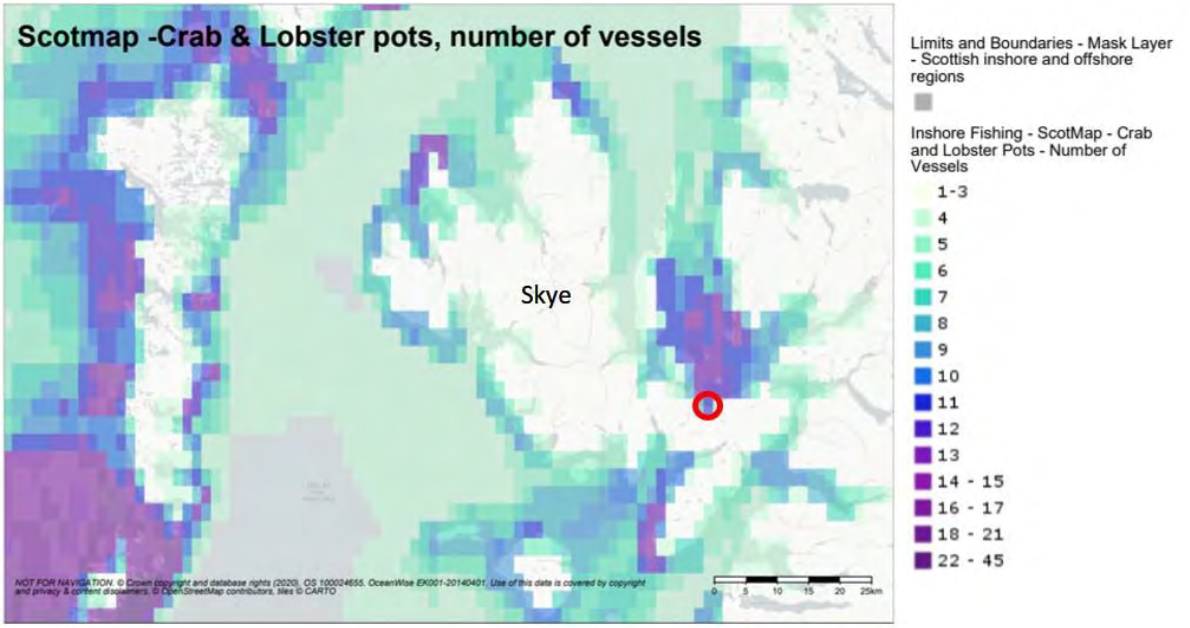
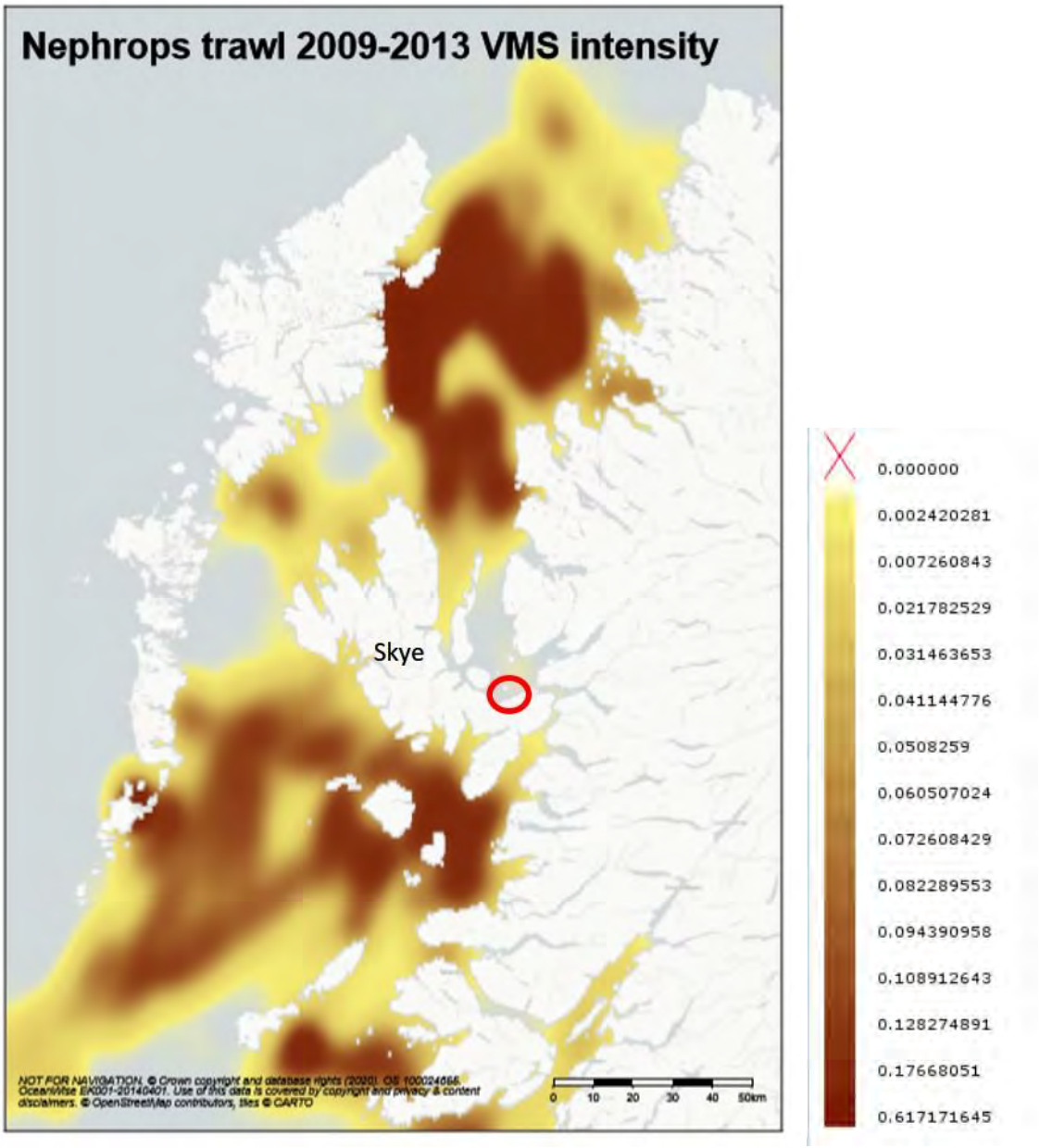


Vessel Monitoring Data, VMS (For vessels over 15m).

VMS intensity data provides an indication of the most intense areas for various types of fishing in Scottish waters. For more information on this VMS data see: http://marine.gov.scot/node/12882. VMS Data was examined for the North West Highlands to assess potentially import fishing grounds around the Proposed Development area and more widely. See plots below for *Nephrops* trawl and scallop dredge vessels (downloaded from NMPi):


Nephrops trawl 2009-2013 VMS intensity
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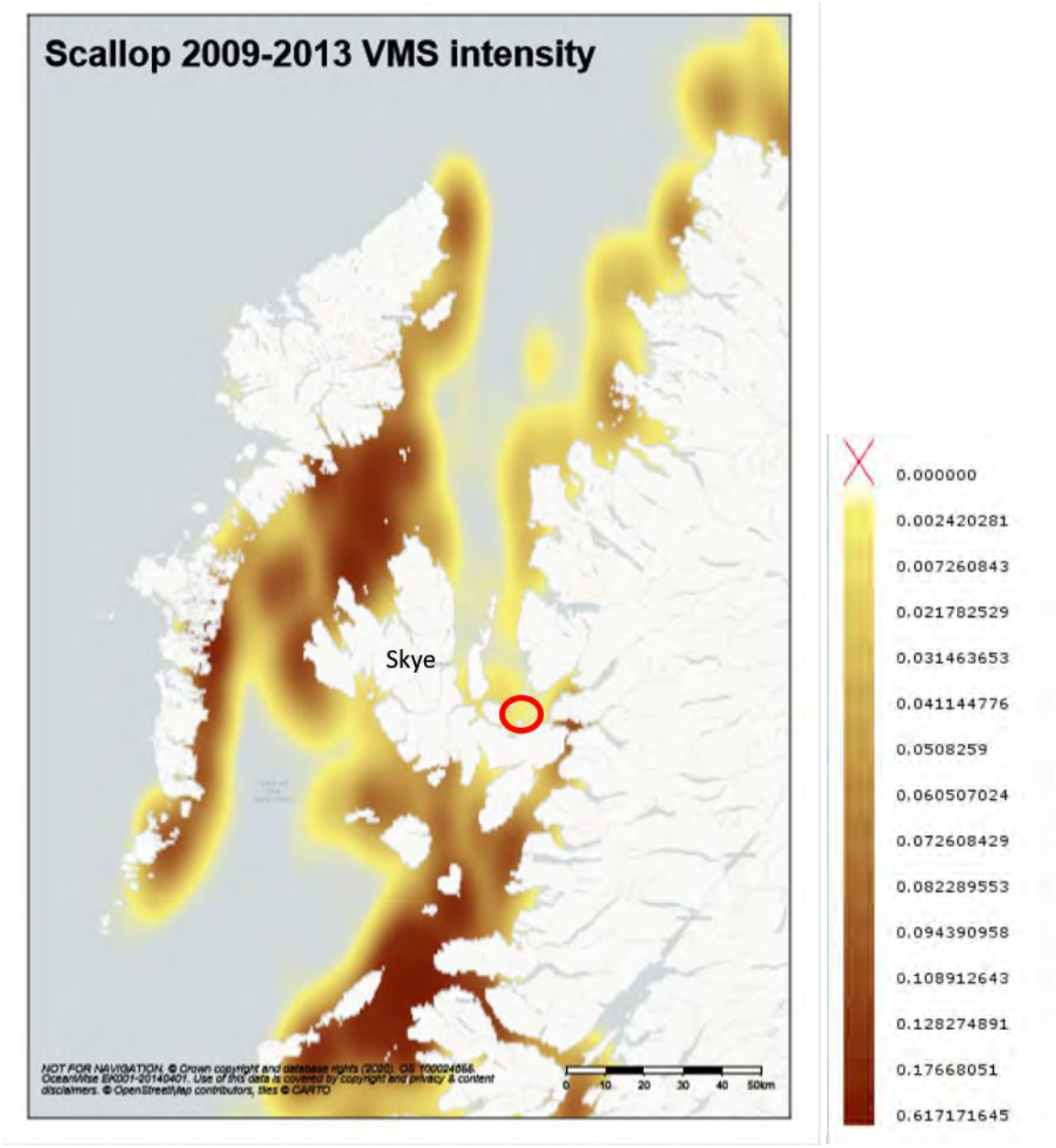
0.082289553
0.094390958
0.108912643
0.128274891
0.17668051
0.617171645
0 10 20 30 40 50km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Visual Impact Assessment

Site Location

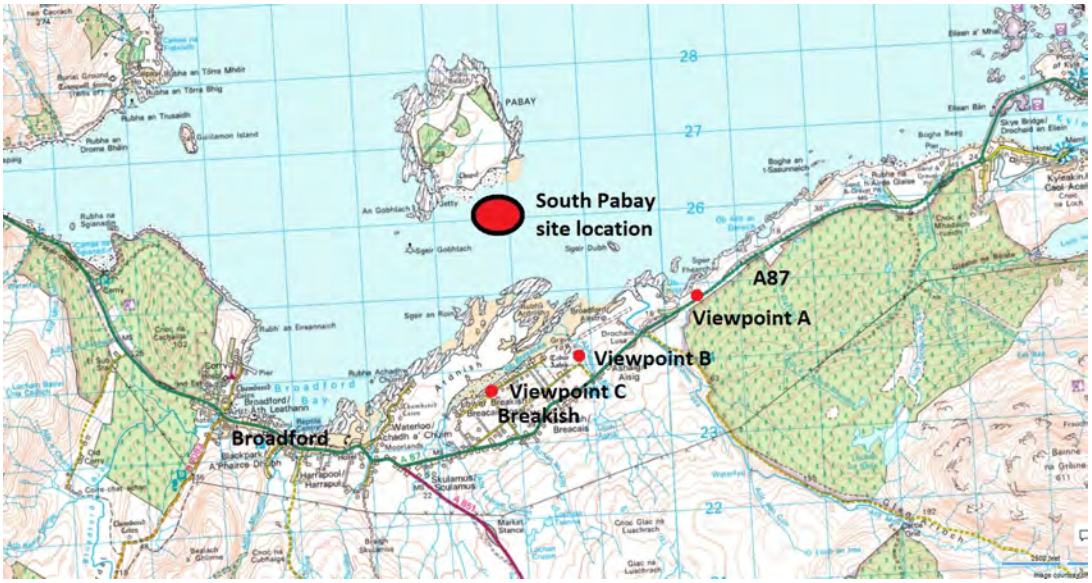


Figure 1. Location Plan and Viewpoints

The South Pabay site is located in the Sound of Pabay, between the (uninhabited) island of Pabay and the northern coast of the Isle of Skye, approximately 4 km to the north east of the town of Broadford. The township of Breakish extends eastwards from Broadford along the shallow shoreline slopes of the island and is the nearest habitation to the proposal at a minimum range of approximately 2km. The A87 truck road, the main arterial route onto and through Skye, follows this coastline above (south of) Breakish.

The crofting township of Breakish is located on two parallel road corridors (Upper and Lower Breakish) aligned with the shoreline, Lower Breakish just above the shore and Upper Breakish following a low rise at an elevation of approximately 20m ASL. The 'unplanned' nature of the crofting township results in spatial variety and visual complexity, with numerous individual trees, hedges, copses, barns and houses scattered around the parallel crofts. As such, the visibility of the South Pabay site area from specific viewpoints is hard to predict; the site comes in and out of view dependent on local factors, but the chosen photographic locations offer a summery of visibility from this coastline.

Three photographic viewpoints have been considered in assessing the visual impact of the proposed Seaweed Farm; View A: from the A87 to the east of Breakish; View B: from the eastern end of the Upper Breakish minor road corridor above Ashaig; and View C: from the western end of Lower Breakish, looking over the low peninsula of Ardnish.

Proposed Site Character

The sea surface features of the proposed Seaweed Farm cover an area of approximately 3.5Ha. (350 x 100 metres). The site is laid out in two grids of 150 x 100 metres, with a 50 metre gap between the grids. At the main corners of these grids (8 no.) will be large cushion buoys, and it is anticipated these will be low visibility, grey in colour.

Spaced at 50 metre intervals between these eight main buoys will be a further eight grid buoys that support the grid lines on which the seaweed growing lines are attached. These grid buoys will smaller cushion buoys, and also be grey in colour.

The seaweed growing lines will be held by weighted 'dropper lines' from small hard buoys at a depth of 2.5-3 metres and will therefore not be visible on the surface. These small dropper buoys, spaced on an 8 x 50 metre grid, will be visible and will be 120 in number. Again, it is anticipated that these will be grey to mitigate visual impact.

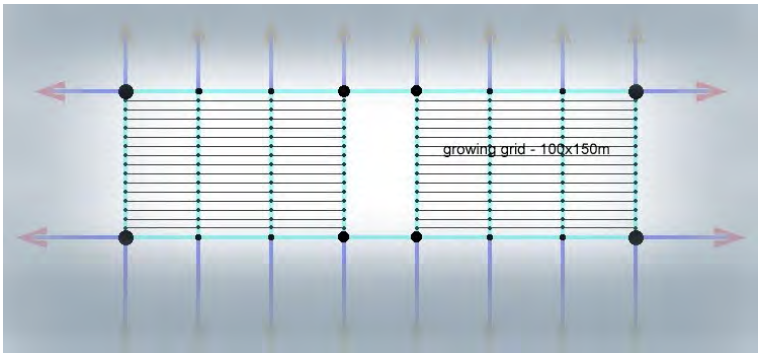


Figure 2. Site layout (Surface). Shaded areas are mooring lines dropping to sea bed. Grids of Growing Lines are 2.5 metres below surface

Navigational Lighting

It is anticipated that lit navigational maker buoys will be required at the south eastern and south western corners of the proposed farm area* . These have been illustrated in the following computer renderings. The solar powered lights on these navigation buoys flash yellow at 5 second intervals, and their maximum visual range tends to be in the region of 1.5nm (2.7km) in good atmospheric conditions. As such, lighting may be faintly visible at night from Breakish. Whilst fulfilling Northern Lighthouse Board (NLB) requirements, the visual prominence of any marking and lighting required will be minimised where possible.

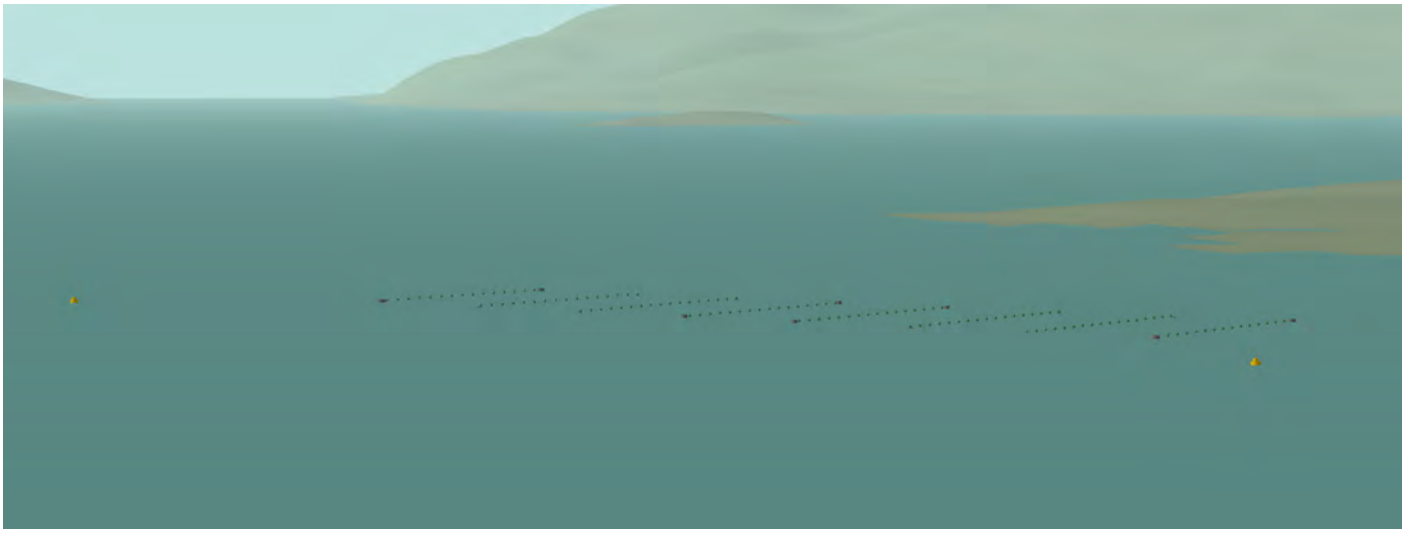
*KelpCrofting Ltd cannot currently confirm the navigational lighting requirements for the proposed site. The NLB will advise once a Marine License application is submitted.

Visual Impact

Below is a computer generated theoretical image of the sea-surface elements of the proposed farm, viewed from 100 metres elevation above the small island of Sgurr Dubh (below the word 'location' on Figure 1). The range to the nearest corner of the farm is approximately 1500 metres. The island of Pabay is visible beyond and off to the right, with the shoreline of Scalpay in the far distance.

The surface buoys of the farm have been visualised with representation of scale and colour, though their scale errs somewhat on being oversized. Large cushion buoys marking the corners of the grids, yellow at the southern extremities, and eight lines of 16 small dropper buoys, at 8 metre spacing, create linear visual elements.

Figure 3. Computer rendering of site surface features from a 'birds-eye' viewpoint above Sgurr Dubh island, focusing closely on the proposed farm area. Note that the scale of all buoys and markers has been oversized significantly so as to make the surface elements of the farm visible in illustrations for this report. This is also the case in the following views from public viewpoints.



View A

View from the A87, east of Breakish, looking north west towards Pabay.

The black lines indicate the cropped view of the computer visualisation below

Computer generated future view (with oversized buoys) demonstrating the location and apparent scale of the proposed seaweed farm

The buoys of the proposed site are difficult to distinguish at a range of minimum 2.3km, despite their being oversized in the rendering, and zoomed in focus of this visualisation (viewcone width is 20°). The visual impact of the proposed development is low/negligible from this viewpoint.

View B

View from the minor road at the eastern end of Upper Breakish, above the cemetery and Ashaig beach, looking north over Pabay.

The black lines indicate the cropped view of the computer visualisation

Computer generated future view (with oversized buoys) demonstrating the location and apparent scale of the proposed seaweed farm

The site area is visible at a minimum range of approximately 2.2km. Note that again, the elements of the site are oversized for clarity. The parallel alignment of the small 'dropper' marker buoys is discernible from this location. The visual prominence of the buoys is reduced by the relatively low elevation of the viewpoint, resulting in a linear foreshortening of the site elements and their visually coalescing with the island of Pabay beyond. The visual impact of the proposed development is low/negligible from this viewpoint.

View C

View from the minor road towards the western end of Lower Breakish, looking over the Ardnish peninsula towards Pabay.

The black lines indicate the cropped view of the computer visualisation

Computer generated future view (with oversized buoys) demonstrating the location and apparent scale of the proposed seaweed farm

The foreground grassy peninsula of Ardnish screens views north over the Sound of Pabay from Lower Breakish, and from this low viewpoint it tends to be visually continuous with the southern shoreline of Pabay beyond. The visual impact of the proposed development is negligible from this viewpoint.

Conclusions

Overall visual impact from the proposed development, viewed from the nearest relevant public viewpoints on land, is considered to be **low / negligible** by day, and **low** at night (with lighting from anticipated navigational buoys). Visual impact from the sea in the area of the site, over the local seascape, is considered **moderate / low**, given the relatively low volume of vessel traffic in the area (see Supplementary Material, Page 13, AIS vessel traffic data), and is to be mitigated by the use of neutral coloured buoys wherever possible.

Alex Glasgow

July 2020