

Seazou Aquaculture Ltd Seaweed Farm



Overview Document

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Seazou Aquaculture Ltd Seaweed Farm Overview Document

1 The Purpose of the Project

Seaweed is an important marine natural resource and aquaculture is currently the fastest growing food production sector worldwide. The Welsh National Marine Plan sets out the Welsh Government's long-term vision for the sustainable development of Welsh seas where natural resources are sustainably managed for the benefit of both current and future generations. The plan highlights that aquaculture can help to underpin sustainable economic development in rural and coastal communities as well as contribute to the security of food supply.

Seaweed farms can act as underwater forests that absorb carbon, nitrogen, and phosphorus, making them an invaluable tool to fight climate change. Seaweeds produce 70% more oxygen than land-based plants and are extremely efficient at absorbing carbon from the atmosphere and using it to speed up their growth. One hectare of seaweed can absorb 3.21 tonnes of carbon per year.

Seaweeds acts as a water purifier creating new habitat for a diversity of marine life and in turn helps to regenerate depleted coastal marine ecosystems. Naturally occurring seaweed beds provide some of the most biologically diverse habitats within the UK and play a critical role in the life cycle of some commercially important fish and shellfish species. Seaweed farms have the potential to behave in a similar manner by providing complex 3D habitats that would otherwise not be present.

Not only does seaweed benefit the environment during its cultivation, it also has huge potential to benefit the environment in a number of its end uses. Seaweed can be used to create an organic substitute to plastic packaging. It can be used as a biofuel, a plant fertiliser, and it can be made into cattle feed pellets, a handful of which can reduce methane production in the cattle by up to 90%. As the world looks to meet a growing demand for healthy food, the low environmental footprint of farmed seaweed makes it an important ingredient of the future food supply. Seaweed is a high protein alternative to meat as we transition to a more plant-based diet. Seaweed can also be used in organic cosmetics, organic clothing material and in medicines.

Seaweed farming as an industry is in its infancy but shows tremendous potential to benefit the local environment, the communities that surround it and the planet as a whole.

Seazou Aquaculture Ltd are looking to set up the third licensed seaweed farm in Wales.

2 Description of Operations

Seazou Aquaculture Ltd. are submitting a Marine License application for a 25-hectare, (500m x 500m), seaweed farm in the Bristol Channel off the south coast of the Gower Peninsular.

The farm will include 3 rows of 20 x 100m long submerged seaweed longline arrays suspended from weighted mooring anchors at either end. For a more detailed description of the farm infrastructure please refer to Section 4 of this report.

The intention is to install the infrastructure for the seaweed farm in the summer of 2024 and then proceed with seeding and growing in September 2024. The initial phase will be focussed on research and development, where locally sourced seaweed species will be seeded to twine which will then be wrapped around the seaweed growing longlines. A small number of these long lines will be installed for the initial growing season to establish which seaweed species grow most effectively. Once this R&D phase has been completed, the farm will be gradually upsized to full capacity farming the proven seaweed species.

In a typical growing season, the lines will be seeded in September / October when the sea is at the optimum temperature. The seaweed will then be harvested over a 2 to 3 week period in April / May of the following year. The specific harvest time will depend entirely on the sea surface temperature.

Installation, operation and maintenance of the seaweed farm will be done in collaboration with a local vessel based out of Swansea Port. The maintenance strategy for the seaweed farm will include regular site inspections during the growing season. The details of this monitoring plan and other maintenance and repair strategies can be found in the Navigational Risk Assessment and the Mammal Entanglement Protocol document included with this submission.

3 Location

The proposed site is a 25-hectare plot, (500m x 500m), located off the coast of the Pennard Cliffs, east of Oxwich Bay. The farm will be positioned approximately 800m beyond the low water mark of the shoreline south of the community of Pennard and Southgate. The location is illustrated in the location plans shown in Figure 1, Figure 2 and Figure 3.

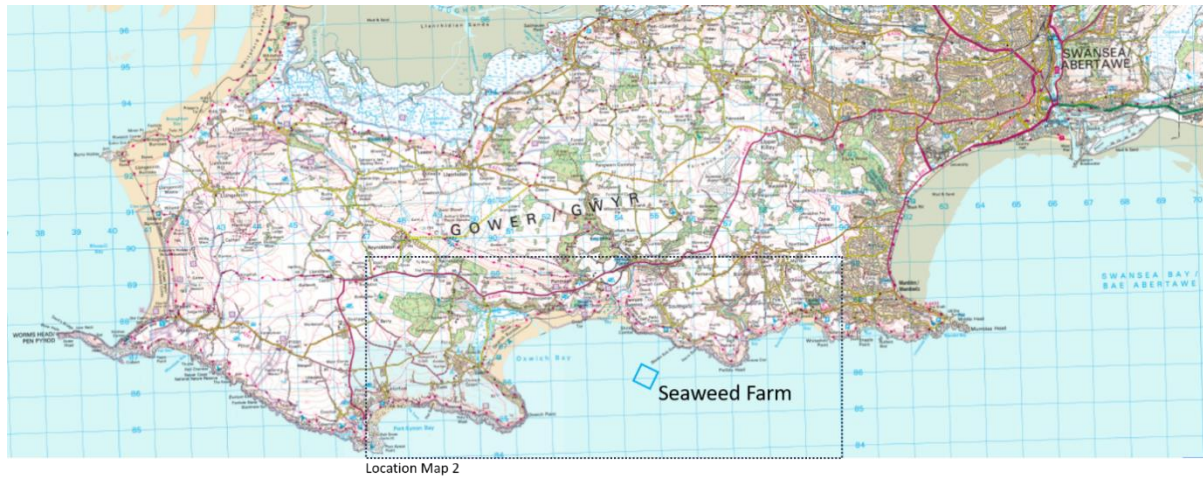


Figure 1: Seaweed farm location map 1

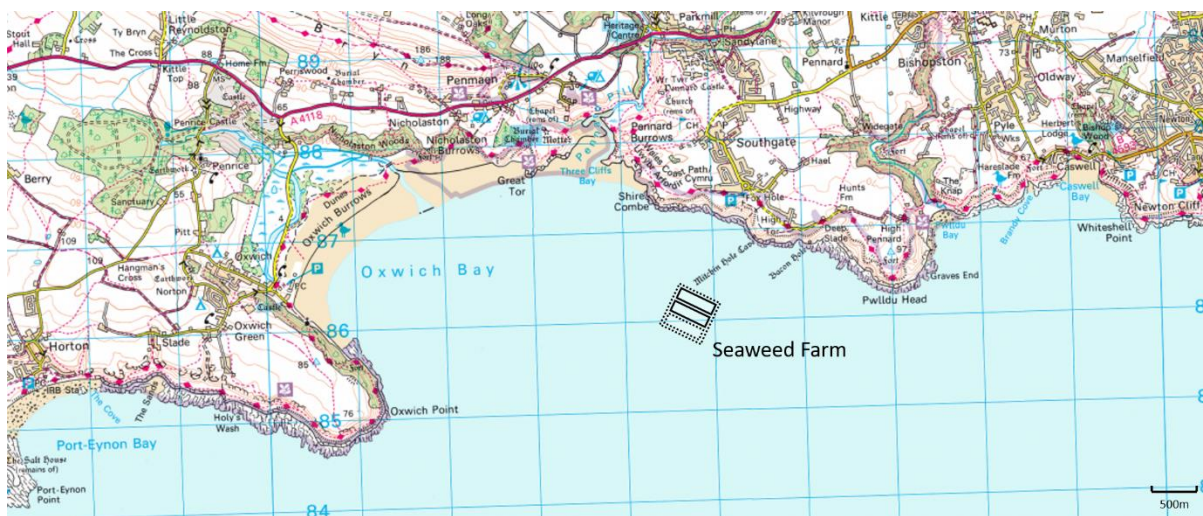


Figure 2: Seaweed farm location map 2



Figure 3: Seaweed farm location

The farm coordinates are illustrated in

Grid Reference	X (Easting)	Y (Northing)	Latitude	Longitude
Corner Points				
SS 54578 86460	254578	186460	51.558226	-4.0991449
SS 55018 86237	255018	186237	51.556331	-4.0927076
SS 54672 85879	254672	185879	51.553028	-4.0975571
SS 54208 86115	254208	186115	51.555029	-4.1043377
Centroid				
SS 54622 86183	254622	186183	51.555750	-4.0983939

Table 1: Farm Coordinates

The farm positioning has taken into account various constraints including water depth, currents, tidal range, average wave height and marine traffic densities. In addition has considered the proximity to the various protected and nationally important waters. Figure 4 shows the proximity of the seaweed farm plot to:

- Sites of Special Scientific Interest (SSSI)
- Special Protection Areas (SPA)
- Special Areas of Conservation (SAC)
- Ramsar
- Marine Conservation Zones

The seaweed farm does not directly interface with any designated protected area.

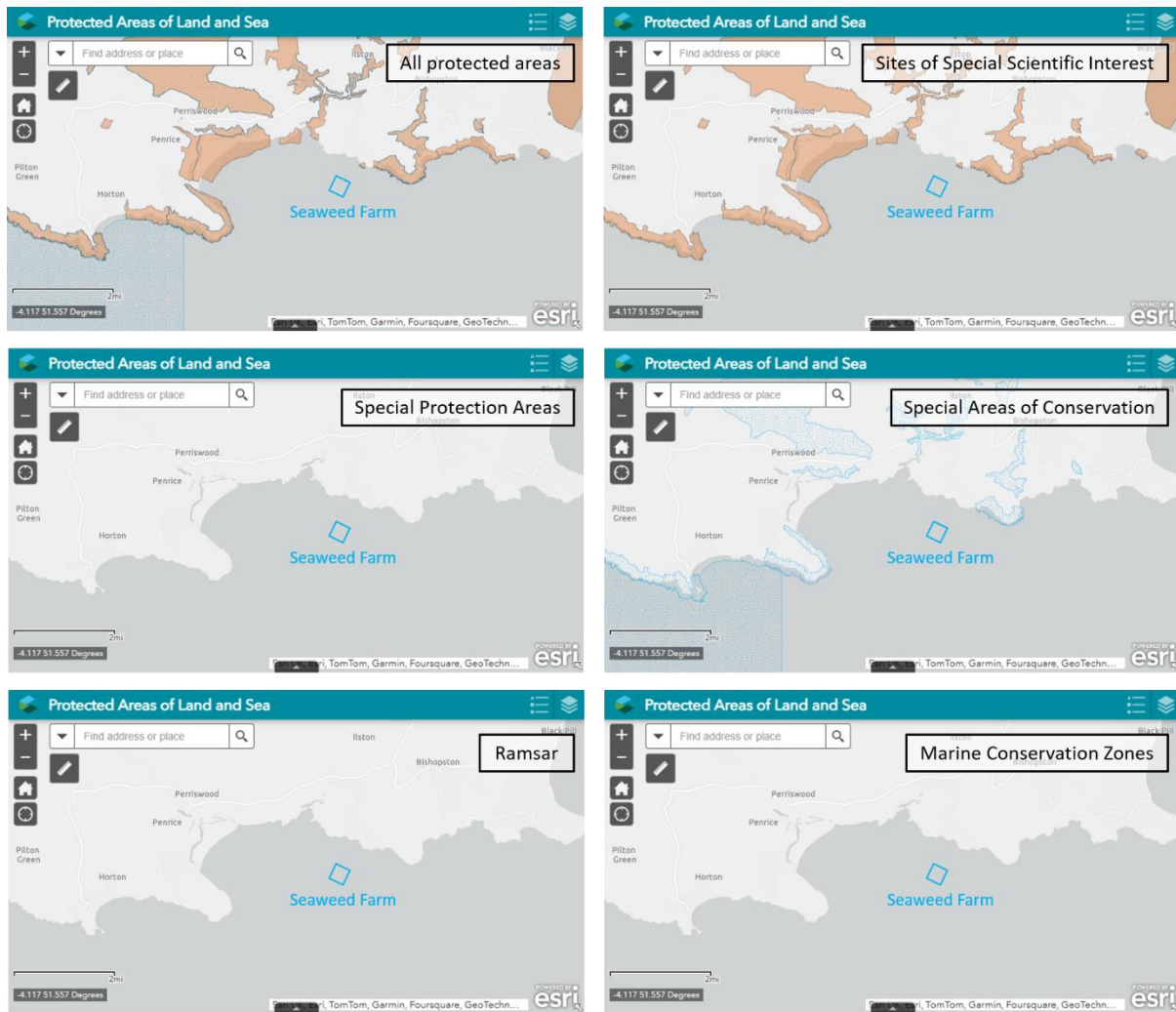


Figure 4: Seaweed farm location in relation to protected areas (source: Natural Resources Wales)

Figure 5 illustrates that the proposed location of the seaweed farm is within the area that has been defined as suitable for aquaculture within the Welsh Marine Plan Area. The source of this map is: <https://datamap.gov.wales/layergroups/appdata-wg-marine:PotentialAquaculture>.



Figure 5: Area suitable for Aquaculture within the Welsh Marine Plan Area

4 Farm Infrastructure

The primary farm infrastructure will comprise 60no 100m seaweed growing longline arrays arranged in the 3 rows of 20 lines. The seeded longlines will be suspended at around 2m below the surface of the water from floating mooring buoys spaced at 20m along each longline. Adjacent pairs of longlines will be anchored to the seabed by two 700kg anchors. These anchors will be formed from reef block types weights, which are designed to create a man-made reef on the seabed. The seaweed growing lines will be spaced at 20m centres and the three sets of 20 lines will be separated by two 40m wide clear channels.

The farm design illustrated in this section is a preliminary design and the detailed design will be done by Kelson Marine Engineering to all the applicable design conditions including typical (1 year) and extreme (25 and 50 year) storm events.

The farm infrastructure will be marked by an arrangement of marking buoys arranged as per Trinity House's specifications. The four corners of the farm will each be marked by a yellow spherical shaped lighted buoy, exhibiting a F1.Y.5s (flashing, yellow, every 5 seconds) light and surmounted by a yellow 'X' shaped top mark.

The farm infrastructure arrangement is illustrated in the draft functional diagrams in Figure 6 and Figure 7.

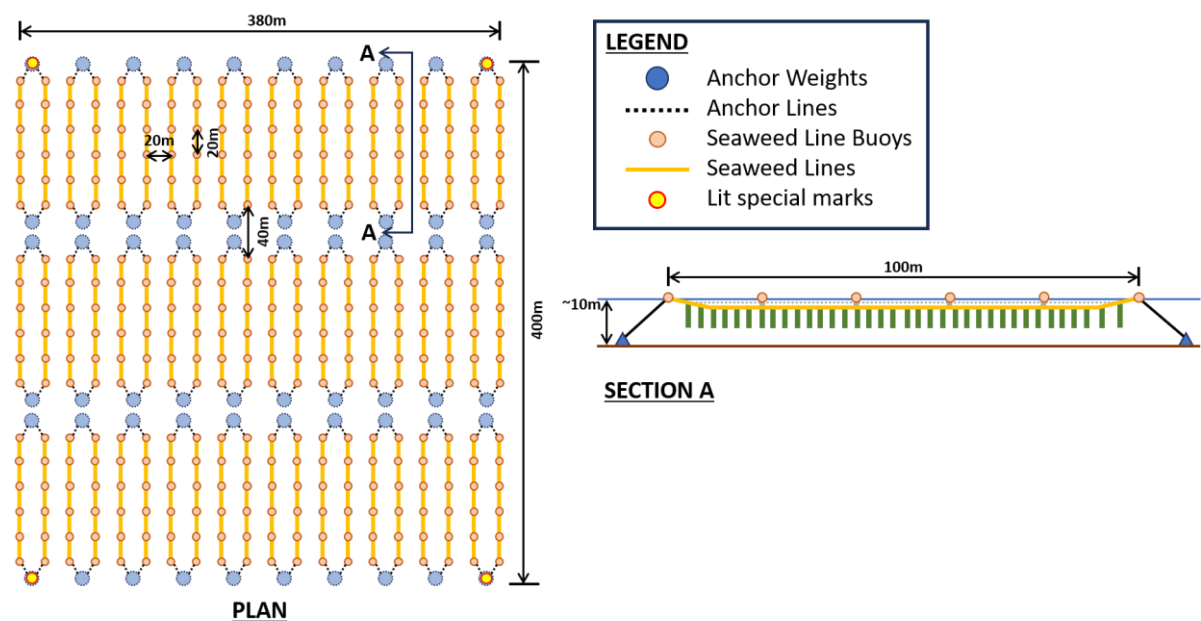


Figure 6: Seaweed farm draft functional layouts

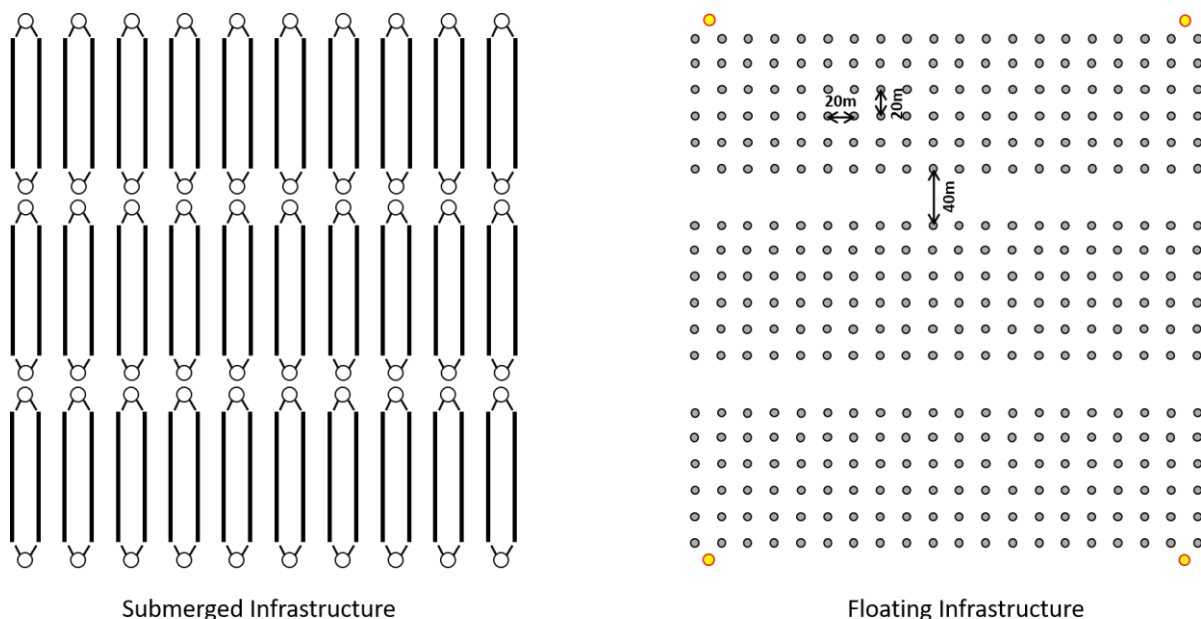


Figure 7: Seaweed farm infrastructure

The draft farm layout includes the following quantities of materials. These quantities will be updated once the final design of the infrastructure has been completed.

Material	Quantity
Reef block anchor weights	60
Anchor chains / ropes	60 (each approximately 10m long)
Marker buoys	4
Seeded seaweed growing line	60 (each 100m long)
Floating marker buoys	360

Table 2: Farm infrastructure quantities

The farm infrastructure will be installed in stages with the first row of 20 lines being installed in the first growing season, and the second and third rows of 20 lines being installed in subsequent seasons. The infrastructure will be installed using a suitable vessel based out of Swansea Maina. During the summer months, the majority of the infrastructure, including all the growing lines and 60% of the floating buoys will be removed from the site, cleaned and stored ready for the following growing season.

Upon completion of the seaweed farming activities, all farm infrastructure will be decommissioned and removed. Natural Resources Wales will be consulted as to whether the reef block weights on the seabed should be left in place to preserve the habitat that they will have created.

5 Seaweed Species

The seaweed farm will grow two varieties of seaweed:

- *Palmaria Palmata* (dulse)
- *Laminaria Digitata* (oarweed)
- *Saccharina Latissima* (sugar kelp)

All three species of seaweed are native to the Gower Peninsular as shown in Figure 8. The maps showing confirmed recordings of the seaweed species are taken from the National Biodiversity Network (NBN) Atlas website.

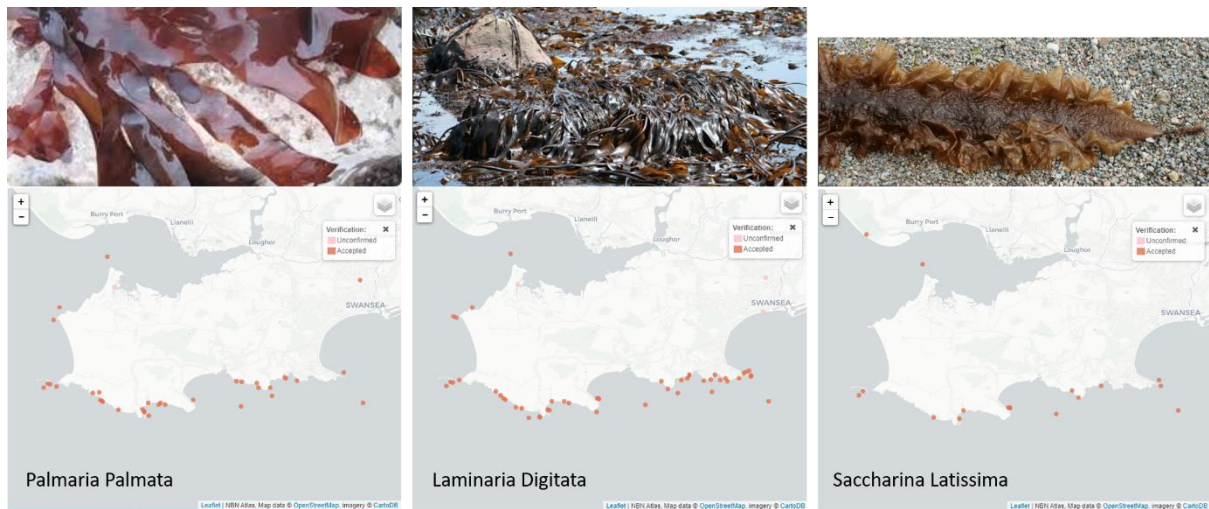


Figure 8: Seaweed species

Cultures of the seaweed will be grown from locally sourced samples in biosecure nursery facilities in Scotland, at the Scottish Association for Marine Science (SAMS) and at the Marivate seaweed hatchery, and in the Netherlands at the Hortimare seaweed breeding facility. The nurseries will provide seeded twine that will be wrapped around the longlines arrays before the lines are placed into the water.

The lines will be placed in the water in September / October, when the water is at the desired temperature and then the seaweed will be harvested April / May of the following year.

6 Contents of the Marine License Application

The following marine license application includes the following documents:

- Farm Overview Document
- Water Framework Directive (WFD) Assessment
- Navigational Risk Assessment (NRA)
- Biosecurity Plan
- Marine Mammal Entanglement Protocol
- Details of any protected site features
- Summary of all consultations undertaken

7 Potential Risk and Mitigation

Throughout the process of putting together this marine license application, risks and mitigations have been reviewed and documents. The risk of the seaweed farm having an adverse environmental impact on the water body and surrounding ecosystems has been evaluated in the Water Framework Directive Assessment and the Biosecurity Plan. Navigational risks that the farm will impose on local marine traffic has been considered in the Navigational Risk Assessment and reflected in the arrangement of Trinity House specified lit special marker that will be installed at the farm. And finally, the risk of a marine mammal becoming entangled in the farm infrastructure is covered in the Marine Mammal Entanglement Protocol document.

The impact to the local communities and local stakeholders has been discussed in the various consultations that have been undertaken, a summary of which has been provided with the marine license application.

8 Data Sources

Various data sources have been used to inform the positioning of the seaweed farm and to provide key information required for the preparation of the various documents. The data sources that have been used are outline in Appendix A of this documents.

9 Visual Impact Assessment

An assessment has been undertaken to review the potential visual impact of the seaweed farm on the properties located along E Cliff Road and W Cliff Road in Southgate. The assessment has reviewed whether the seaweed farm can be viewed from a height of 5m (i.e. a 1st floor window) at a number of locations along the E Cliff and W Cliff Road.

The topography of the clifftop and the distance that the properties are set back from the edge of the cliff mean that the seaweed farm falls into the viewing shadow cast by the cliffs for the majority of the properties. There are 50 properties along E Cliff and W Cliff Road and the seaweed farm will be fully visible from 7 of the properties and partially visible from 4 of the properties.

The visual impact assessment is provided in Appendix B.

10 Appendix A: Data Sources

Reports

The following two reports have been used to assess the suitability of the proposed location for the development of seaweed aquaculture.

1. Sector Locational Guidance: Enabling Evidence for Sustainable Development – Aquaculture – June 2022.

<https://www.gov.wales/sites/default/files/publications/2022-11/sector-locational-guidance-aquaculture.pdf>

The purpose of this report is to support characterisation of areas in Wales where there is good potential for aquaculture projects to prosper.

2. Project Madoc

<https://projectmadoc.cymru/full-study/>

Project Madoc, a comprehensive 12-month feasibility study, funded by the European Maritime and Fisheries Funded (EMFF), assessed the economic viability, environmental impact and social acceptability of developing a sustainable and competitive industry for Wales, based on the cultivation and downstream processing of selected species of native seaweed.

Natural Resources Wales

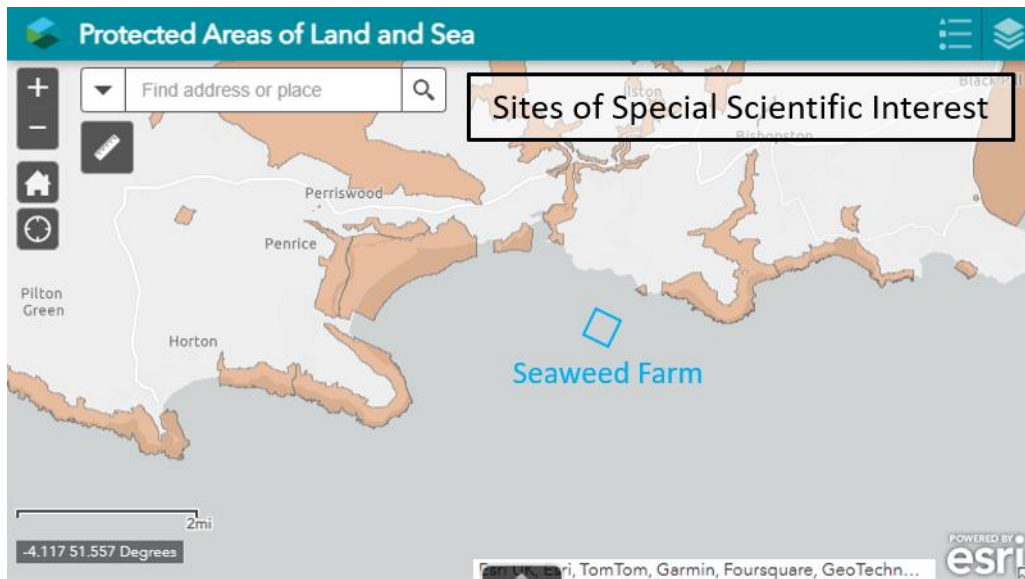
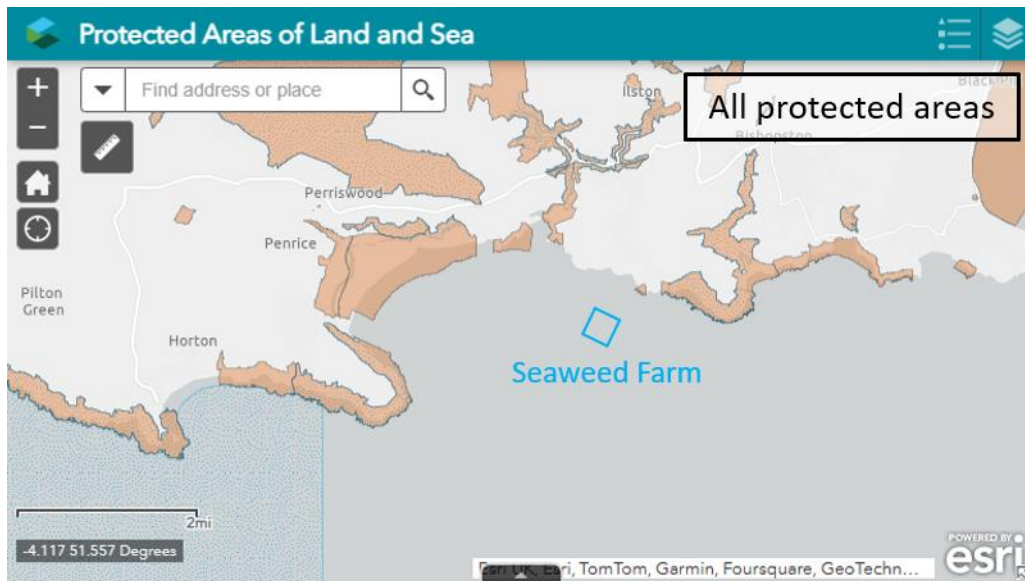
NRW's website provides guidance for how a marine license application should be drafted and submitted. In addition the NRW's website contains the following maps.

Protected Areas of Land and Sea

<https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/protected-areas-of-land-and-seas/find-protected-areas-of-land-and-sea/?lang=en>

Map outlines the following protected areas:

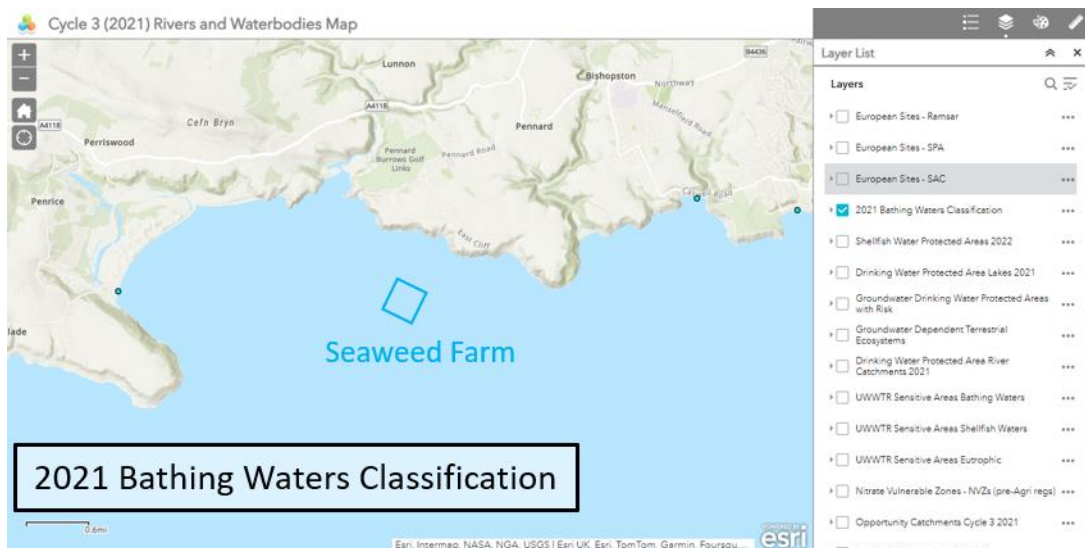
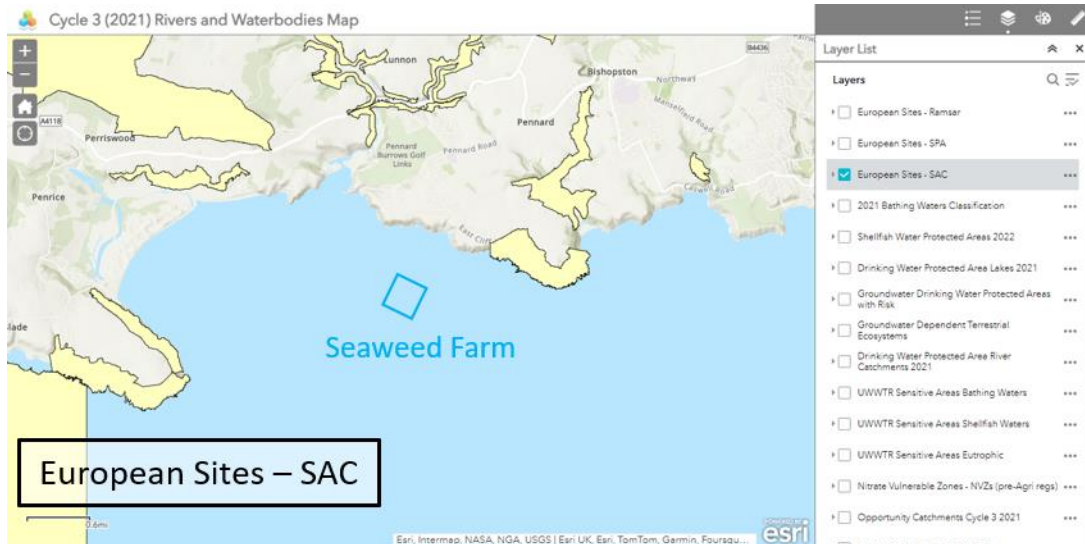
- Sites of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- Special Areas of Conservation (SAC)
- RAMSAR
- Marine Conservation Zones

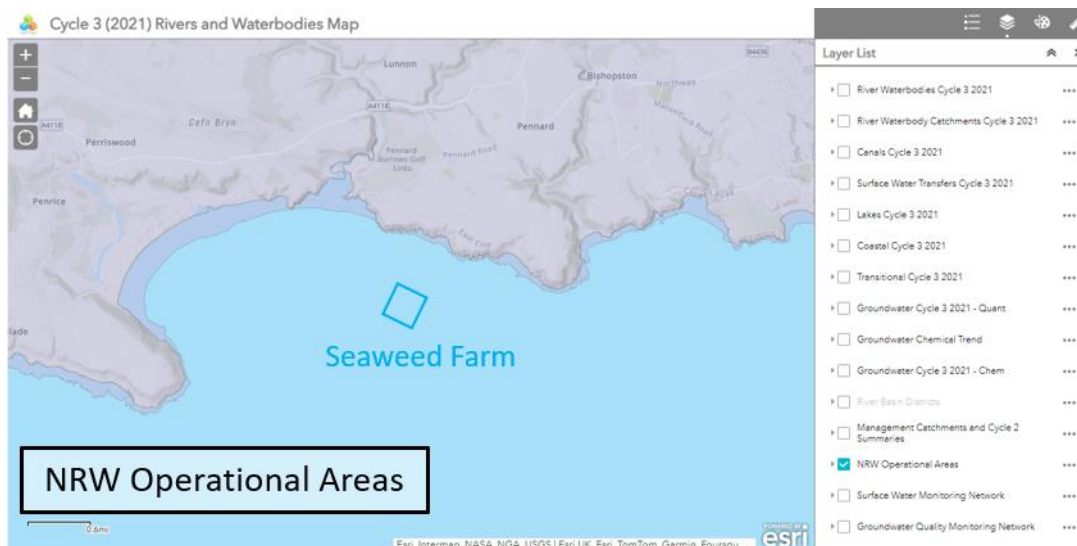




Water Watch Wales

Water Watch Wales Map Gallery https://waterwatchwales.naturalresourceswales.gov.uk/en/	The Natural Resources Wales Water Watch Map Gallery is a collection of web maps related to the Water Environment(Water Framework Directive)(England and Wales) Regulations 2017 in Wales. The key maps that impact the seaweed farm are: - European Sites – SAC - 2021 Bathing Water Classification - Shellfish Water Protected Areas 2022 - UWWTR Sensitive Areas Shellfish Waters - Coastal Cycle 3 2021 - NRW Operational Areas
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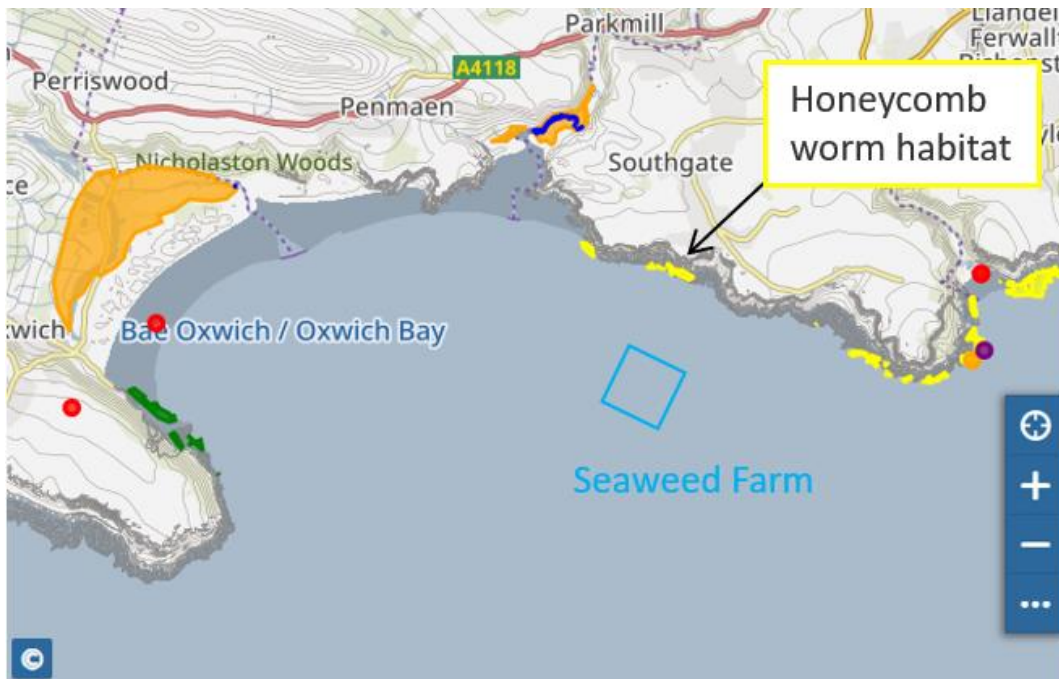


Data Maps Wales:

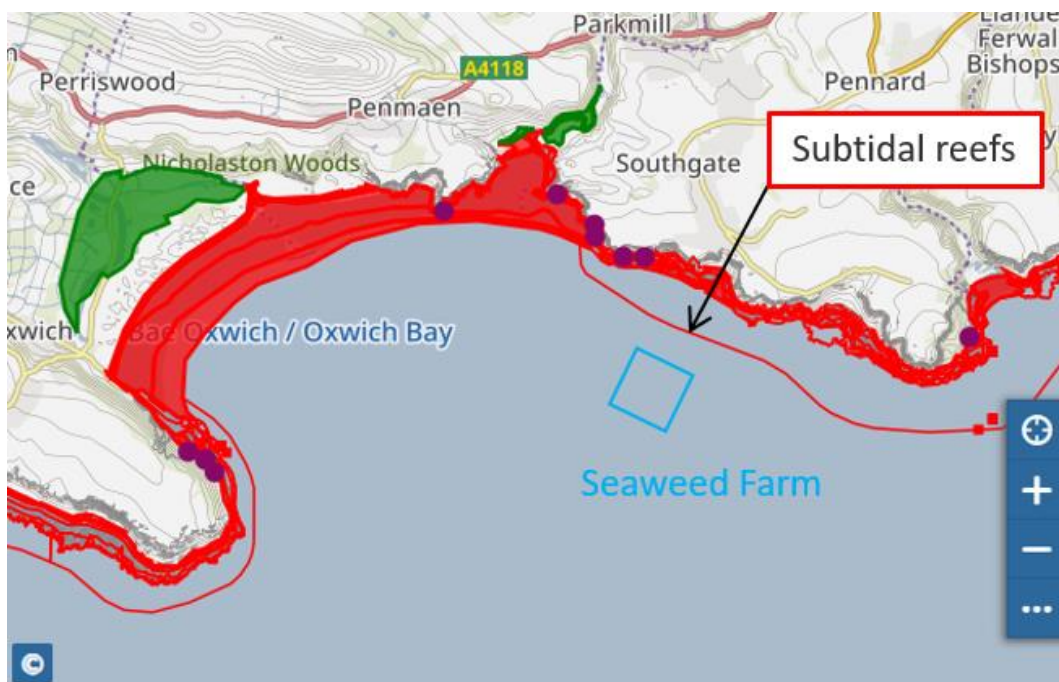
Map 1 Environment (Wales) Act Section 7 and OSPAR: Marine Species https://datamap.gov.wales/layergroups/inspire-nrw:MarineBAPSpeciesInWales	This spatial dataset details the location of those marine species classed of "Principle Importance" under Section 7 and are regarded as "threatened or declining" under OSPAR in Wales. There are a number of honeycomb worm (<i>Sabellaria alveolata</i>) reefs along the coastline adjacent to the seaweed farm's location, however they are more than 500m away.
Map 2 Marine Article 17 Habitats Features https://datamap.gov.wales/layergroups/inspire-nrw:MarineArt17Features	Map illustrates the current known extent / location and status of habitat features both inside and outside of SACs. The map shows the sandy coastline and the extent of possible subtidal reefs near the seaweed farm.
Map 3 Marine Licensing: Band 1 Sensitive Areas https://datamap.gov.wales/layergroups/inspire-nrw:MarineLicensingBand1SensitiveAreas	Map illustrates habitats and SAC features are sensitive to a range of Marine Licensing Band 1 activities. Map shows the location of the honeycomb worm (<i>Sabellaria alveolata</i>) reefs.
Map 4 Marine Conservation Zones https://datamap.gov.wales/layers/inspire-nrw:NRW_MNR	The map contains the digital boundaries of Marine Conservation Zones (MCZs) former Marine Nature Reserves in Wales. No impact to the proposed seaweed farm.
Map 5 Marine Special Areas of Conservation (SAC) Features https://datamap.gov.wales/layergroups/inspire-nrw:MarineSACFeatures	The map provides the indicative baseline extent and status (i.e. "Definite" or "Potential" feature status and / or confidence) of SAC features. No impact to the proposed seaweed farm.
Map 6 Marine Protected Areas in Welsh Waters https://datamap.gov.wales/layergroups/geonode:nrw_marine_protected_areas_in_welsh_waters	The Marine protected area (MPA) network is a subset of existing protected sites that have marine features. Sites include: SACs, SPAs, Ramsars, SSSIs and MCZs. Info also available through the NRW website.
Map 7 Potential Aquaculture https://datamap.gov.wales/layergroups/appdata-wg-marine:PotentialAquaculture	The Welsh Government commissioned a study by ABPmer, to assess the potential for aquaculture within the Welsh Marine Plan Area. Similar to the map below.

Map 8 Mapping for Strategic Resource Areas - Aquaculture Seaweed Suspended Resource https://datamap.gov.wales/layers/appdata-wg-marine:sra_aquaculture_seaweed_suspended_resource	The map illustrates a work in progress assessment of where the Welsh government think are good locations for Seaweed farms.
Map 9 Aquaculture Seaweed Suspended Soft Constraints https://datamap.gov.wales/layergroups/appdata-wg-marine:sra_sc_aq_se_su	The map represents soft constraints which might have implications for any future development of the suspended seaweed aquaculture resource within the Welsh National Marine Plan area. The map shows possible sub sea cables in the location of the seaweed farm.

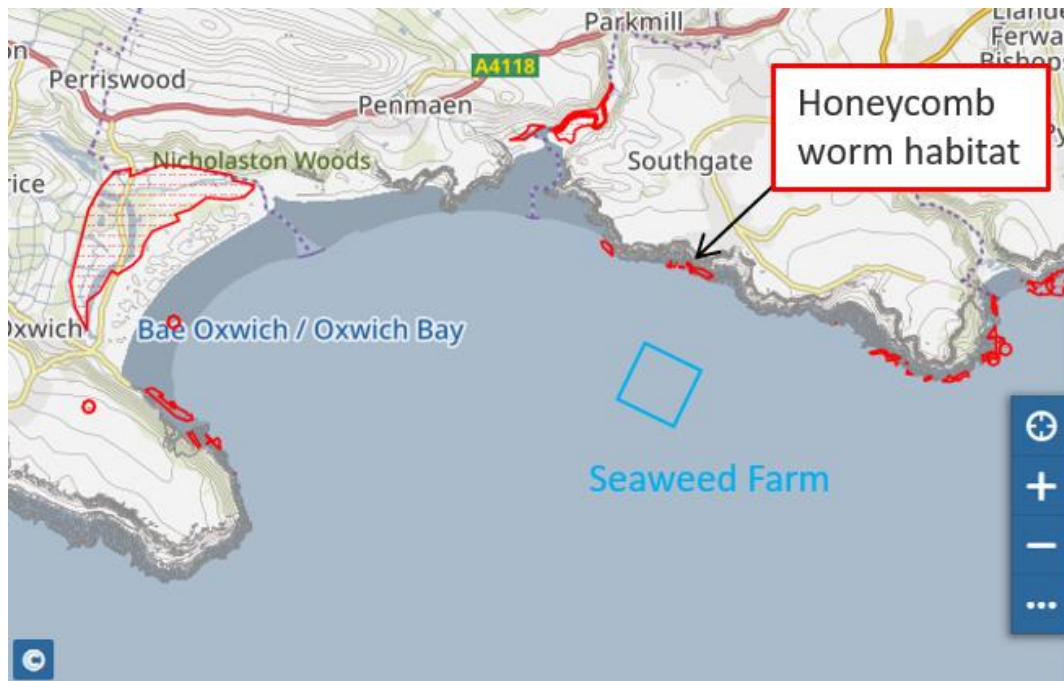
Map 1: This dataset details the extent and location of those marine habitats classed of "Principle Importance" under Section 7 and are regarded as "threatened or declining" under OSPAR in Wales.



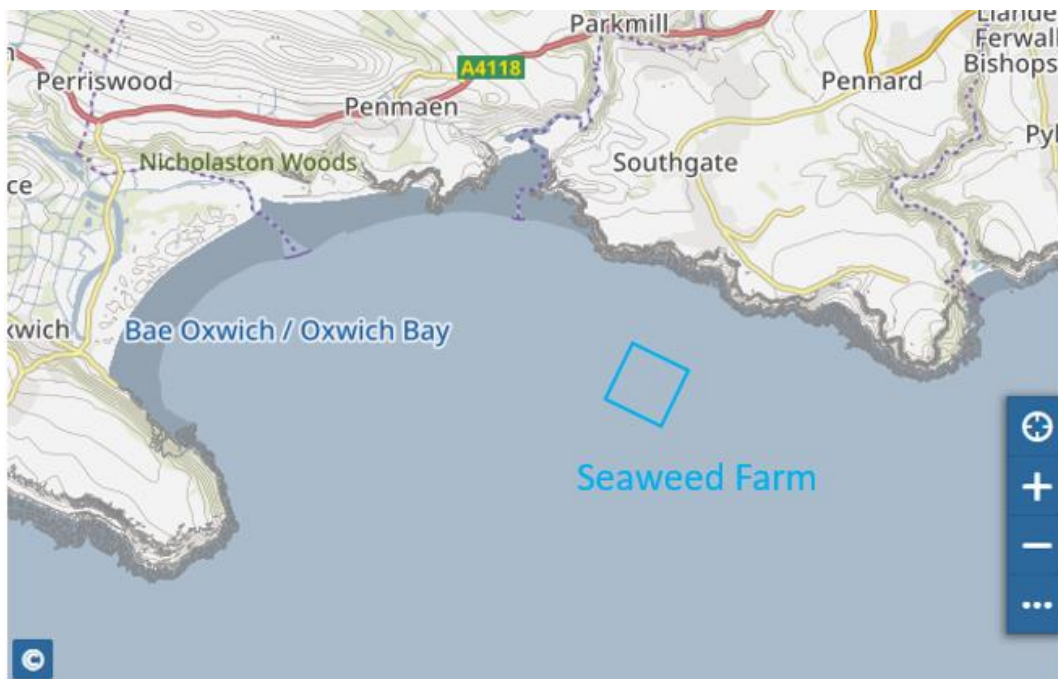
Map 2: The map illustrates the current known extent / location and status of habitat features both inside and outside of SACs.



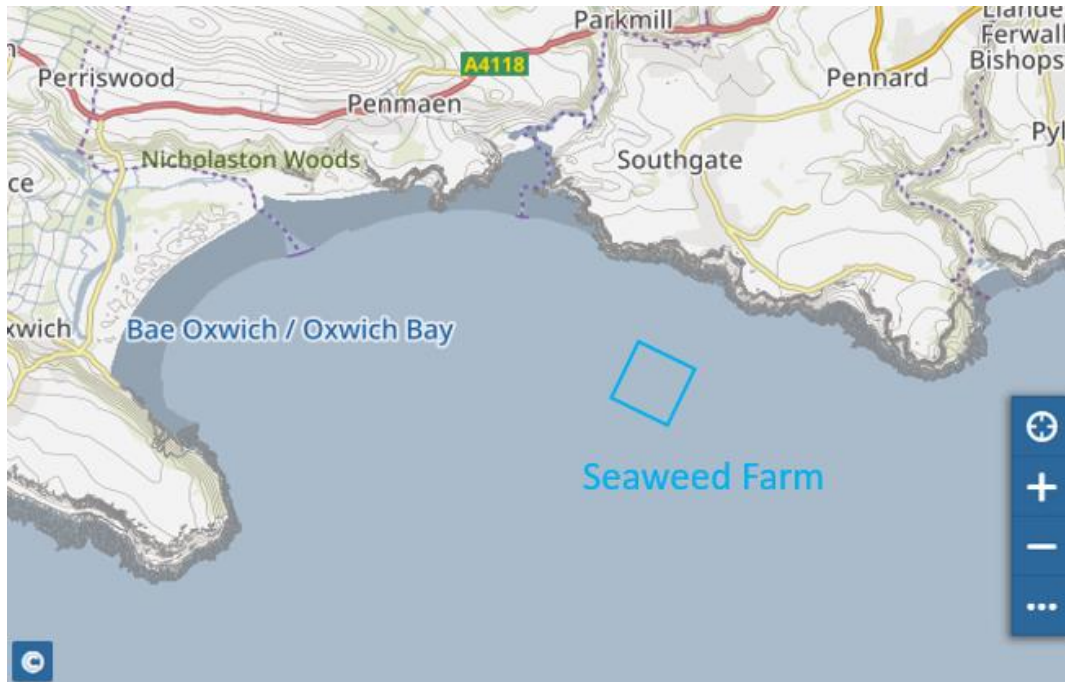
Map 3: The map illustrates habitats and SAC features are sensitive to a range of Marine Licensing Band 1 activities.



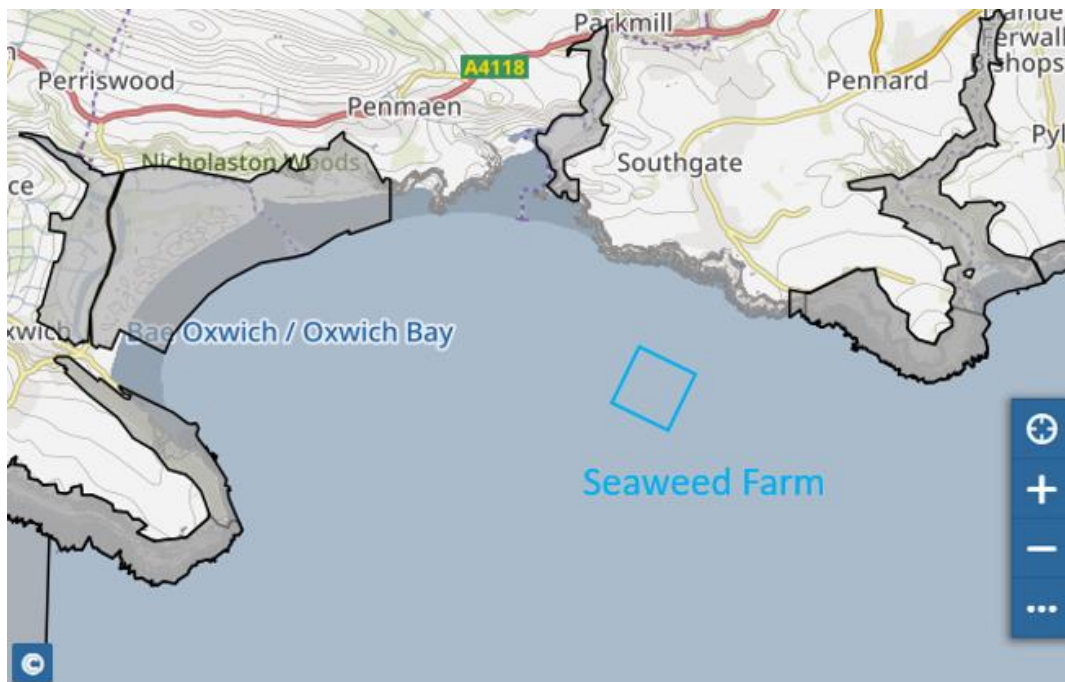
Map 4: The map contains the digital boundaries of Marine Conservation Zones (MCZs) former Marine Nature Reserves in Wales.



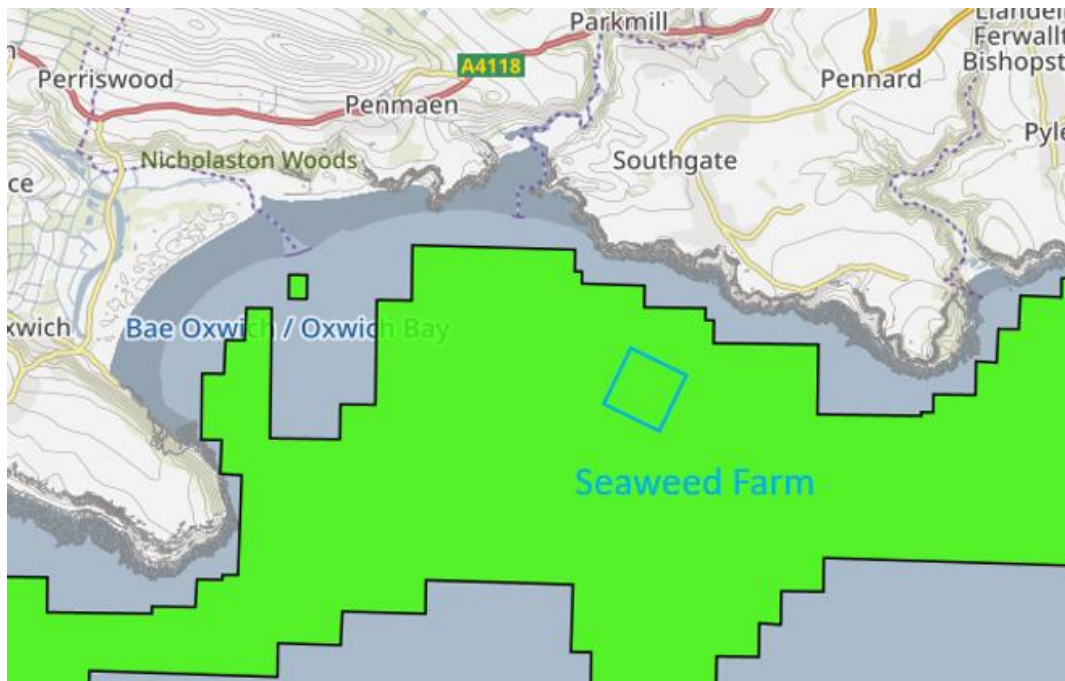
Map 5: The map provides the indicative baseline extent and status (i.e. “Definite” or “Potential” feature status and / or confidence) of SAC features.



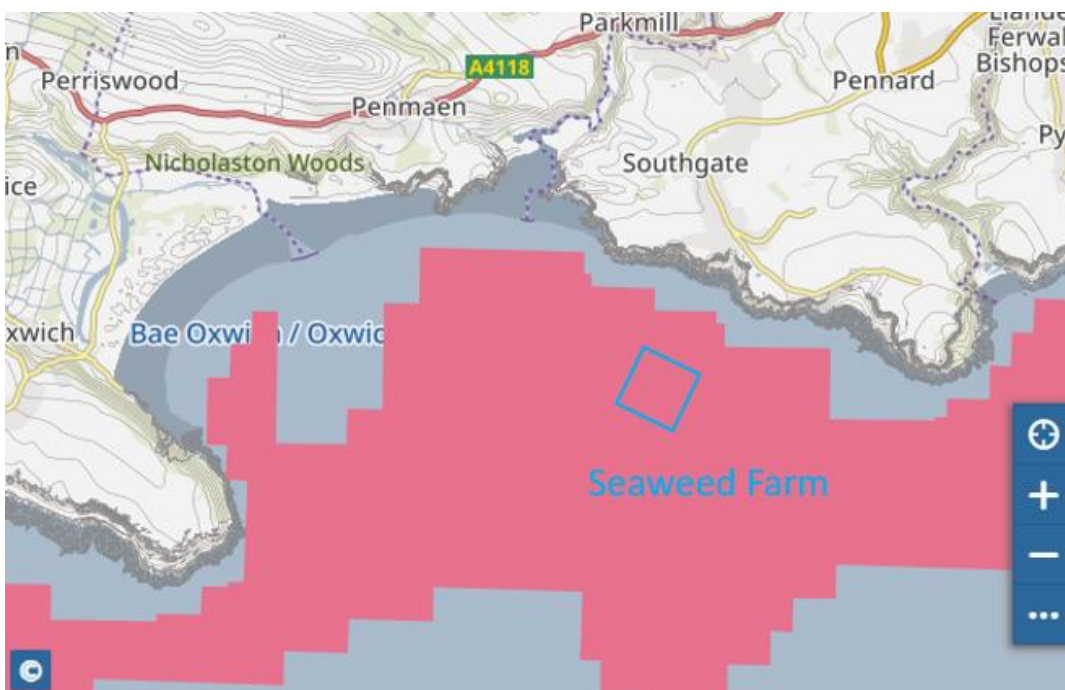
Map 6: The Marine protected area (MPA) network is a subset of existing protected sites that have marine features. Sites include: SACs, SPAs, Ramsars, SSSIs and MCZs. This information is the same as the Natural Resources Wales protected area maps.



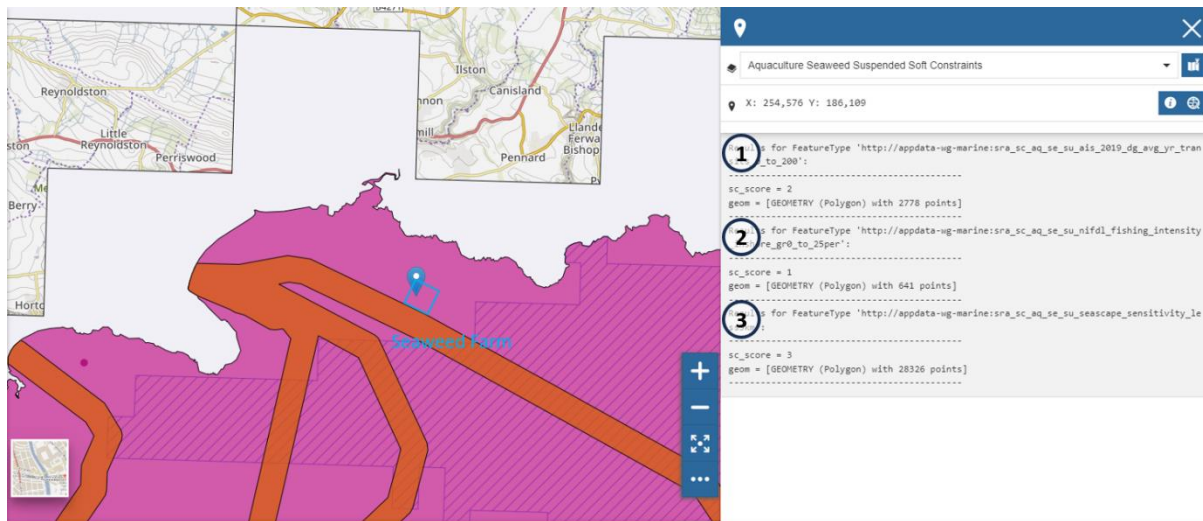
Map 7: The Welsh Government commissioned a study by ABPmer, to assess the potential for aquaculture within the Welsh Marine Plan Area. This map can be read in conjunction with Map 8.



Map 8: The map illustrates a work in progress assessment of where the Welsh government think are good locations for Seaweed farms.



Map 9: The map represents soft constraints which might have implications for any future development of the suspended seaweed aquaculture resource within the Welsh National Marine Plan area.



1 – AIS Data 2019 – Average Yearly Transits – 0 to 200

2. – Fishing Intensity Inshore – 0 to 25

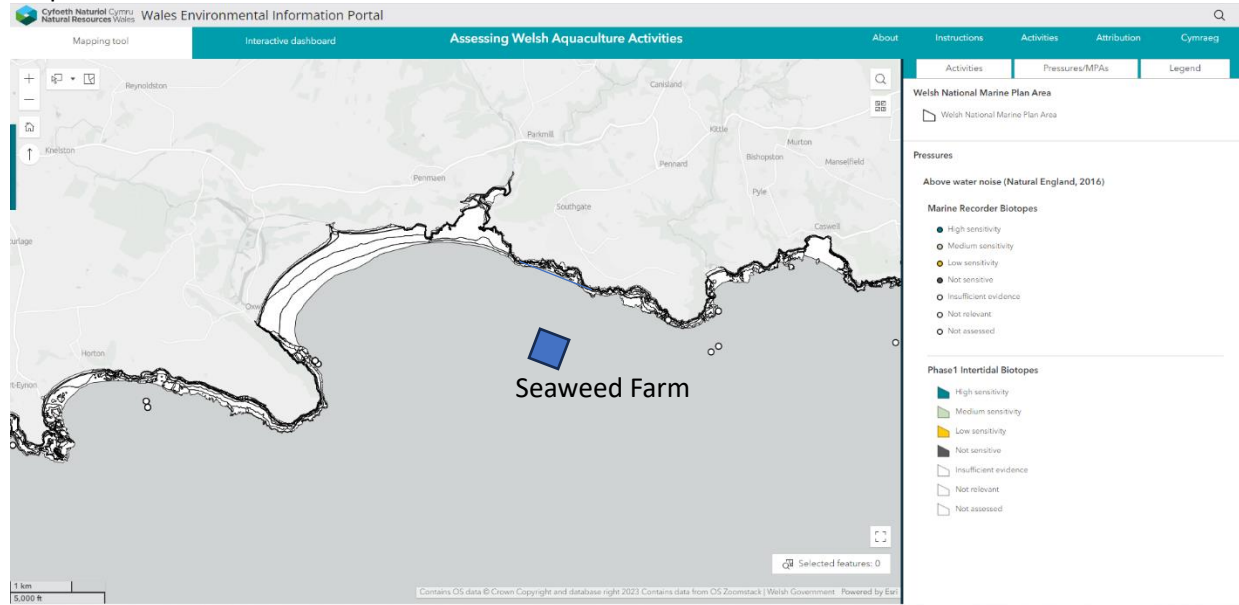
3 – Seascape Sensitivity – less than 5km

The areas indicated by the dark orange on the map above indicate the exclusion zones around subsea cables. The farm has been located outside of these exclusion zones.

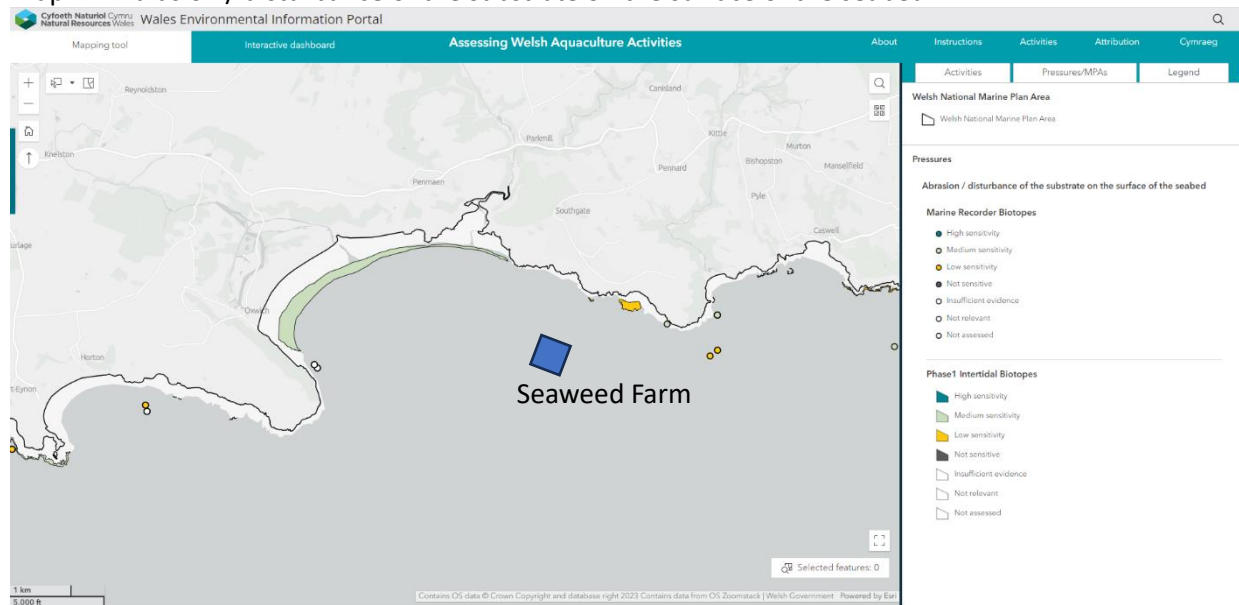
AWA Mapping Tool

AWA Mapping Tool https://smnr-nrw.hub.arcgis.com/apps/73894fae28f64ed0b9b7344dcc667493/explore	The AWAA mapping tool allows the user to identify the sensitive biotopes and species overlapping or nearby the proposed seaweed farm location.
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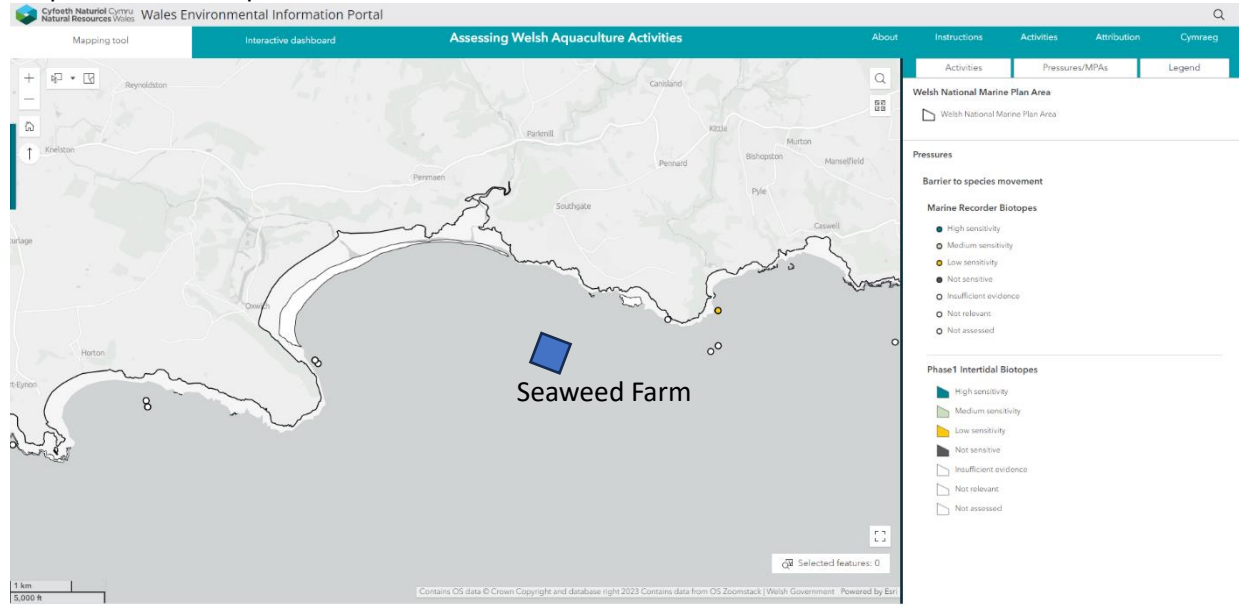
Map 1 – Above water noise



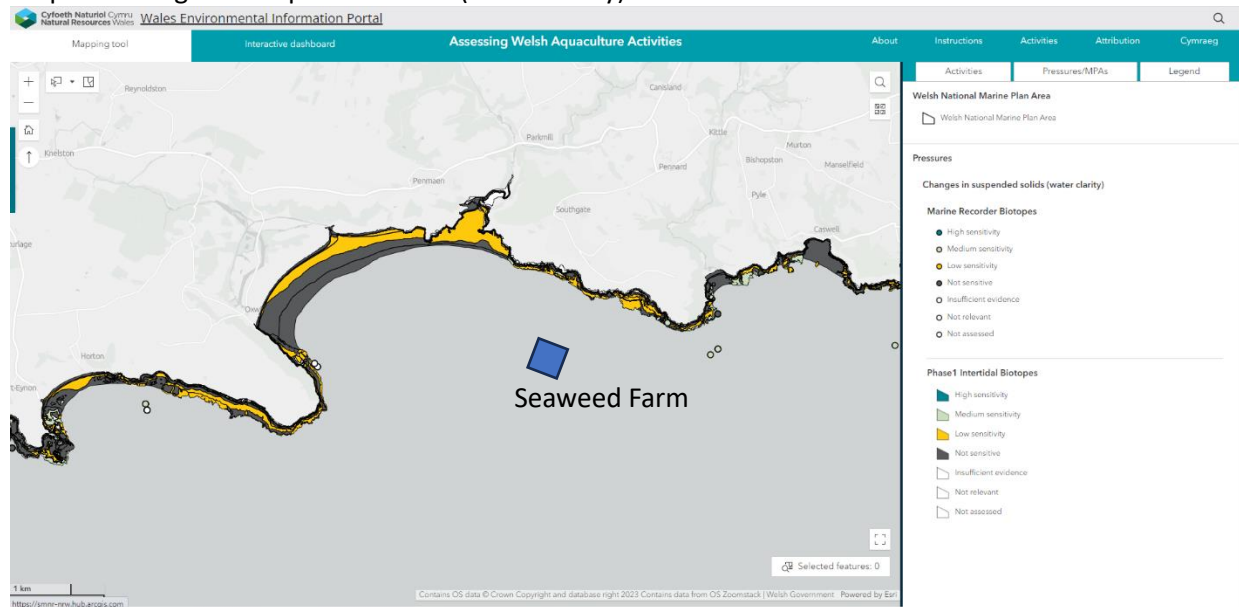
Map 2 – Abrasion / disturbance of the substrate on the surface of the seabed



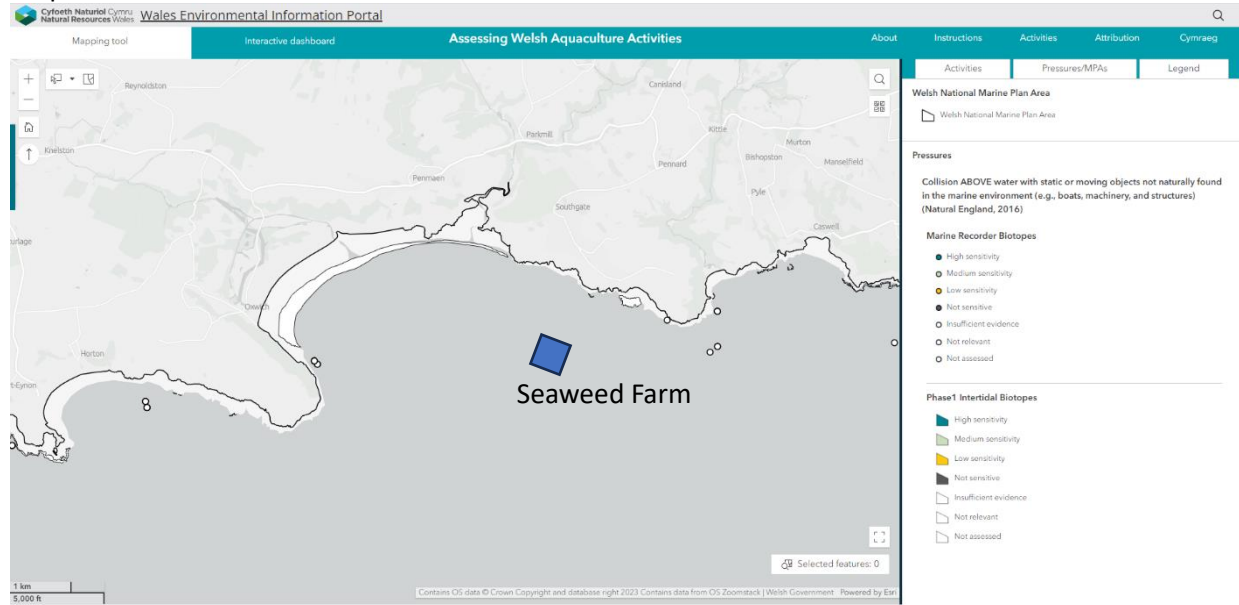
Map 3 – Barrier to species movement



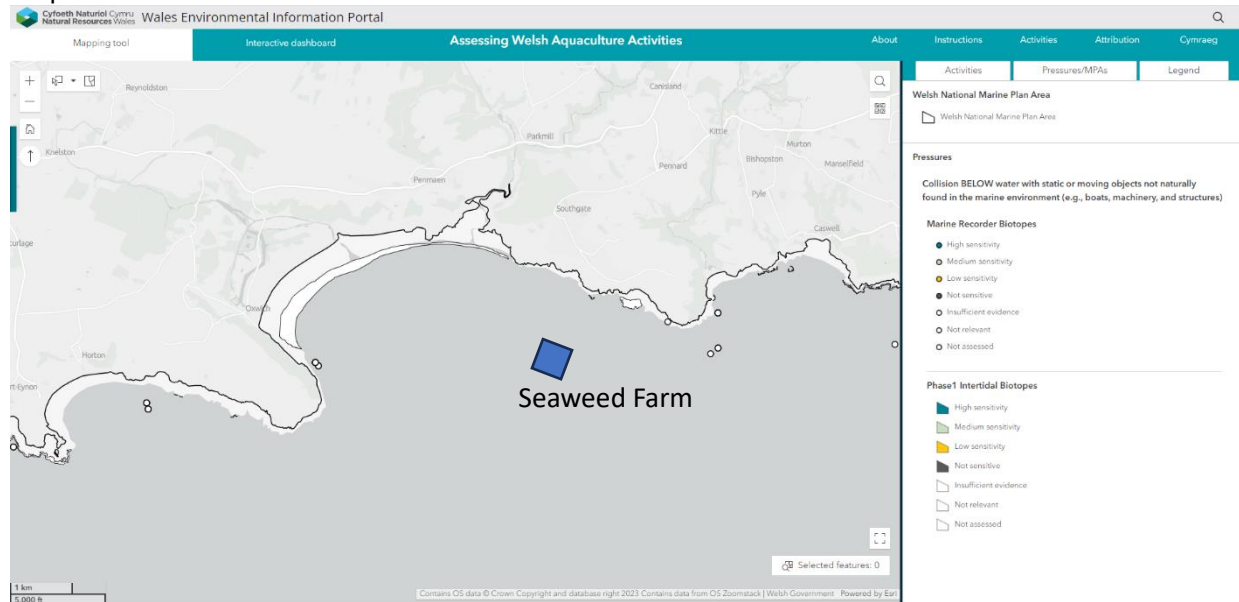
Map 4 – Changes in suspended solids (water clarity)



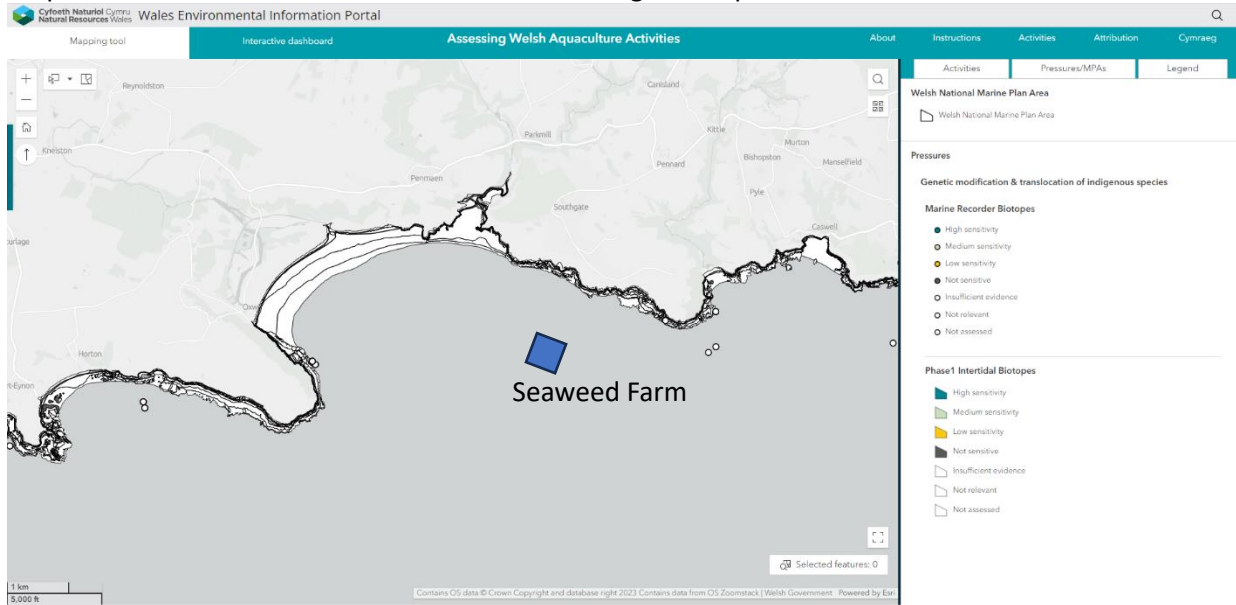
Map 5 – Collision ABOVE water



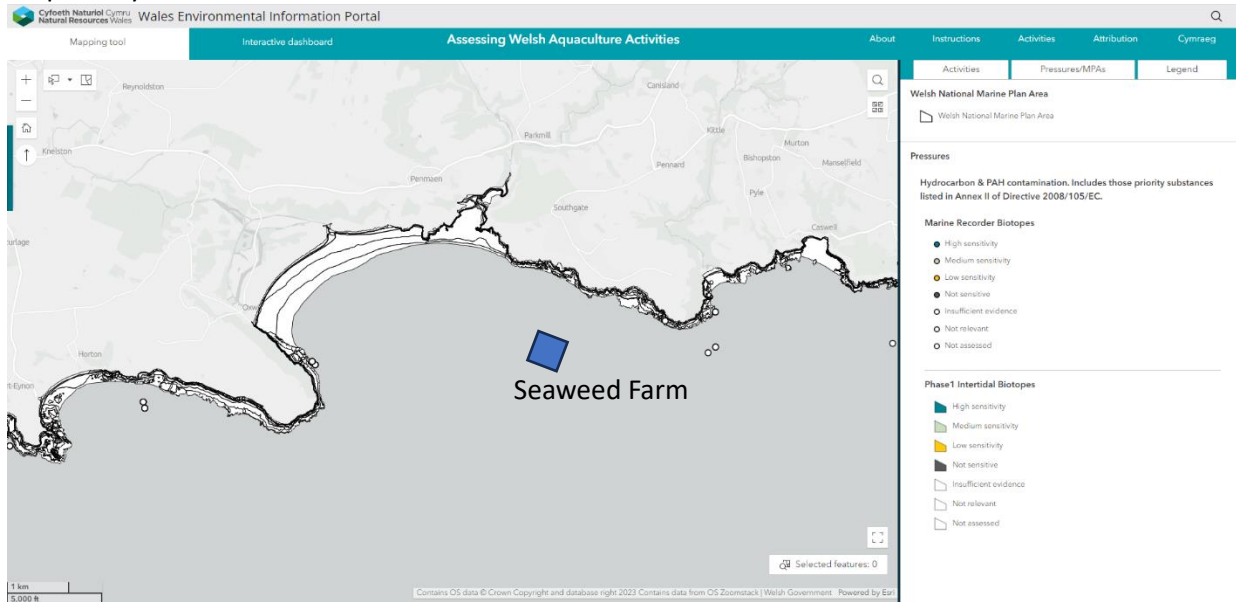
Map 6 – Collision BELOW water



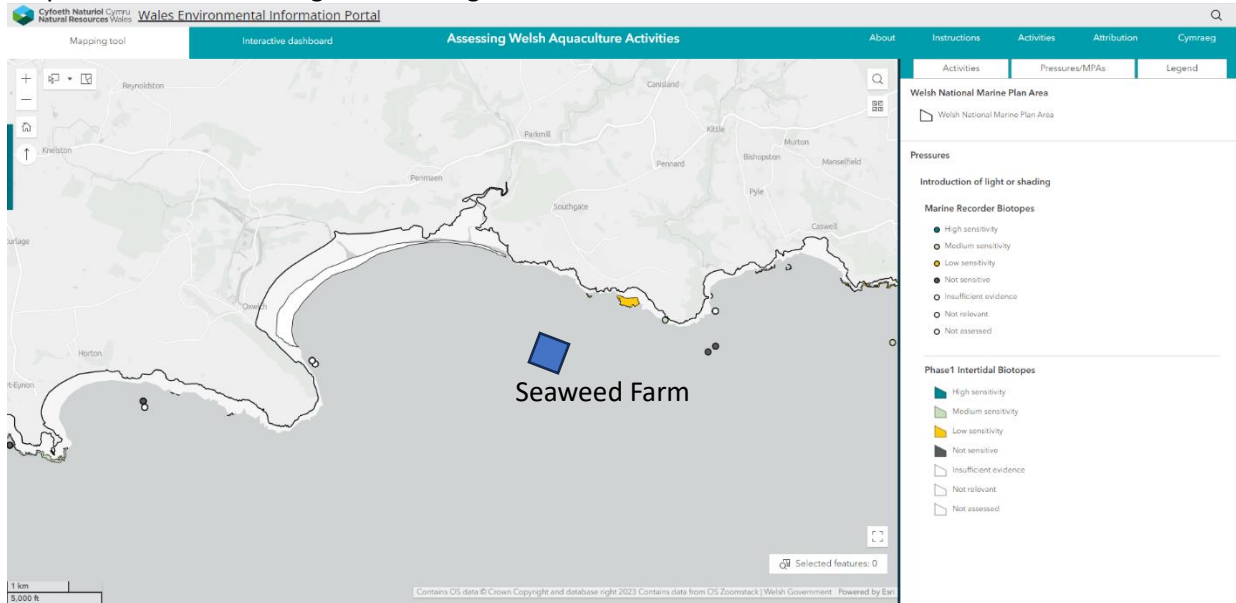
Map 7 – Genetic modification & translocation of indigenous species



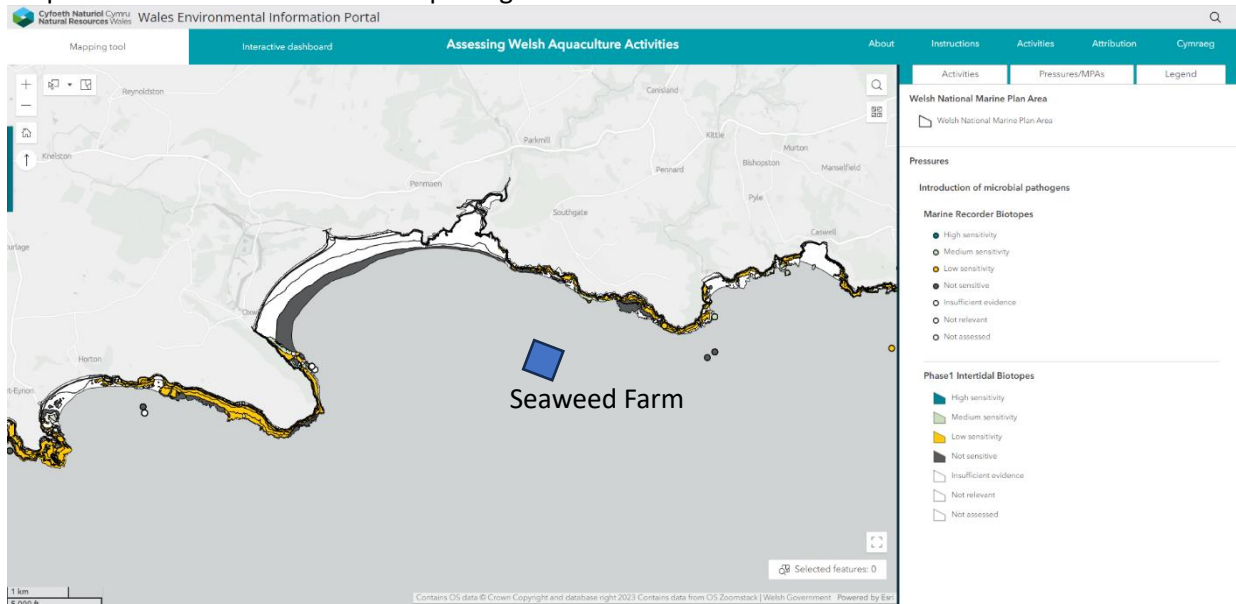
Map 8 – Hydrocarbon & PAH contamination.



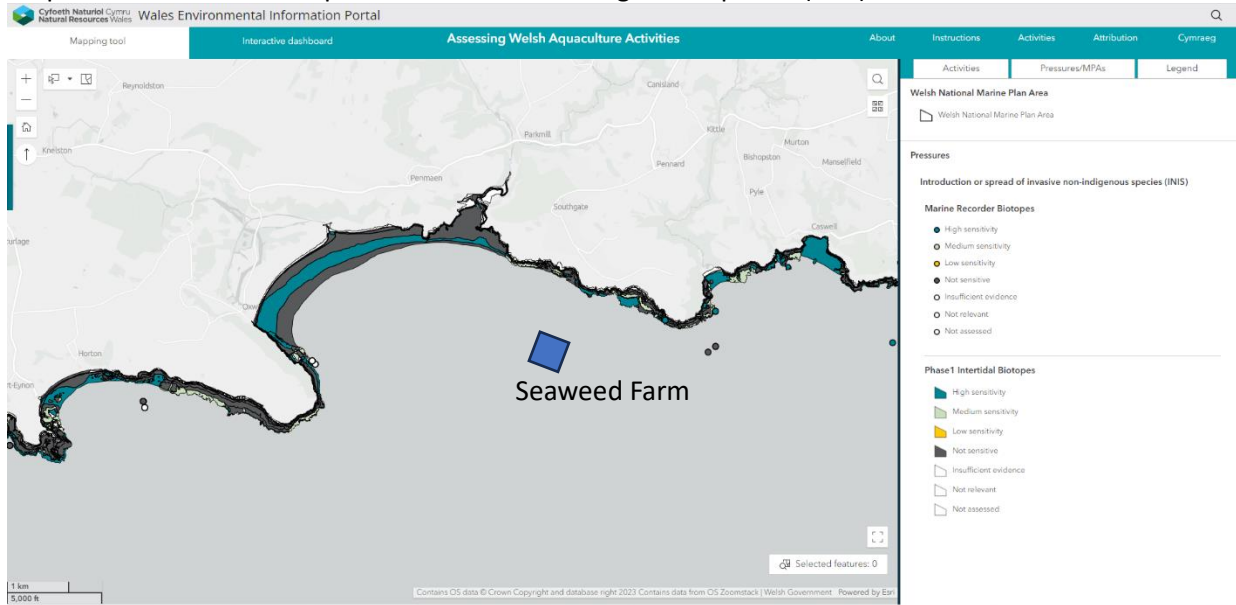
Map 9 – Introduction of light or shading



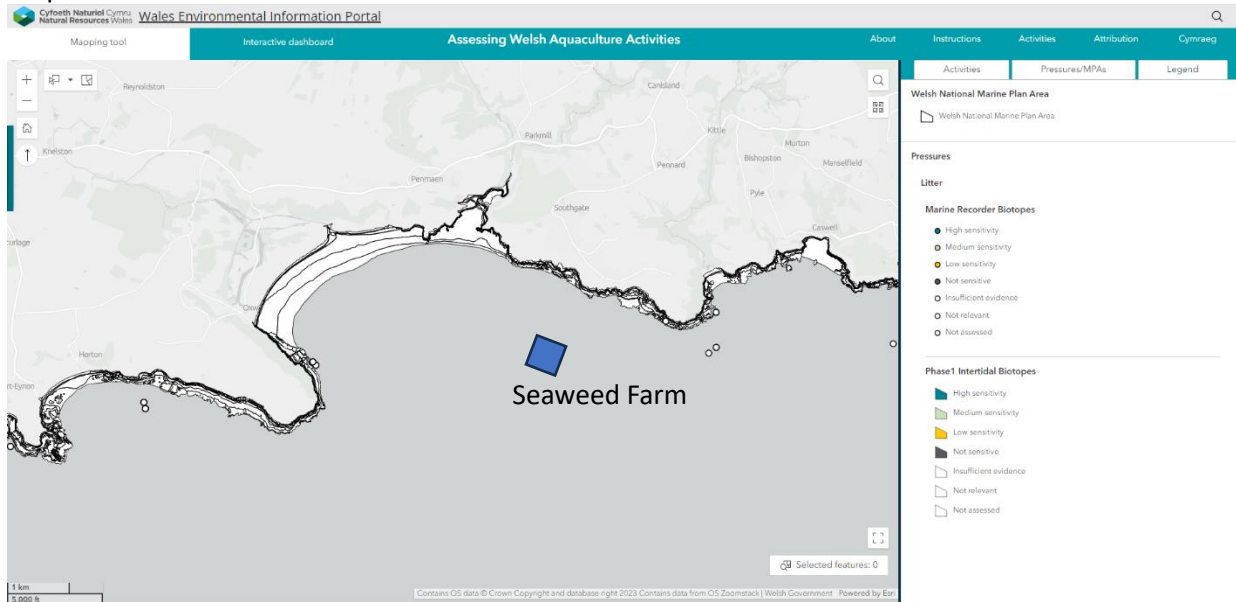
Map 10 – Introduction of microbial pathogens



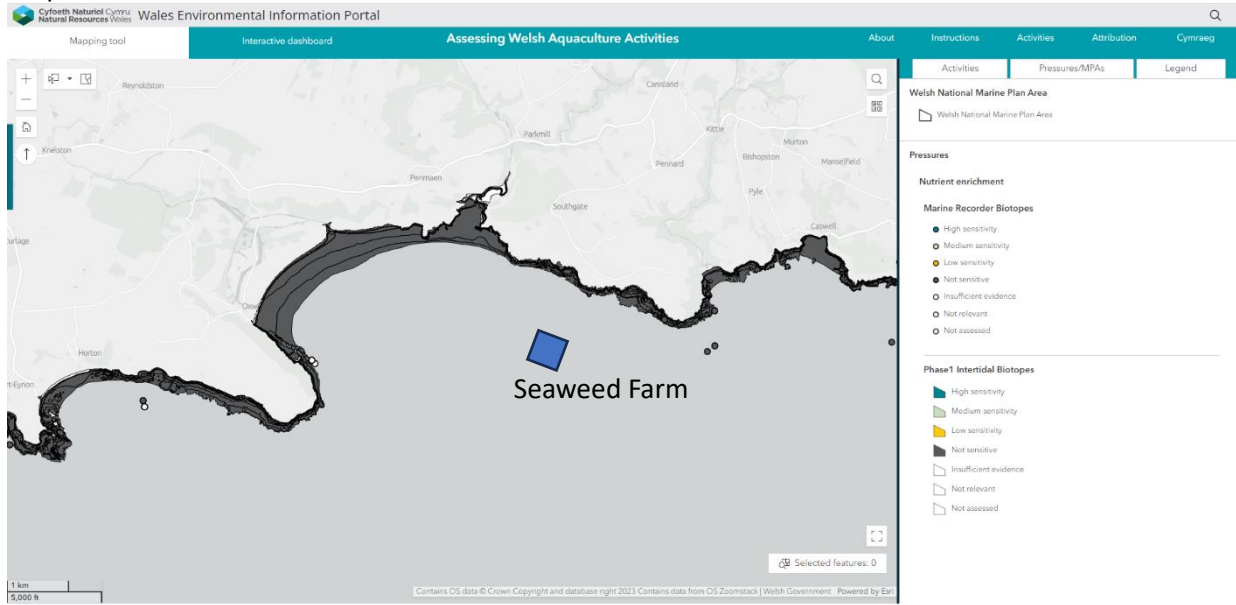
Map 11 – Introduction or spread of invasive on-indigenous species (INIS)



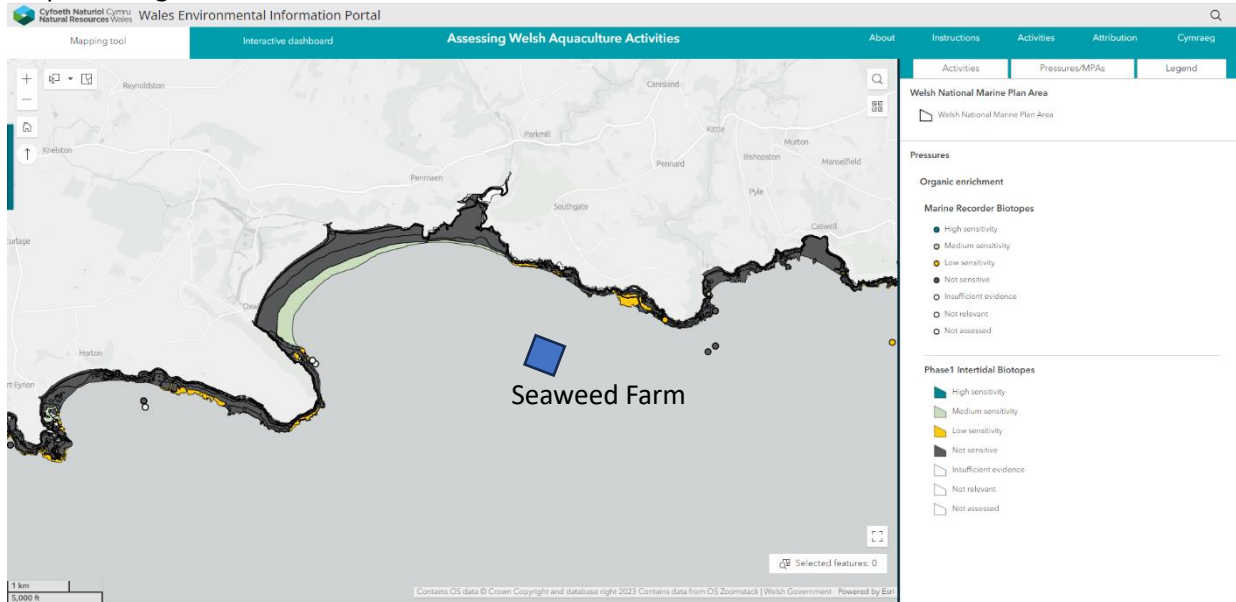
Map 12 – Litter



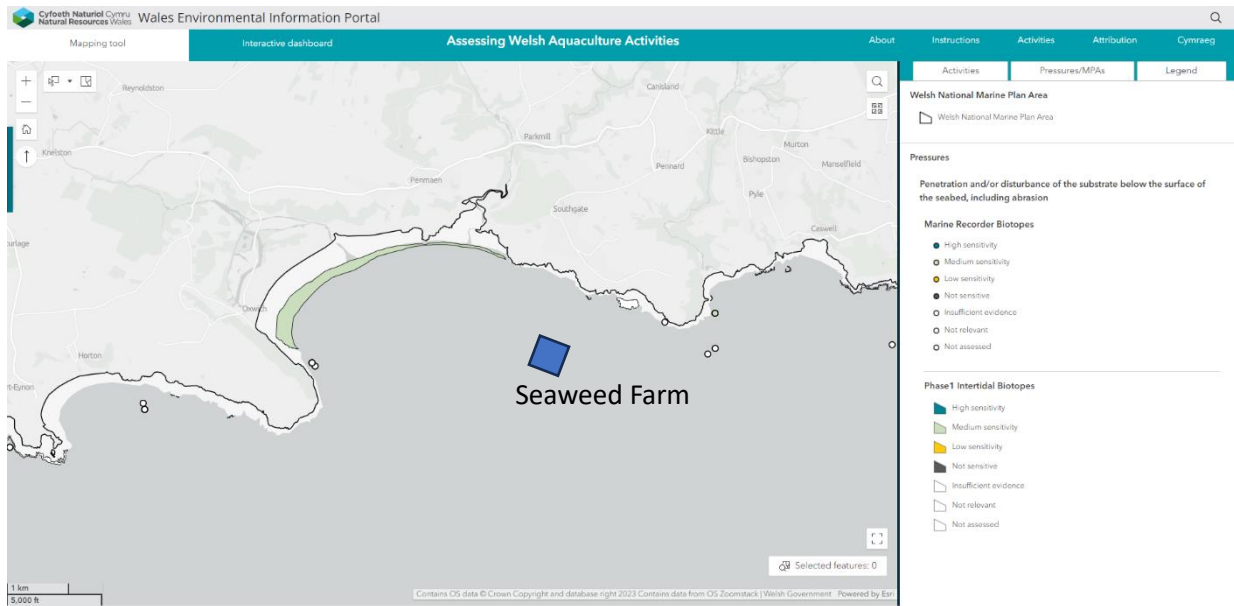
Map 13 – Nutrient enrichment



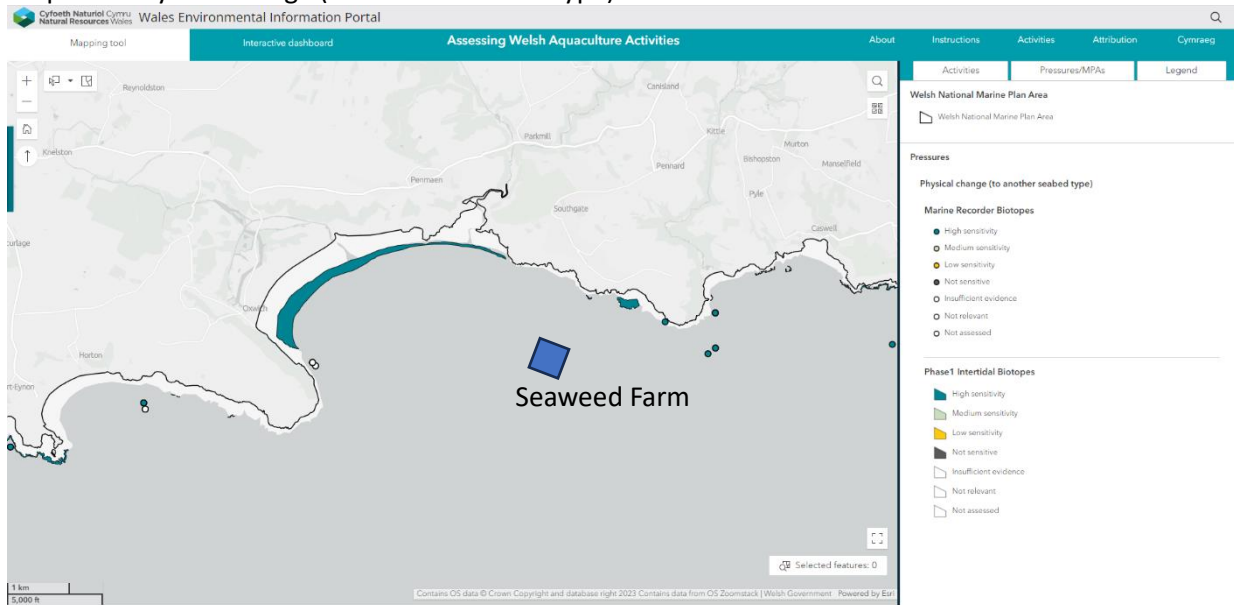
Map 14 – Organic enrichment



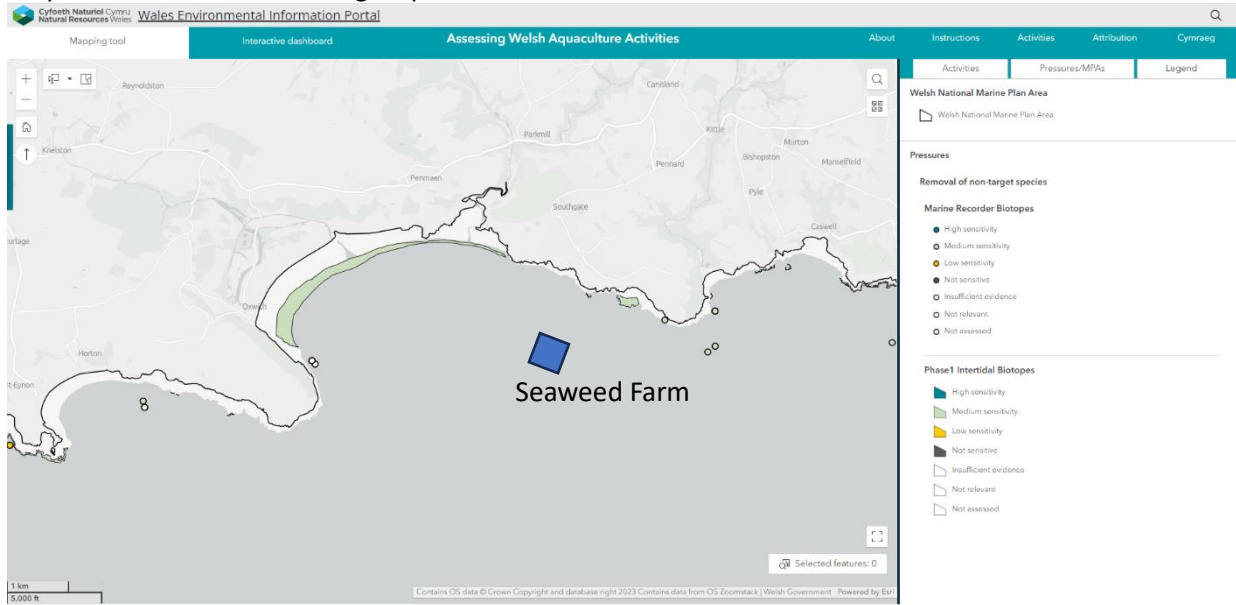
Map 15 – Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion



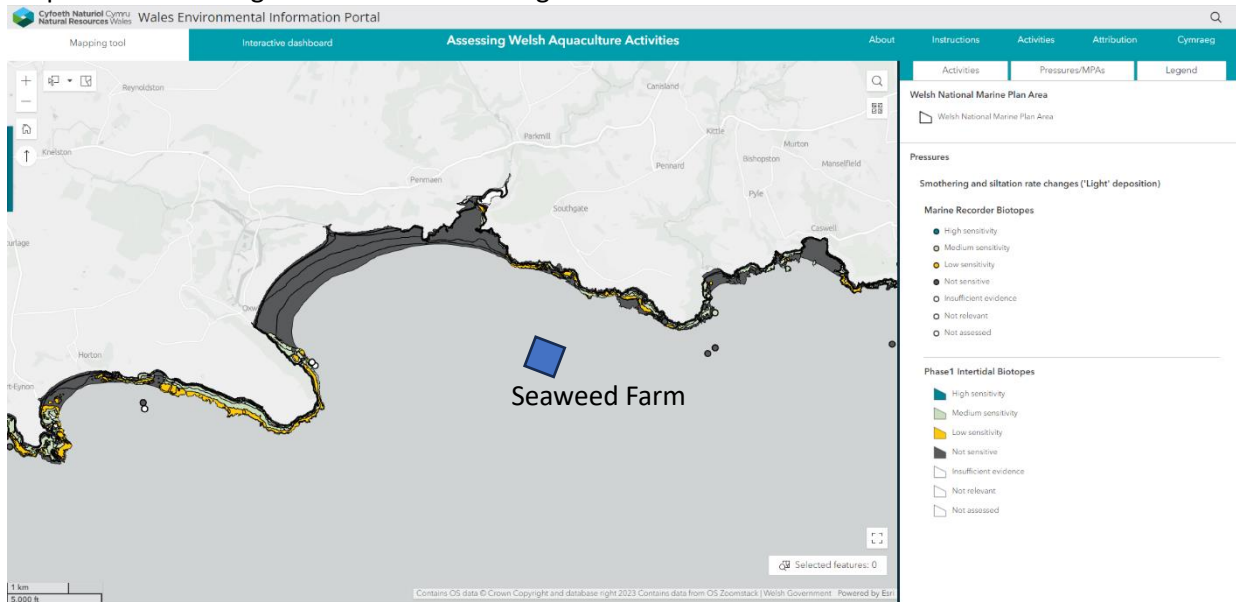
Map 16 – Physical change (to another seabed type)



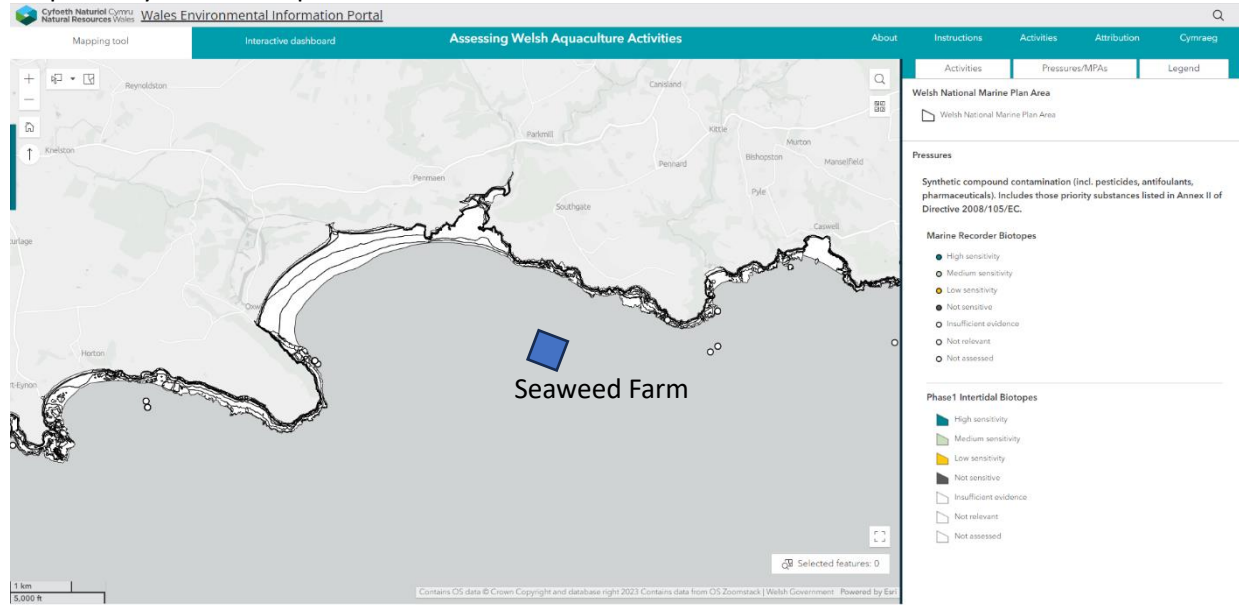
Map 17 – Removal of non-target species



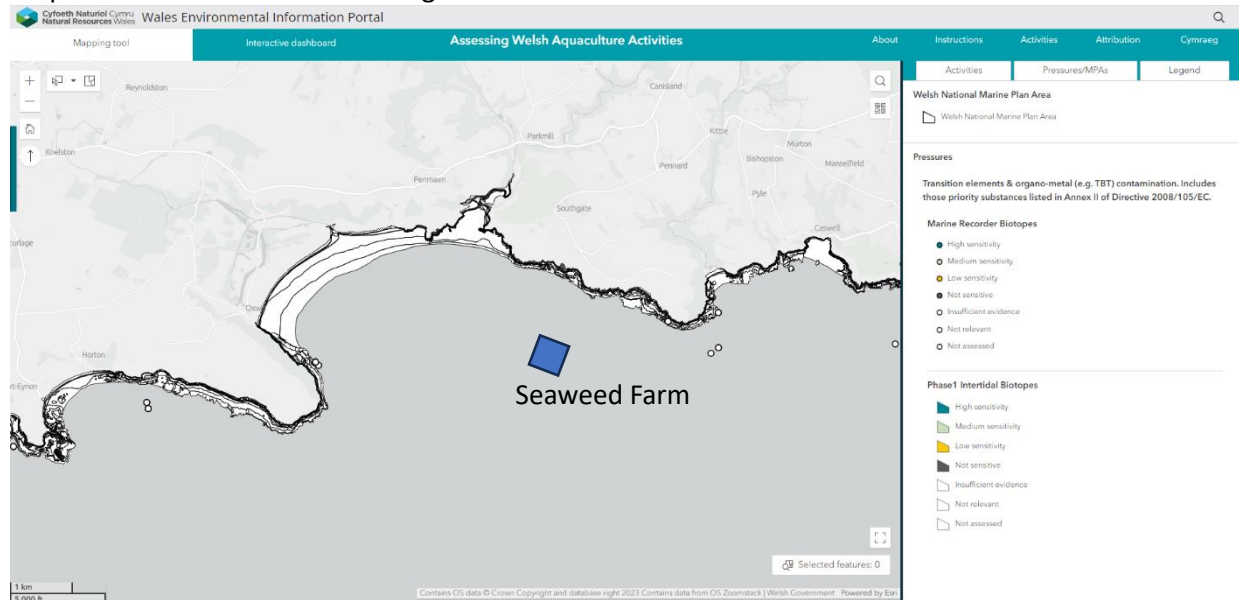
Map 18 – Smothering and siltation rate changes



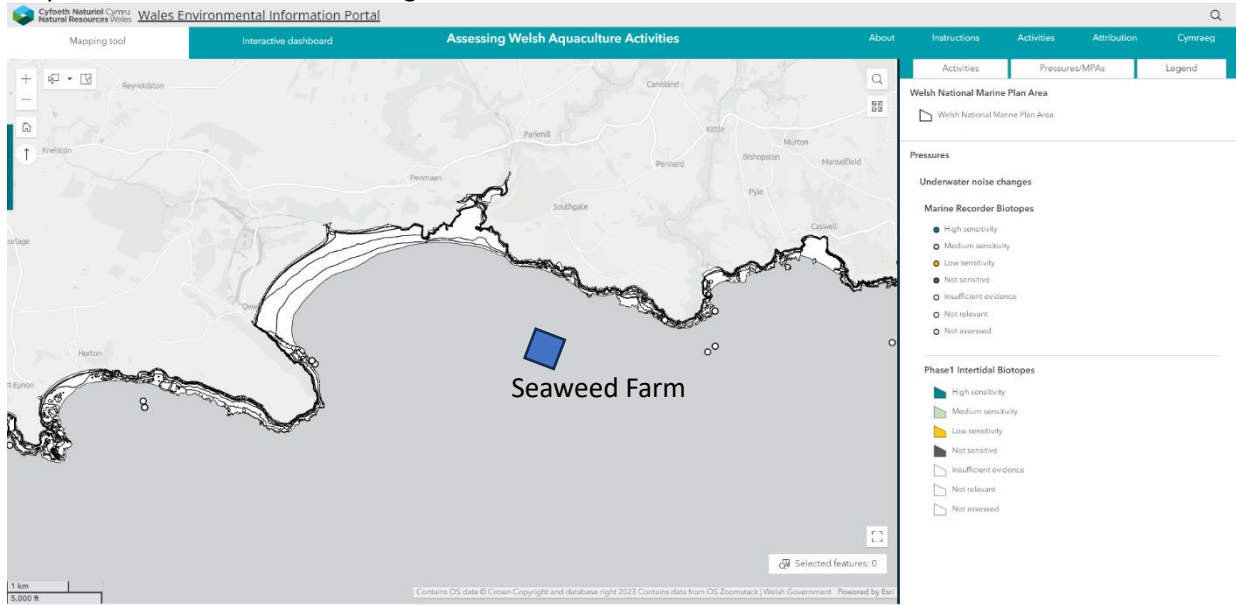
Map 19 – Synthetic compound contamination



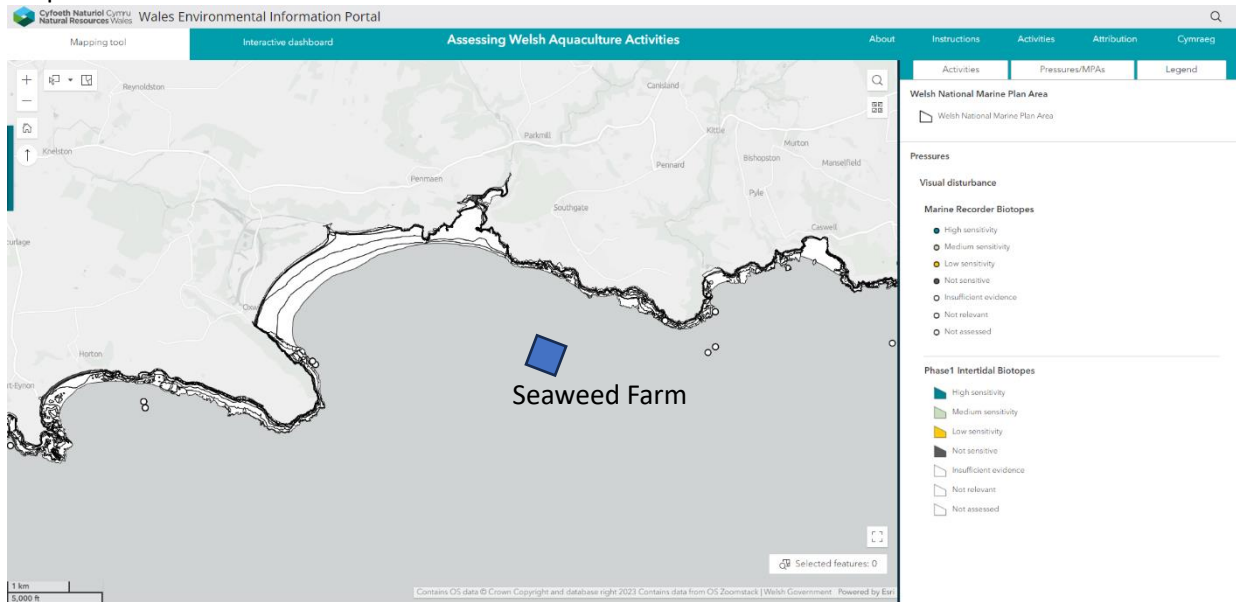
Map 20 – Transition elements & organo-metal contamination



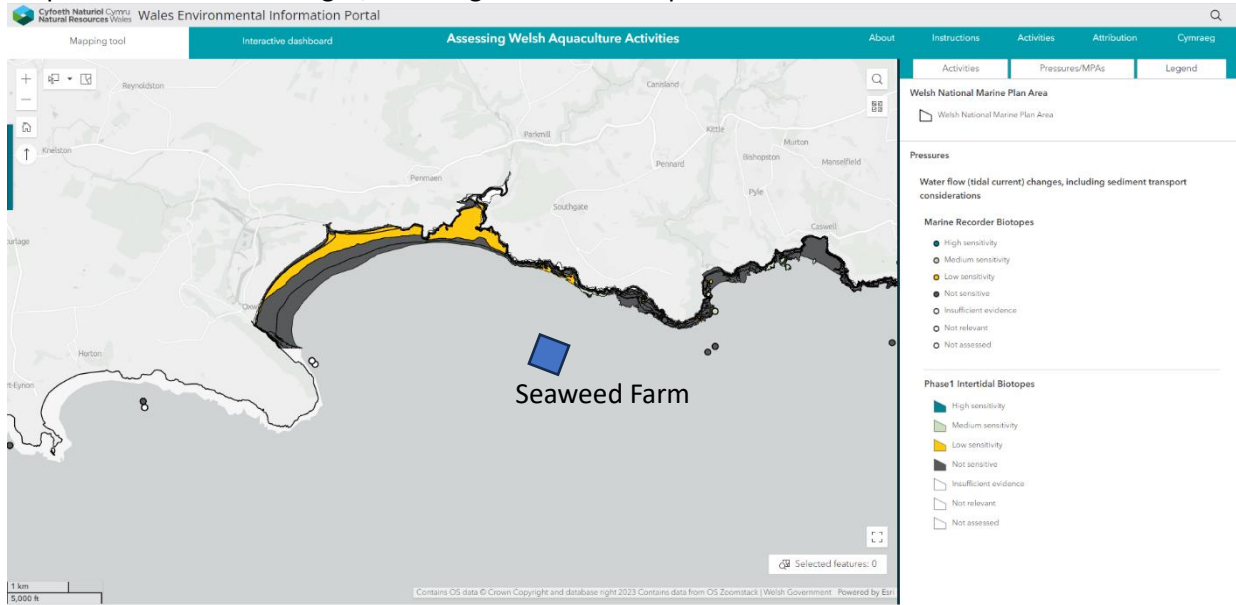
Map 21 – Underwater noise changes



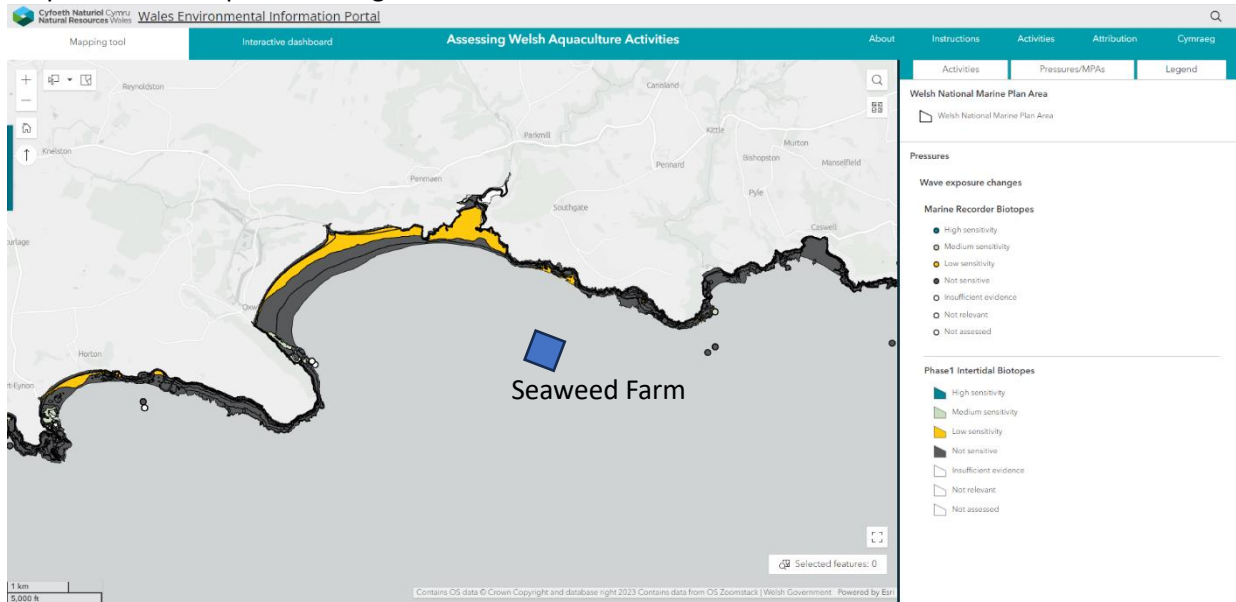
Map 22 – Visual disturbance



Map 23 – Water flow changes, including sediment transport considerations



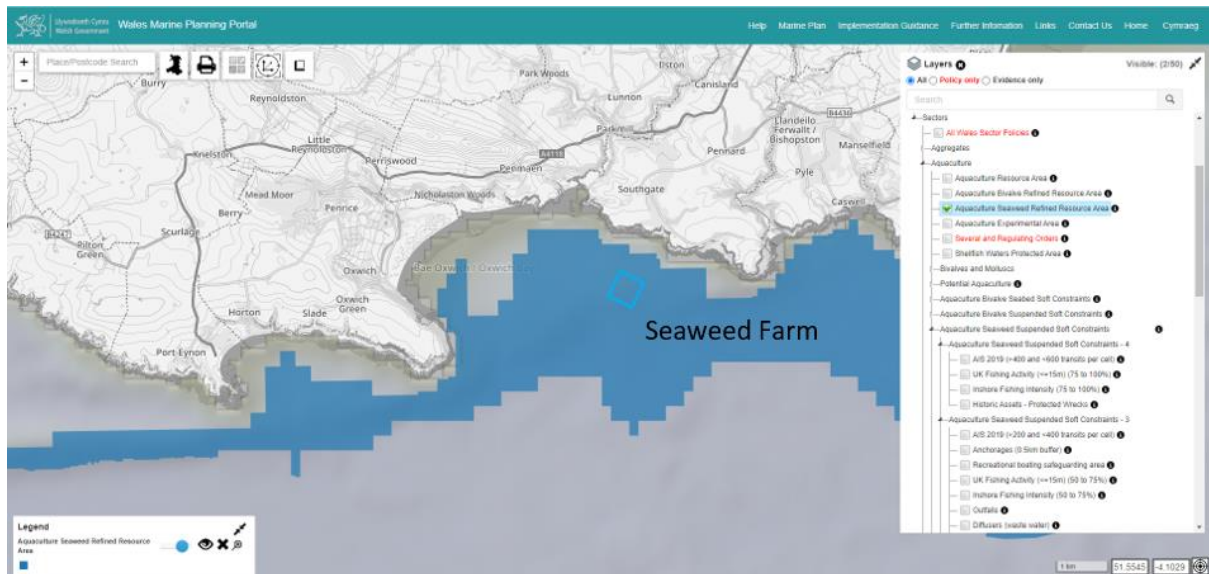
Map 24 – Wave exposure changes



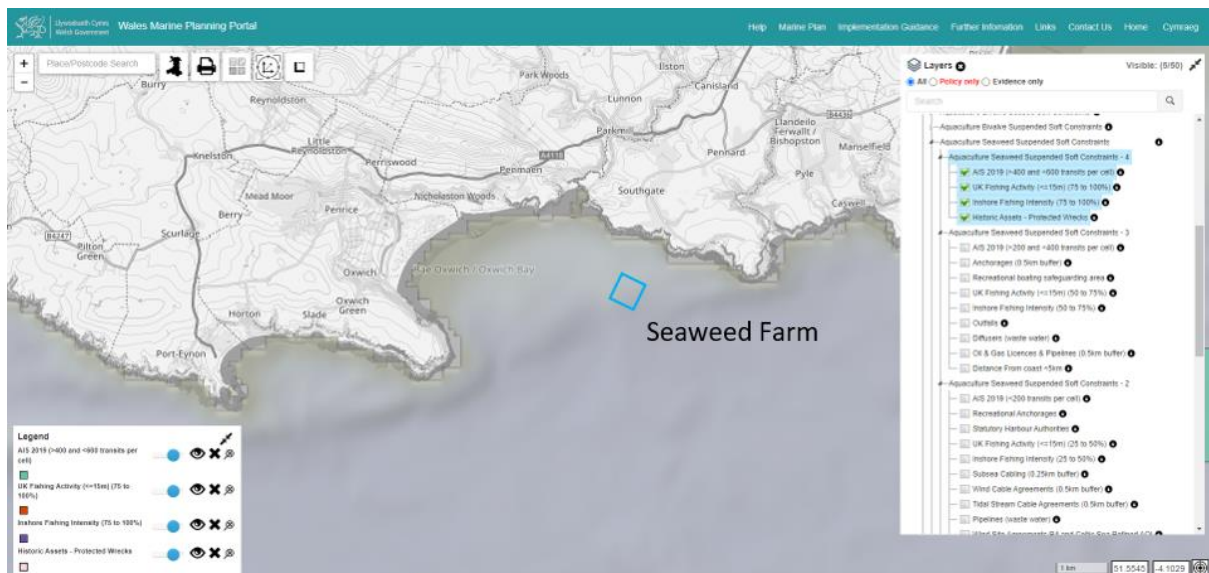
Wales Marine Planning Portal

Wales Marine Planning Portal https://lle.gov.wales/apps/marineportal/#lat=52.5145&lon=-3.9111&z=8&tgt=false	The Wales Marine Planning Portal is an interactive mapping tool for data relating to marine planning in Wales.
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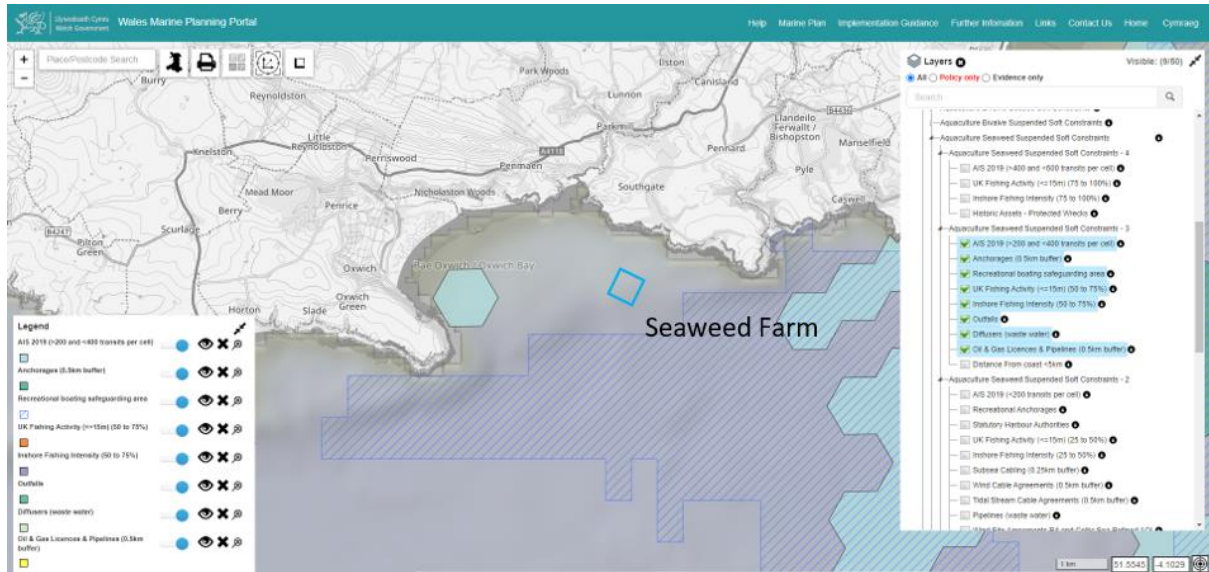
Map 1 – Aquaculture Seaweed Refined Resource Area



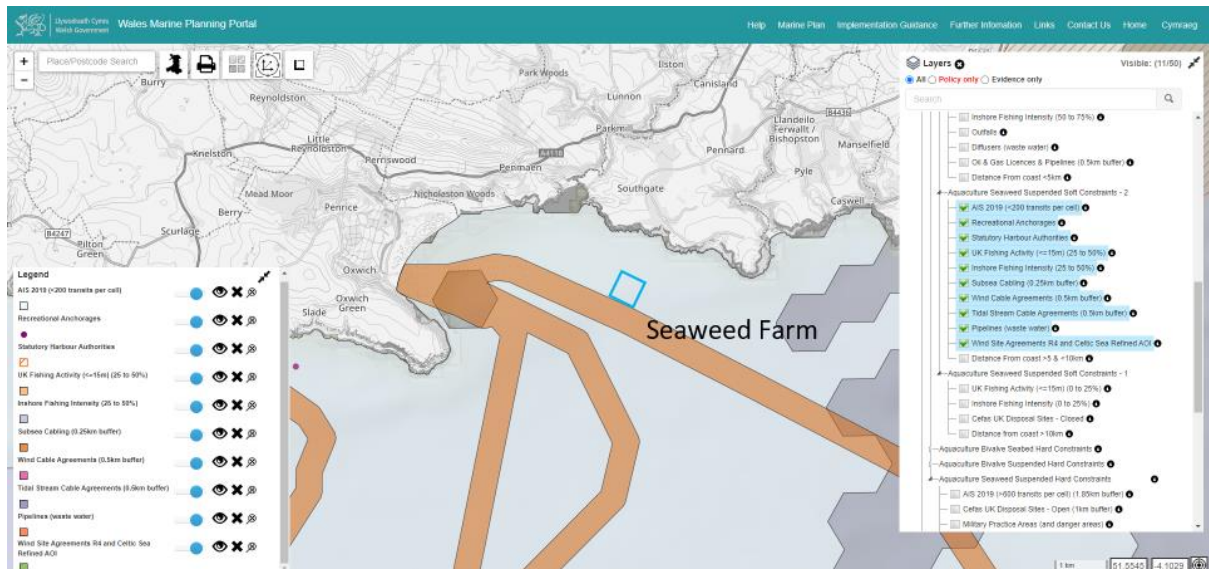
Map 2 – Aquaculture Suspended Seaweed Soft Constraints (1)



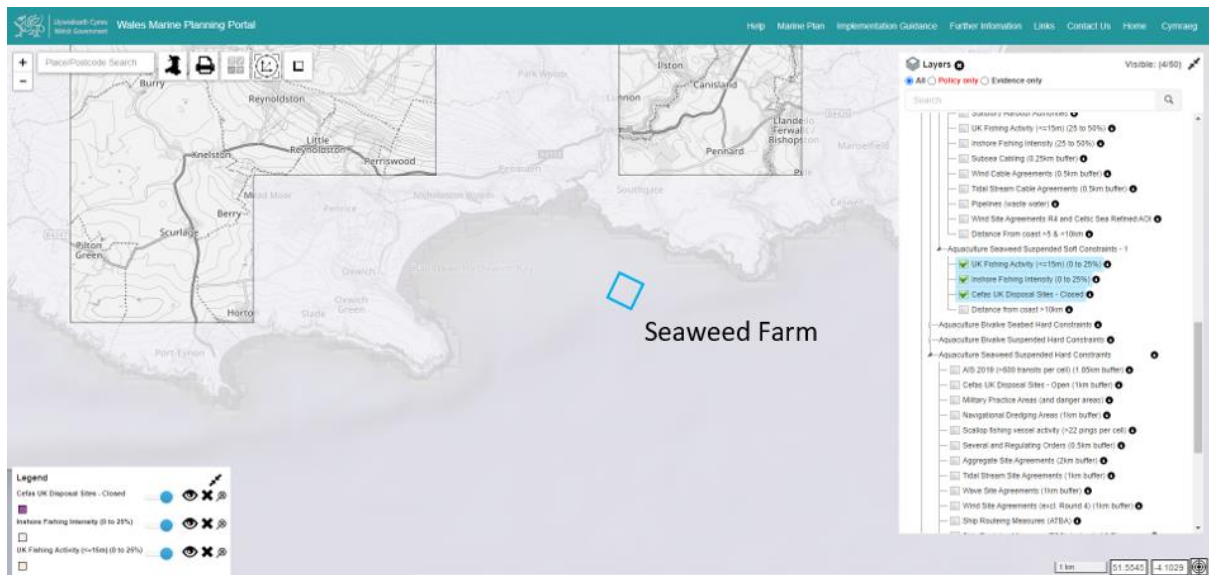
Map 3 – Aquaculture Suspended Seaweed Soft Constraints (2)



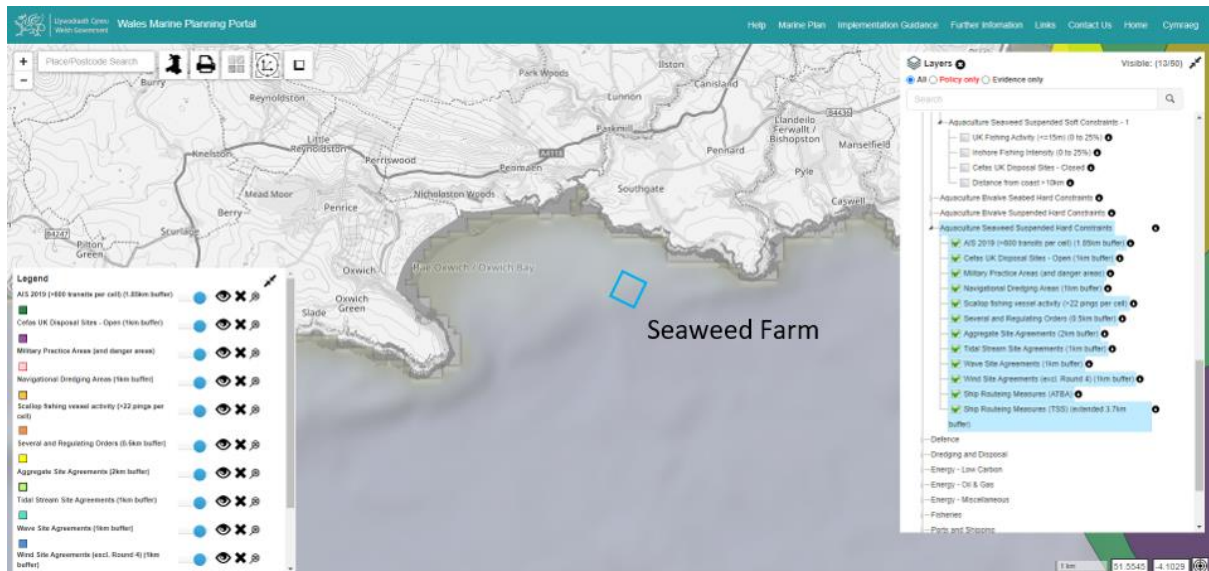
Map 4 – Aquaculture Suspended Seaweed Soft Constraints (3)



Map 5 – Aquaculture Suspended Seaweed Soft Constraints (4)



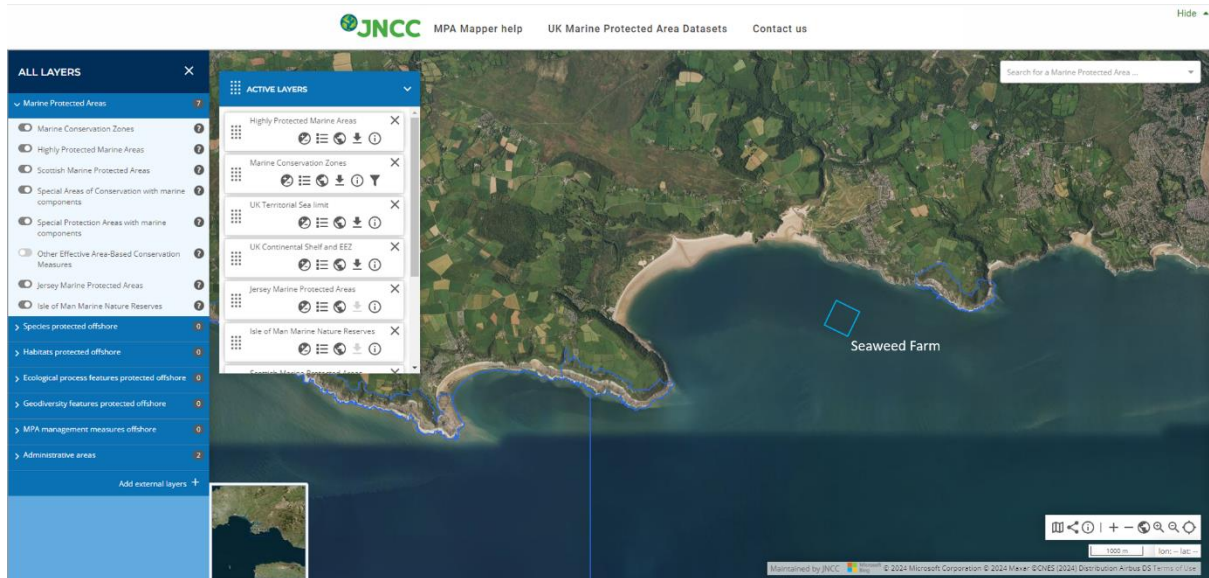
Map 6 – Aquaculture Suspended Seaweed Hard Constraints



JNCC MPA Mapper

JNCC MPA Mapper https://jncc.gov.uk/mpa-mapper/	The JNCC Marine Protected Area (MPA) mapper is an interactive resource containing information on the MPAs designated in UK and Crown Dependency waters. The mapper displays MPA boundaries in all UK and Crown Dependency waters, and protected feature information for sites within UK offshore waters.
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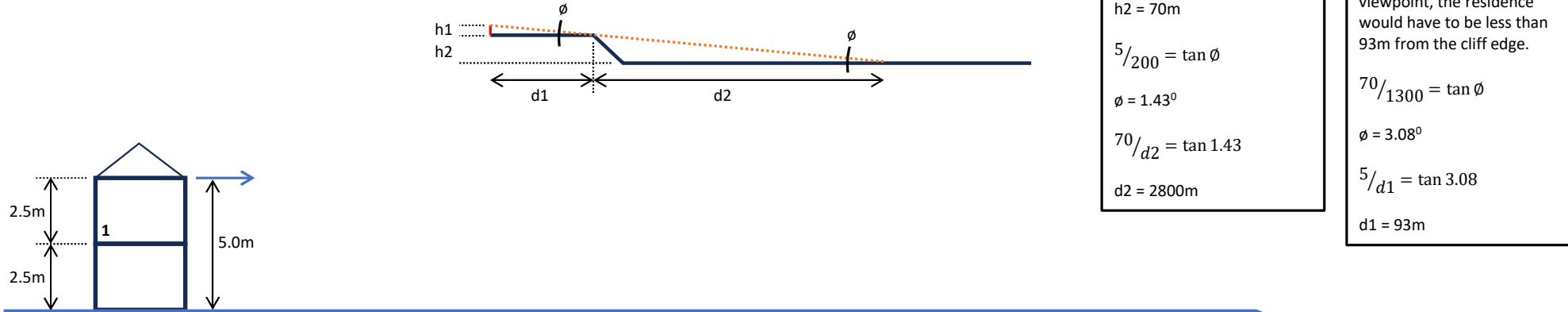
Seazou Aquaculture Ltd Seaweed Farm – Overview Document



11 Appendix B: Visual Impact Assessment

Seazou Seaweed Farm Visual Impact Assessment

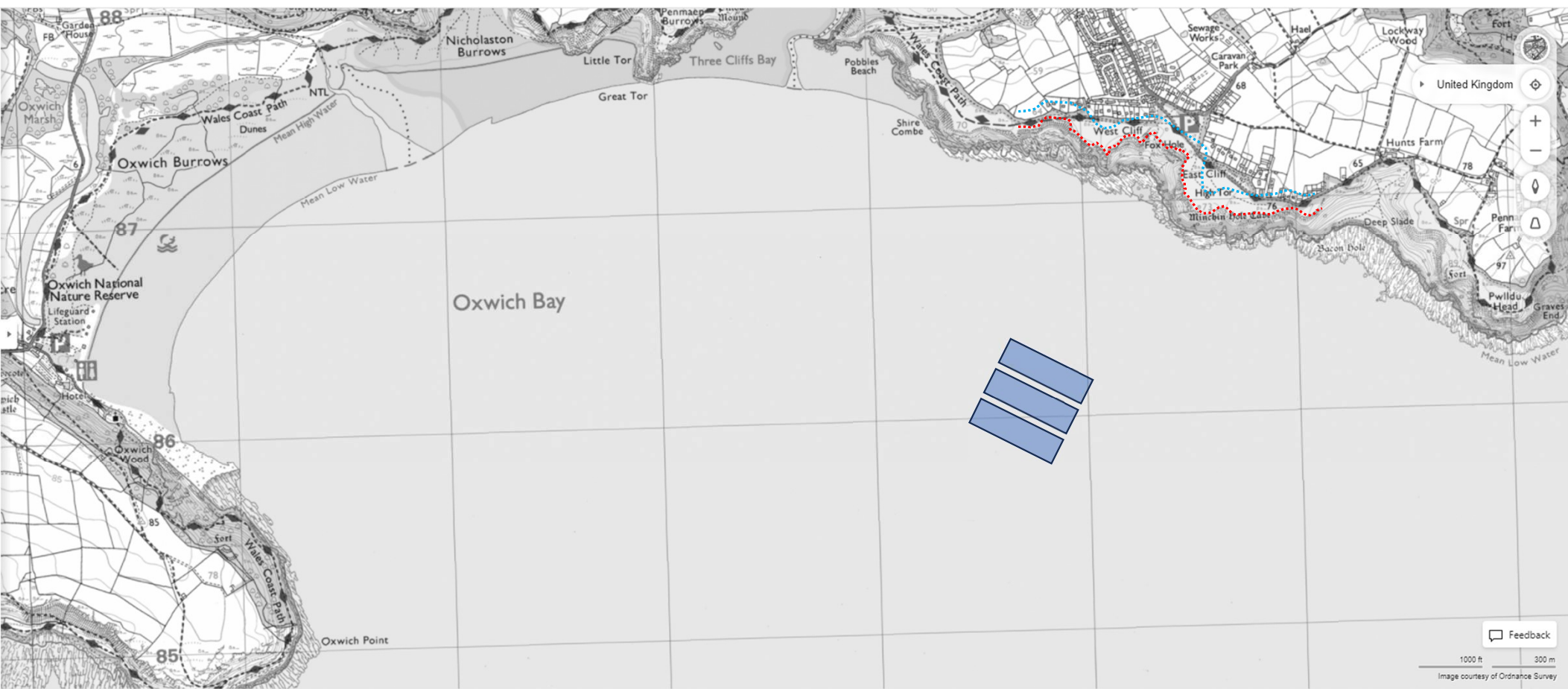
Visual Impact Assessment



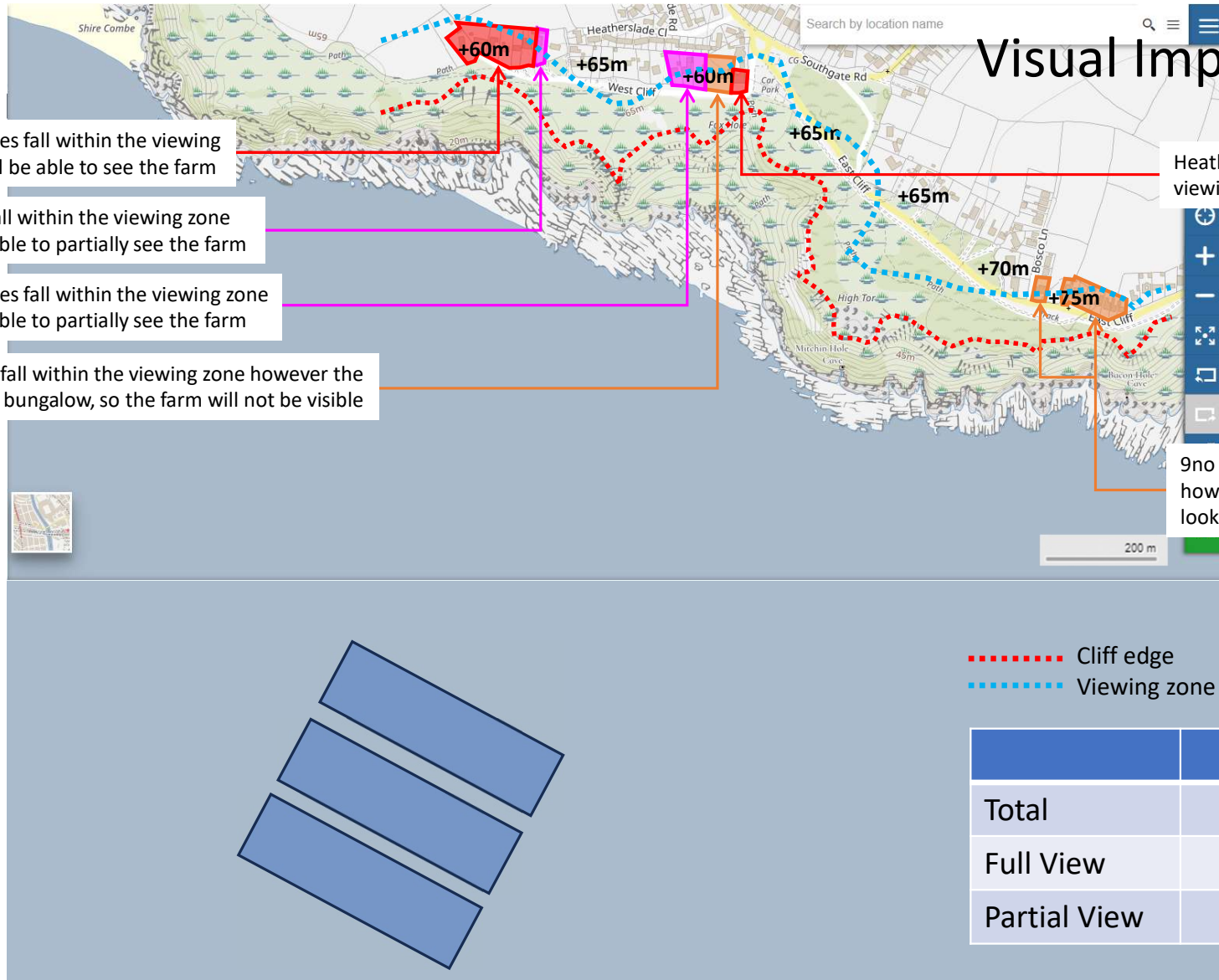
- +5.0m is the viewpoint from the 1st floor of a standard two storey house
- The houses in Southgate are typically 2 storey houses, so the +5.0m viewpoint is an appropriate height to use for this study.

Elevation	Viewing Zone
+60m	108m
+65m	100m
+70m	93m
+75m	87m

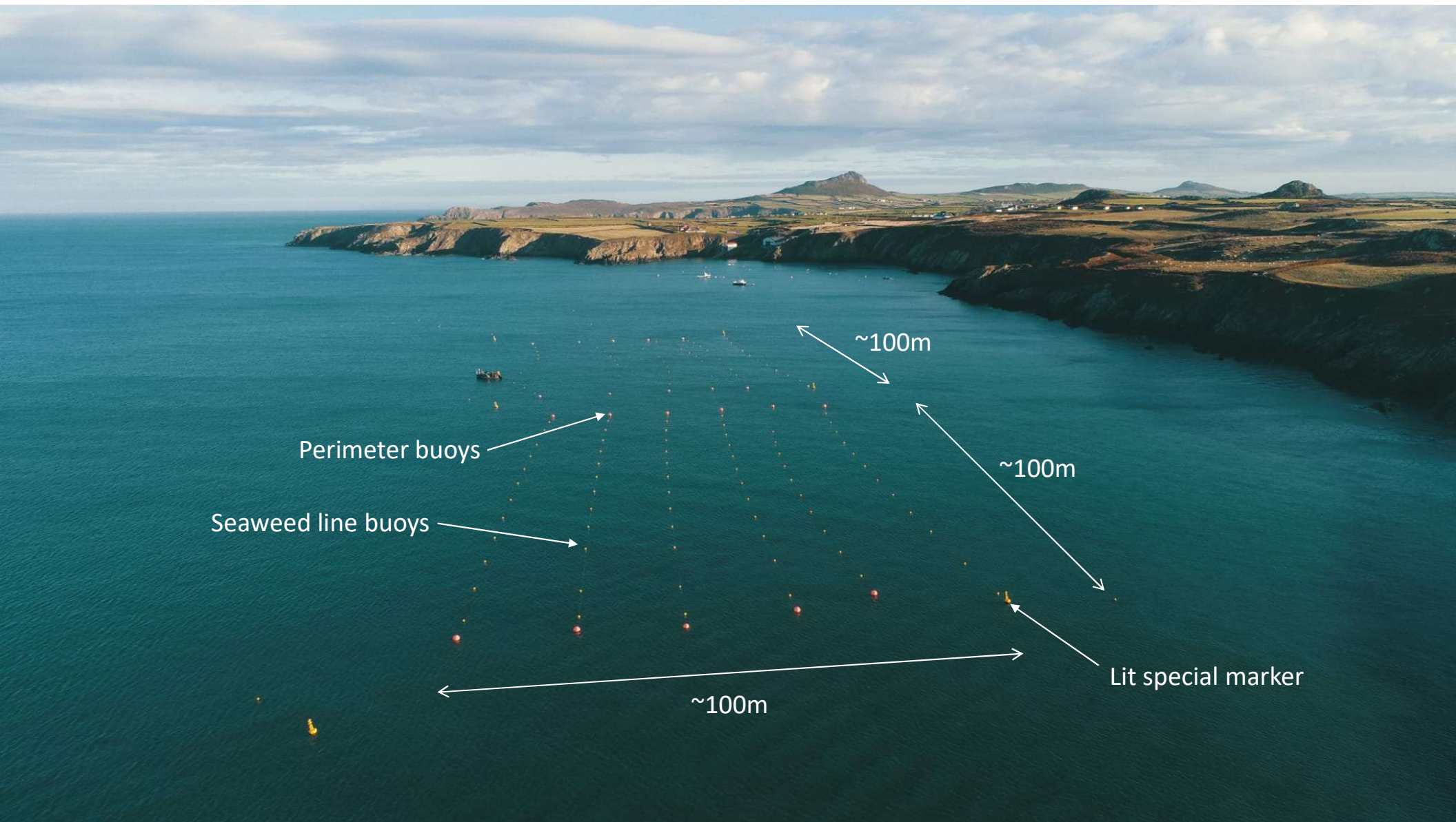
Visual Impact Assessment



Visual Impact Assessment



Example: Câr-y-Môr Seaweed Farm



Perimeter buoys

Seaweed line buoys

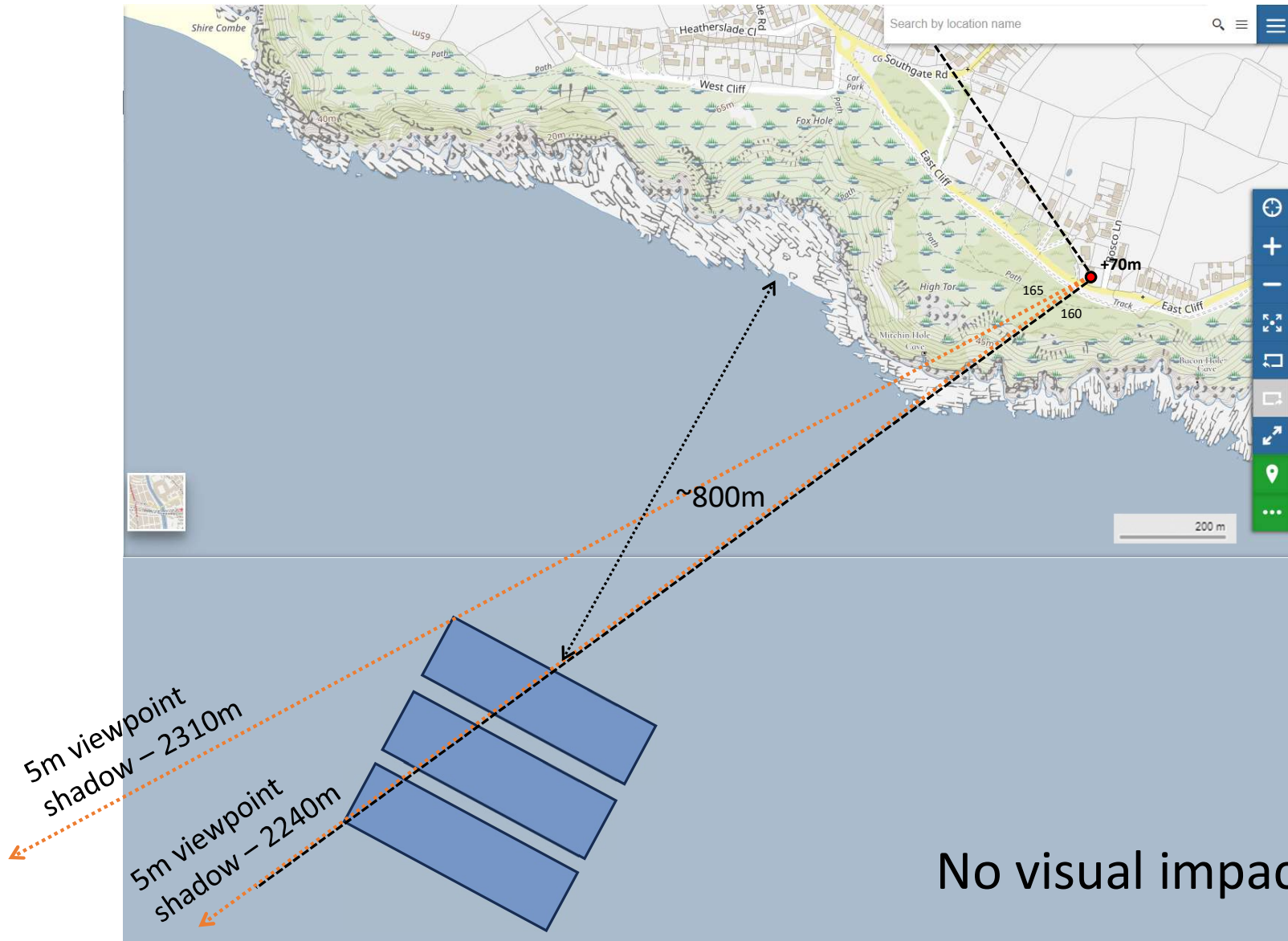
~100m

~100m

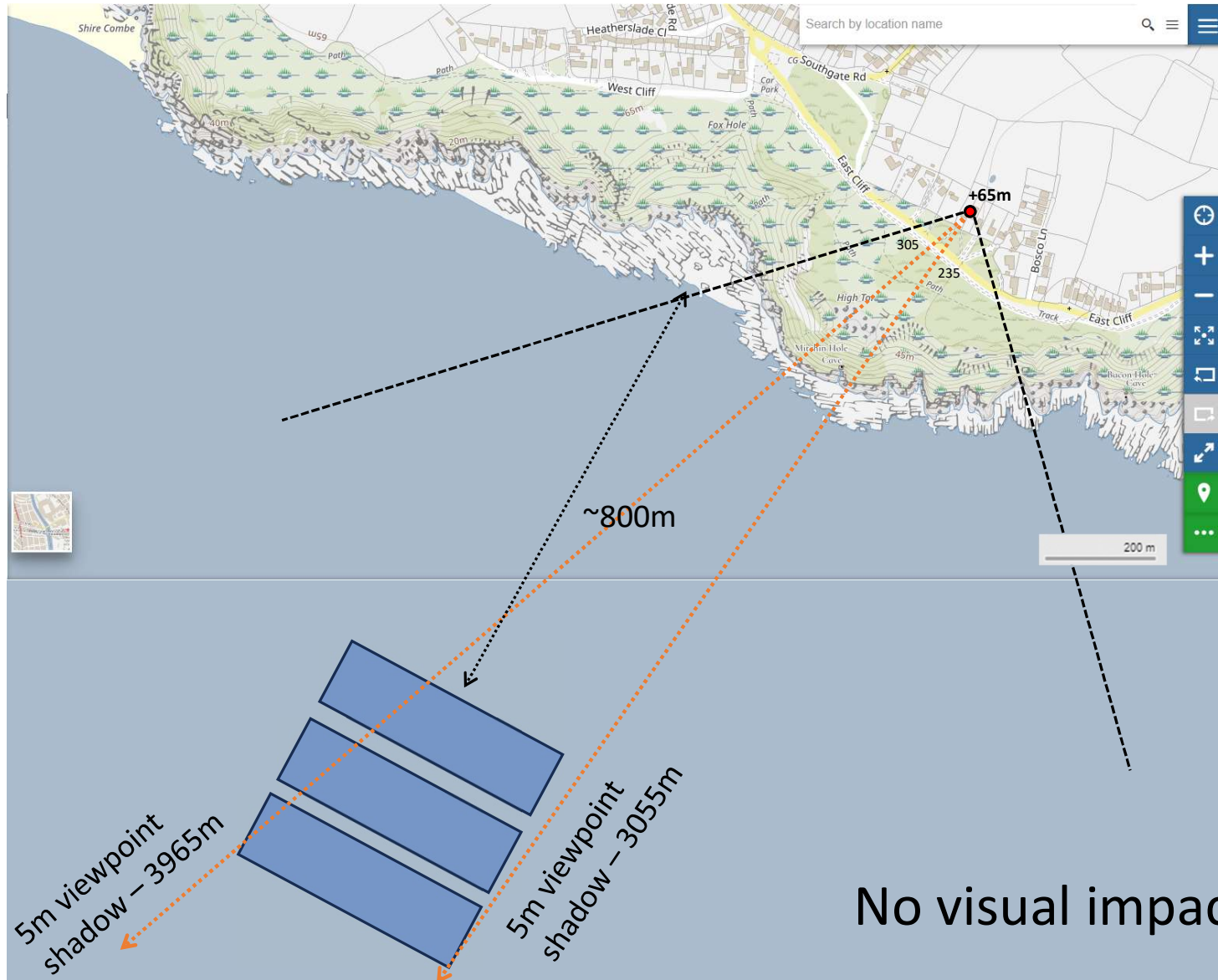
~100m

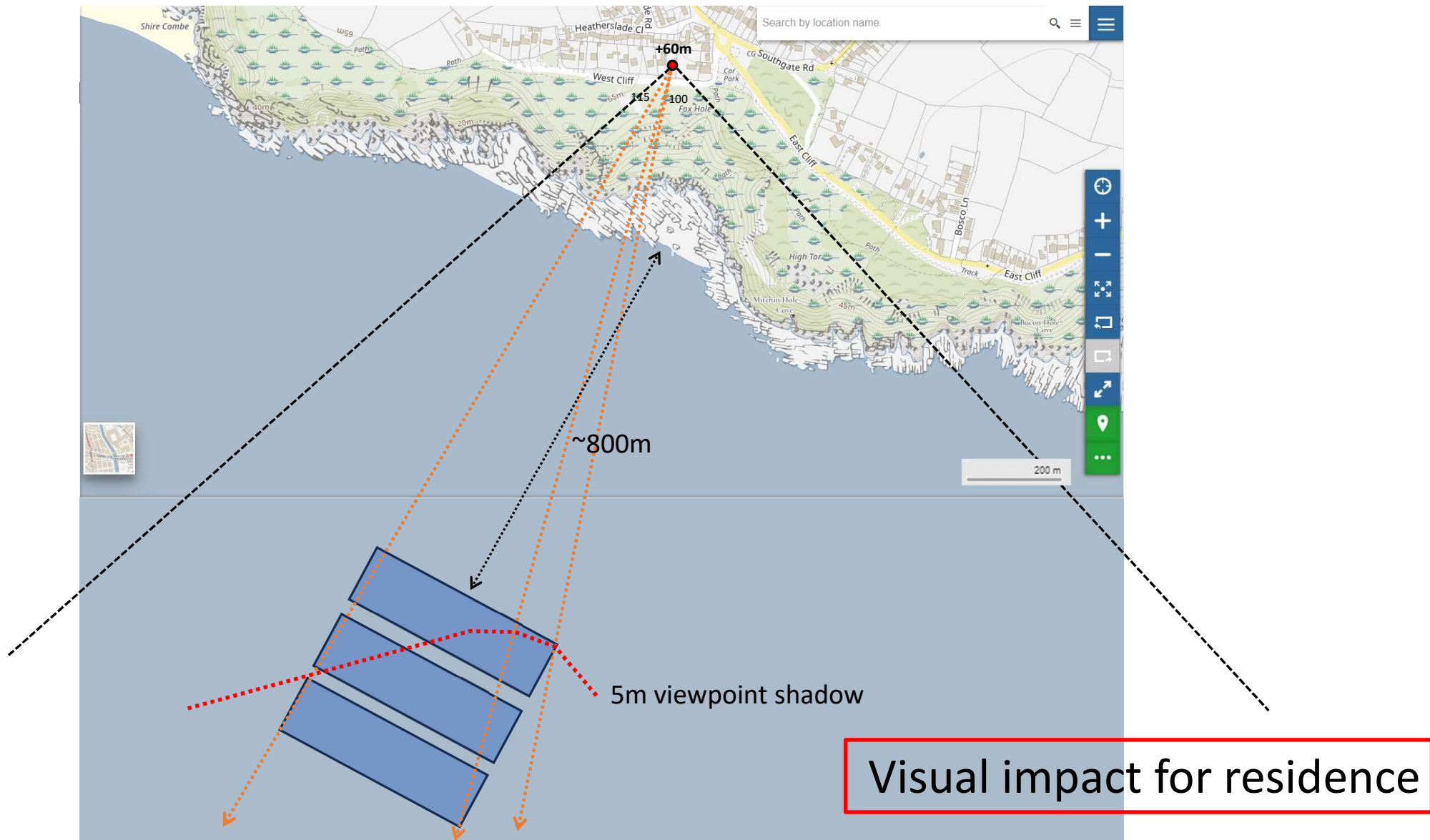
Lit special marker

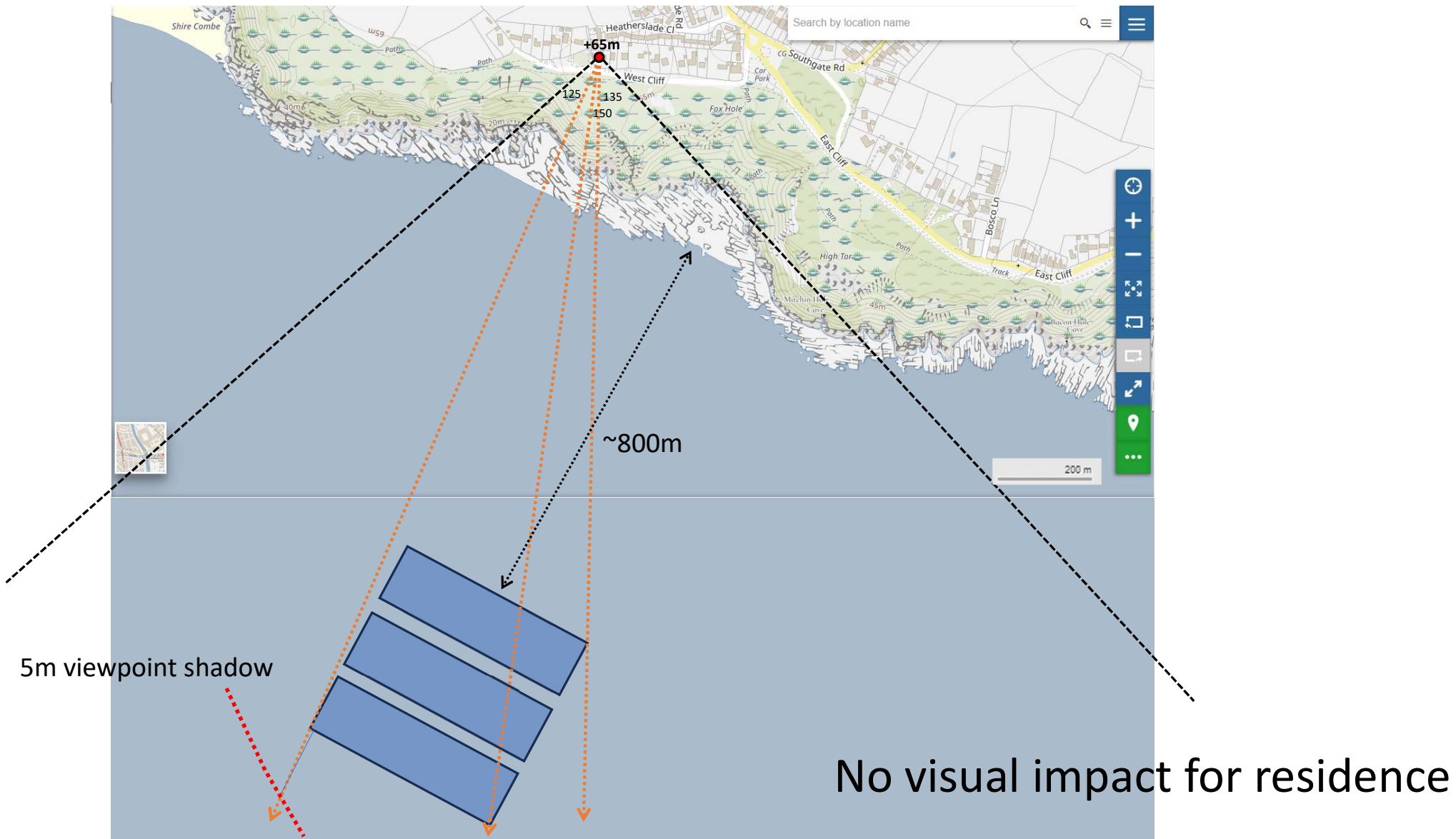
5m Viewpoint Shadow Projections

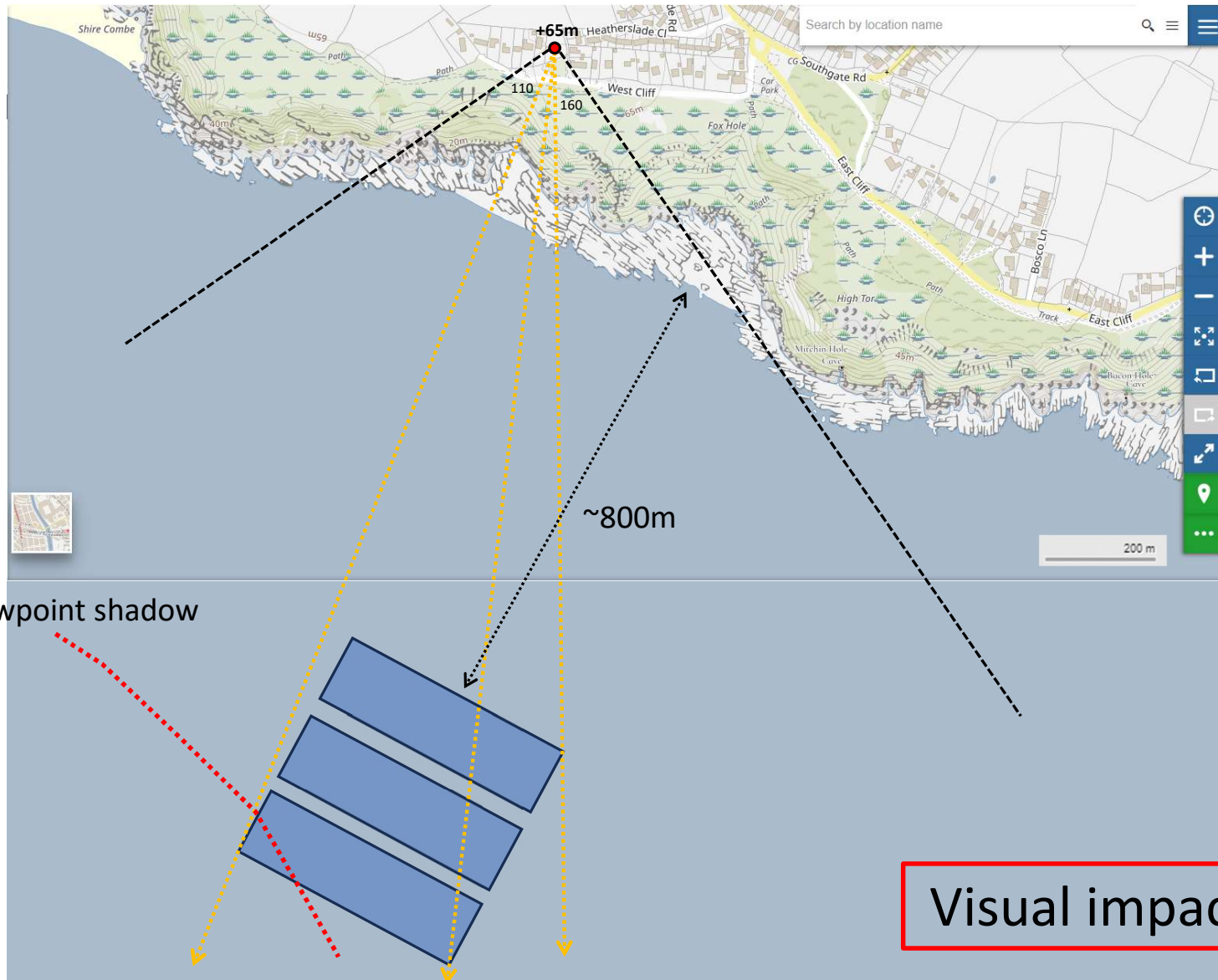


No visual impact for residence

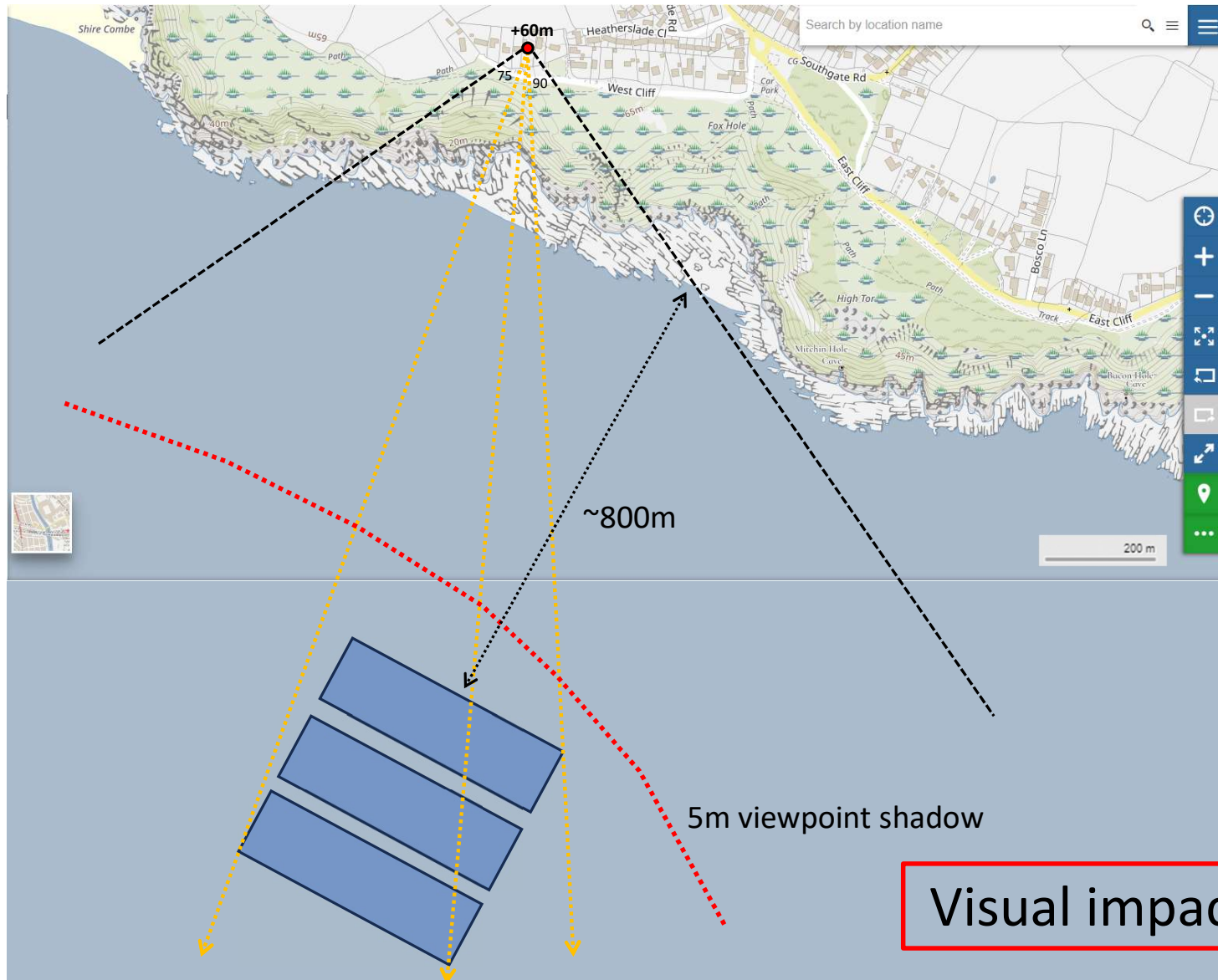




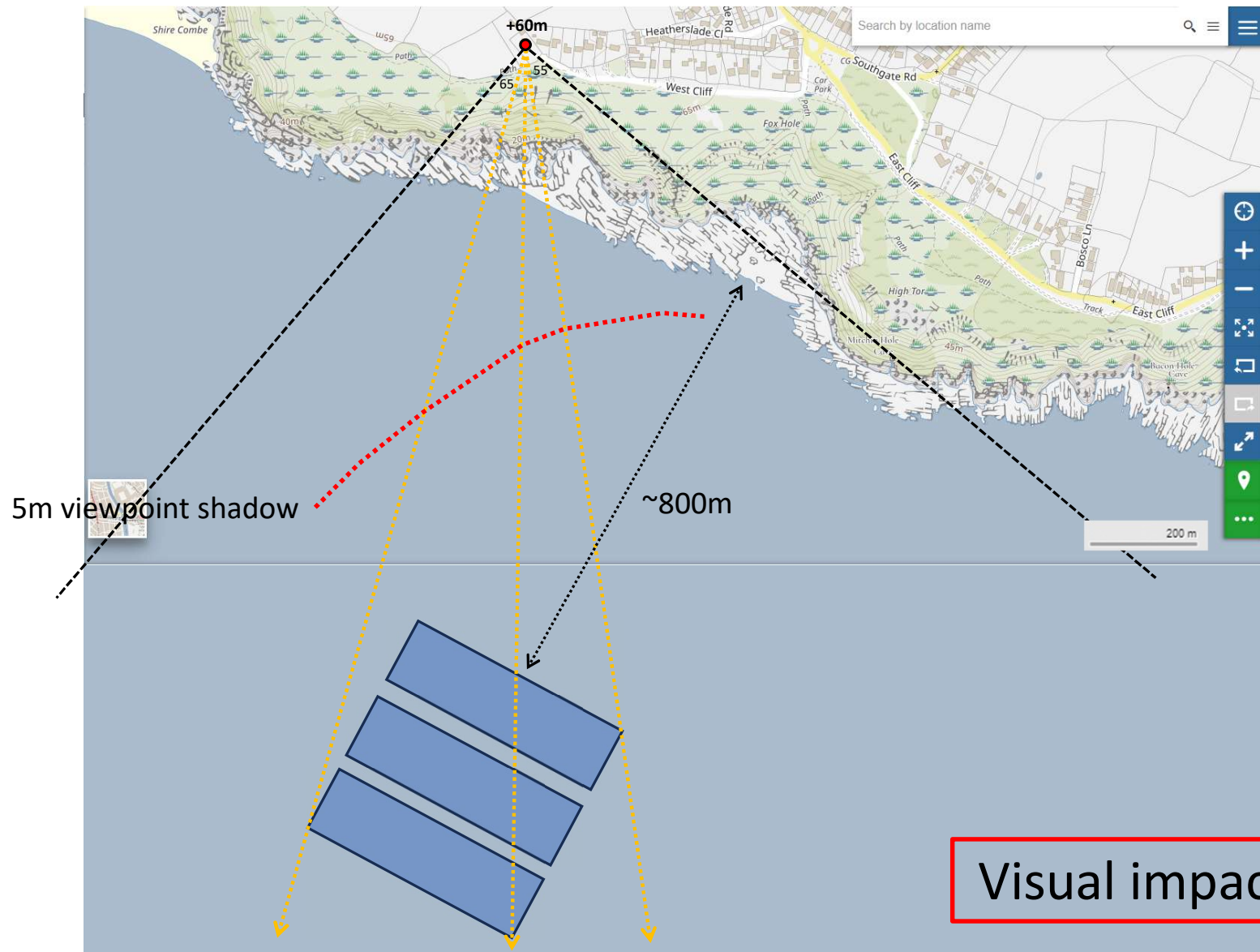




Visual impact for residence



Visual impact for residence



Visual impact for residence