NAVIGATIONAL RISK ASSESSMENT (NRA) FOR THE PROPOSED

CAR-Y-MOR ST JUSTINIAN'S

THREE HECTARE RESTORATIVE 3D OCEAN FARM

GROWING NATIVE BIVALVES AND SEAWEEDS

Company number RS008172

Trial farm licence number DEML2013

Trial farm started/Date licence determined - 09/06/2020

NRA Objectives

- Evaluate the level of potential risk of the proposed aquaculture project on commercial and recreational shipping and any other significant water traffic.
- Evaluate any impact of the proposed aquaculture project on commercial and recreation shipping and any other significant water traffic.
- Analyse the impact to vessel traffic patterns and traffic constraints as a result of the proposed aquaculture.
- Identify potential mitigation measures that, if required, will reduce navigation risk associated with the aquaculture project.
- Set out emergency response procedures. Emergency Action Card appended.

Introduction

Câr-y-Môr (For the Love of the Sea Limited) has started a pioneering regenerative ocean farming system off of the St Davids Peninsula in Pembrokeshire. There are two licenced trial sites at Carn ar Wig and Porthlysgi. These trial sites have been operated for one year to test the suitability of the gear, viability of farming indigenous species and develop the best Marine working practises. The crops grown are Sugar Kelp (*Saccharina latissima*), Oarweed (*Laminaria digitata*), Laver (*Porphyra sp.*) and Dulse (*Palmaria palmata*), alongside three local species of shellfish - Scallop (*Pectin maximus*), Oyster (*Ostrea edulis*) and Mussel (*Mytilus edulis*). This farming method uses no fertiliser, pesticides, agricultural land or freshwater. It is a sustainable, low impact, low to negative carbon system. It creates a

significant source of food, soil conditioners, pharmaceutical and neutraceutical ingredients, biomass that can be used for biopolymers and biofuels, and many more Natural Products. The farms have the potential generate employment, improve local livelihoods, remove nitrate and phosphate agricultural pollutants from the water, reduce oceanic acidity, and absorb significant atmospheric CO_2.

Câr-Y-Môr's plans are to develop a three-hectare Seaweed and Shellfish farm and "The St David's Seafood House" facility retailing and wholesaling local Seafood. Additionally, the society are planning a small production facility for medicinal and cosmetic and related products. The development of these facilities in St David's are to teach and inspire others to replicate this regenerative ocean farming method across Wales, the UK and eventually further afield. Regenerative ocean farms across Wales will enhance local marine biodiversity and the well-being of local communities, stimulate sustainable coastal job creation, and give young people a route into an integrated Welsh seafood sector.

In-water infrastructure design

The farm is oriented on long-lines running north to south, 150 metres from the shore, and will be installed in two phases. Phases 1 and 2 are represented by 125m marine grade aquaculture long-lines in 8 rows (4 seaweed lines and 4 shellfish lines intercalated) to make a 125 m x 100 m site. The long lines are spaced ~15 metres apart. Eleven fifteen-inch A floats for each seaweed line and five 250L pencil floats for each shellfish line make a total of 88 A floats and 40 pencil floats.

Growing schedule and harvesting protocol

Macroalgae (seaweed) species are seeded in October/November and harvested in April/May. The seaweed lines are lifted using a small hydraulic deck crane on board a 10m x 4m flat bottom barge with a 1m hull depth and cargo hold 2,5 x 1 x 0,9m**.** The seaweeds are cut with a knife and the harvested biomass is packed into 50kg nets. 500kg of harvest is returned to port where the biomass is washed in freshwater and air dried.

Shellfish are harvested year-round. The lantern nets holding Scallops or mussels are lifted by the onboard crane and the produce returned to shore.

Location. Wales, St Davids Peninsula

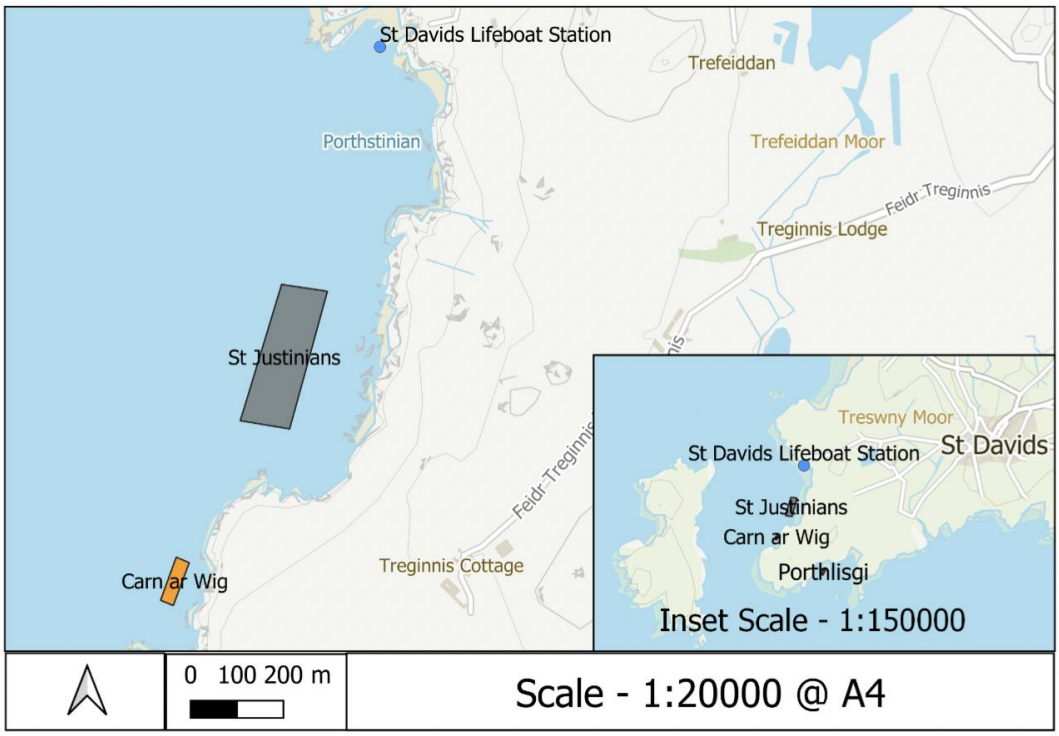
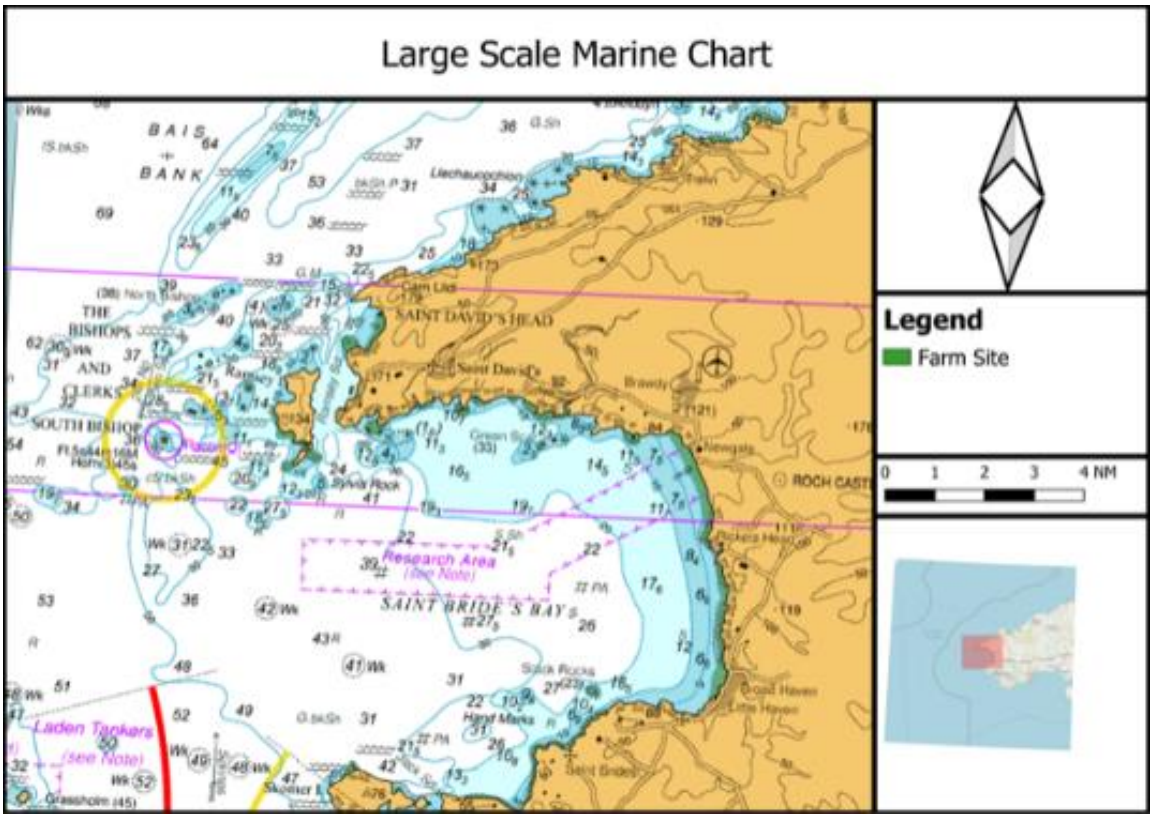


Figure 1. Proposed location of new three hectare integrated multi-trophic ocean farm, (St Justinian's site), black outline, grey infilled box. Existing trial site, (Carn ar Wig), Black outline, orange infill.

Table 1. Longitude and latitude for the area occupied by the proposed St Justinian's ocean farm installation. Coordinates use WGS84 reference coordinate system.

Longitude	Latitude
-5.312440965606686	51.87332853640763
-5.3137350082397505	51.87070162364426
-5.3121900558471715	51.87054263792684
-5.311006965606687	51.87319753571296

2a.



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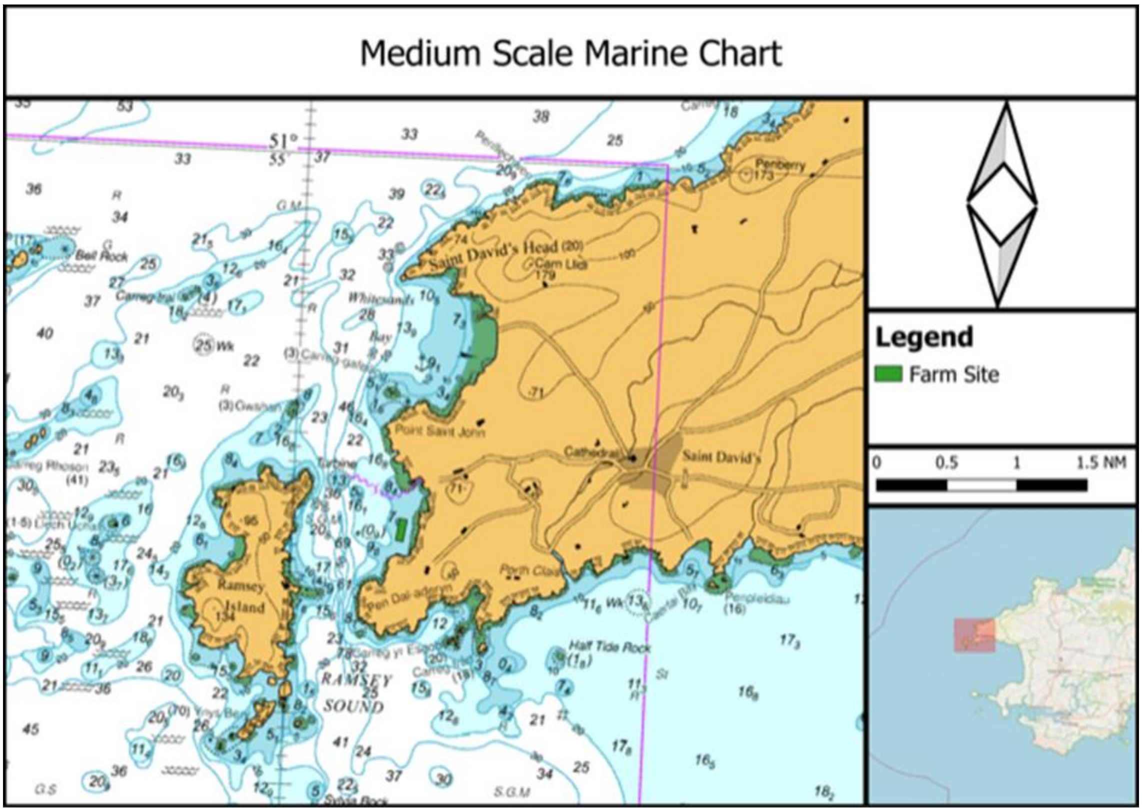
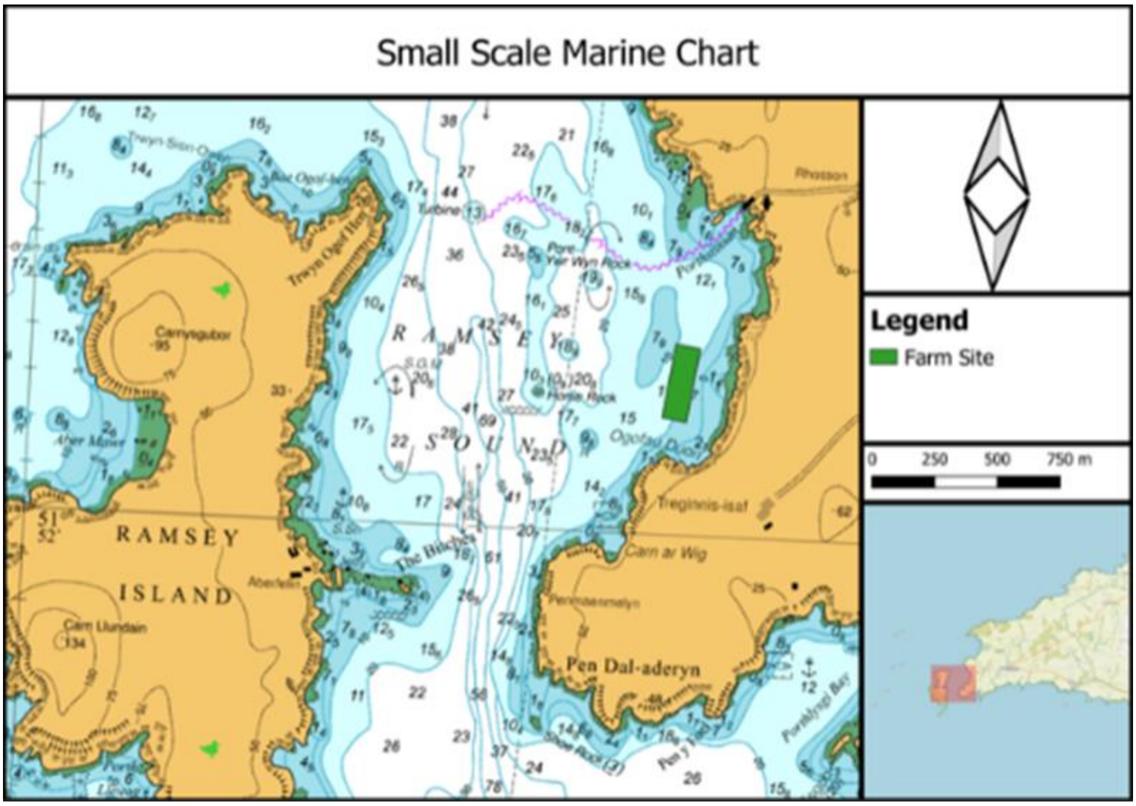
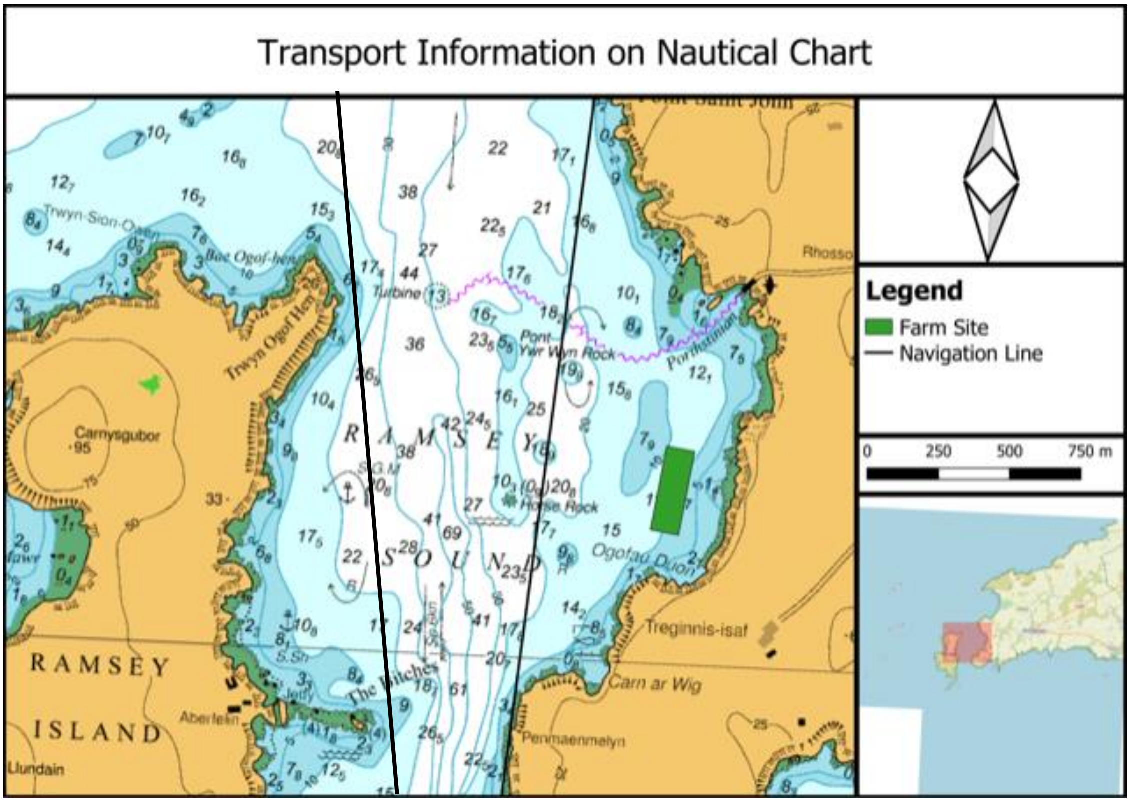

Medium Scale Marine Chart
Legend
Farm Site
0
0.5
1
1.5 NM
Saint David's Head
Ramsey Island
RAMSEY SOUND
Saint David's
Point Saint John
Half Tide Rock
Bell Rock

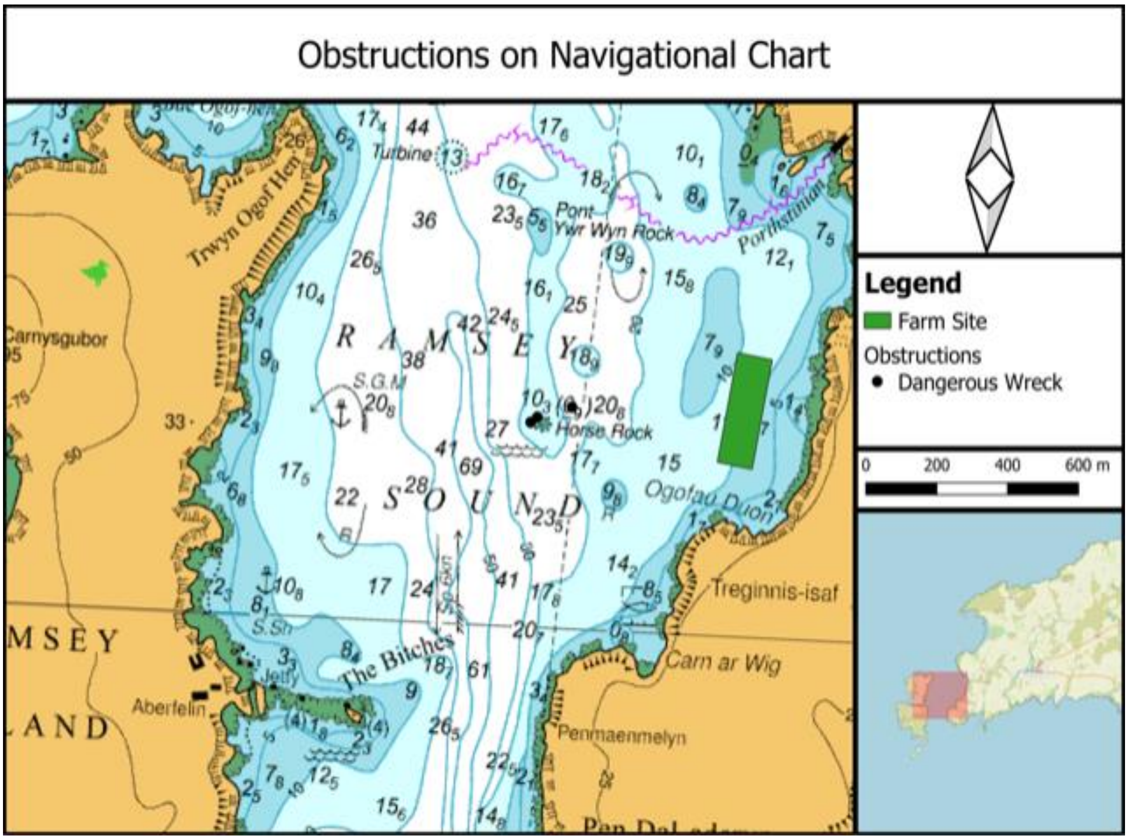
2c.


Small Scale Marine Chart
Legend
Farm Site
0
250
500
750 m
RAMSEY ISLAND
RAMSEY SOUND
Pen Dal-aderyn
The Bitches
Horse Rock
Carn ar Wig
Treginnis-isaf

2d.


Transport Information on Nautical Chart
Legend
Farm Site
Navigation Line
0
250
500
750 m
RAMSEY
ISLAND
RAMSEY SOUND
Horse Rock
The Bitches
Carnysgubor
Treginnis-isaf
Carn ar Wig
Penmaenmelyn
Ogofau Duon
Trwyn Ogof Hen
Turbine
Aberfelin
Llundain

2e.


Obstructions on Navigational Chart
Legend
Farm Site
Obstructions
Dangerous Wreck
0
200
400
600 m
RAMSEY SOUND
Horse Rock
The Bitches
Treginnis-isaf
Carn ar Wig
Penmaenmelyn
Ogofau Duon
Trwyn Ogof Hen
Turbine
Aberfelin

2f.

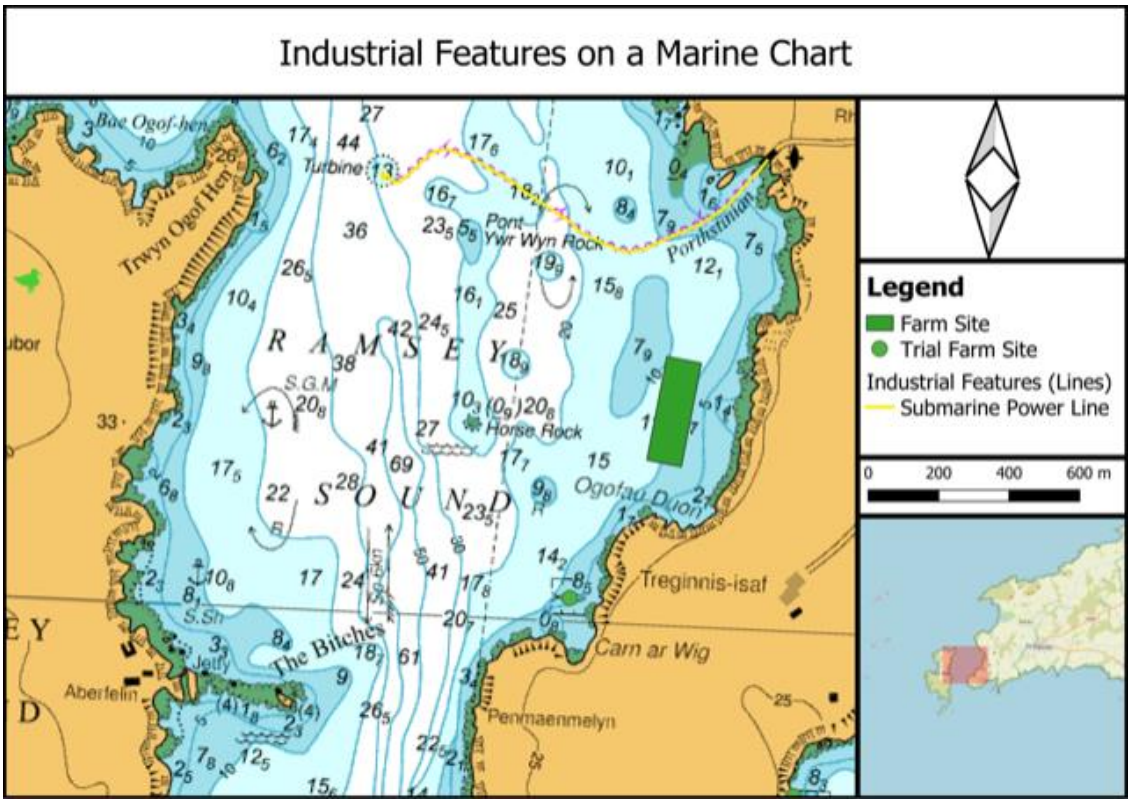


Figure 2. a/b/c/ Location of proposed farm site in decreasing scale. *d/* Safe transit path through sound. *e/* known wrecks. *f/* location of export cable running to a Tidal Energy Converter

Figure 3 Existing trial sites marked with red lines. Installed at location of pre-existing pilot mussel farm.

Summary of vessel traffic in the sound

Assessing vessel traffic in Ramsey Sound Assessing vessel traffic in Ramsey Sound

Vessel traffic has been assessed by extensively consulting expert local waterway users (many of whom are members of the Car-Y-Mor Society.)

Key members and individuals who have input knowledge include:

- RNLI volunteers stationed in St Justinians .
- Jonno Voyce - the only full-time fishermen in Ramsey Sound - who has been fishing these waters for decades.
- Roger Woodage - a part time Porthgain fisherman who uses Ramsey Sound seasonally.
- Blue Shark Fishing Trips. Padrig Rees, commercial diver, Pioneer investor, skipper for offshore wind farms.
- Voyager Boat Trips.
- Derek Rees. RSPB Ramsey Island Main supply contractor for 20years. Has a lifetime of fishing and operating vessels in the Sound.
- Falcon Boats (Skipper and tour boat operator). Ffion Rees. Pioneer investor
- Robust Boats – Marine and Mooring contractors and boat builders - Steve Rees and Bill Preece
- Pembrokeshire Marine Services - ROV specialists - Martin Charlton - Commercial Diver and Marine Pilot
- Milford Haven assistant Harbour Master (David Lockwood)

Other experts/authorities consulted:

- Porthclais Harbour Authority.
- Porthstinian Boat Owners Association - own the moorings and leased area at St Justinians.
- Richard Hill - Planning and Environment Officer for the RYA.

AIS tracking considered, but rejected, due to large commercial vessels historically not using the Sound (ascertained by consensus from above authorities).

Summary of vessel traffic in the sound

After extensive consultation and observation over 18 months with local stakeholders, waterway users and maritime authorities, most of the vessel traffic in Ramsey Sound is identified as originating from the St Justinian lifeboat station launch area. Vessels launching here head due West out into the deeper channel, then either North, South - or continue West directly across the sound to Ramsey Island. Sight-seeing boats comprise the majority traffic with several trips each day in the summer months. Derek Rees operates the boat that primarily services Ramsey island. The RNLI's D class lifeboat also follows this route when launched.

Ramsey Sound is a treacherous waterway - there are significant tidal effects and tidal waterfalls, asymmetrical underwater flow can be 3.8 m/s (12 ft/s) northward (flood) and 1.9 m/s (6.2 ft/s) southward (ebb), with some turbulence. The RYA Coastal Atlas describe the passage through Ramsey Sound as 'moderately used'. This is not a stretch of water that recreational vessels are recommended to traverse at anything other than slack tide, and only if very experienced. Hence only occasional pleasure boaters pass through the sound, always staying in the deeper central channel. Most of the water traffic avoids the Sound and takes the much safer and direct route west of Ramsey Island.

Commercial fishing in the Sound targets crustacean species such as Brown Crab (*Cancer pagurus)* and Lobster (*Homurus Gammarus)*. Buoyed crab and lobster pots/creels are used by the potting boats. The area supports one full time and several part time fishermen. These fishing boats operate around the edge of the sound and west of Ramsey Island keeping their pots in the shallower waters with the slower current speeds

The proposed Càr-Y-Môr St Justinians's farm is more than 150 metres from the safe passage route through Ramsey Sound. There is no beach access for swimmers or kayakers anywhere closer than St Justinians to the installation. There is however plenty of room and depth between the proposed farm site and the shore for the licensed potting boats (or kayaker) to travel.

The farm location isn't subjected to the full force of the tidal flow - the sheltered location acts like a pool off a river, the geology of the area protecting the site.

A Research Vessel (*Severn Sea)* is currently employed by Cambrian SW Ltd. to survey, and has begun preparatory works, for the recovery of a Tidal Energy Converter in Ramsey Sound.

The Severn Sea will also be surveying the export cable running between St Justinians and the device. This proposed Càr-Y-Môr St Justinians's farm is over 500m away from the cable at the closest point

Marking the site, visibly and digitally, for mariners and other water users.

The proposed Câr-y-Môr St Justinians's farm site will be visibly marked by six yellow special marker IALA (International Association of Lighthouse Authorities) compliant buoys as per Trinity House requirements and IALA Guidelines O-139 (spherical or pillar). A single yellow 'X' shaped top mark will be lit at night by FI.Y.5s yellow flashing lights. Surface lines between the special marker buoys, are equipped with yellow 15-inch floats and are positioned above the submerged (approximate depth 150cm) seaweed lines. The shellfish lines will have 250 litre pencil floats supporting them.

Trinity House and The United Kingdom Hydrographic Office (UKHO) will be given the exact coordinates (Lat. and Long.) of the six yellow marker buoys which mark the site perimeter, along with any additional information that they require, so the site is added to current Admiralty charts. Trinity House will also include these in their annual inspection of local aids to navigation.

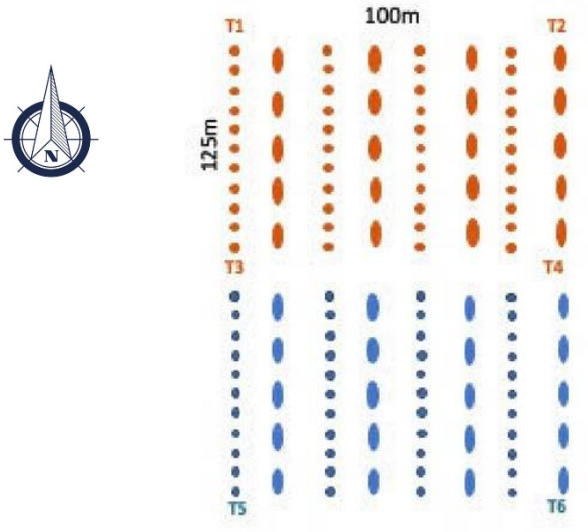


Figure 4. PROPOSED FARM : Plan view of sea surface.

Phase 1 four trinity house yellow special mark buoys are represented by T1-T4. 44 orange circles represent 4 seaweed lines each with 11 fifteen-inch yellow A floats. 20 orange shapes represent 4 shellfish lines each with 5 pencil floats (250 litre)

Phase 2 two trinity house special marks buoys are represented by T5-T6.

44 blue circles represent 4 seaweed lines each with 11 fifteen-inch A floats .

20 blue shapes represent 4 shellfish lines each with 5 pencil floats (250 litre).

Long lines separated by 15 meters to allow emergency vessel access.

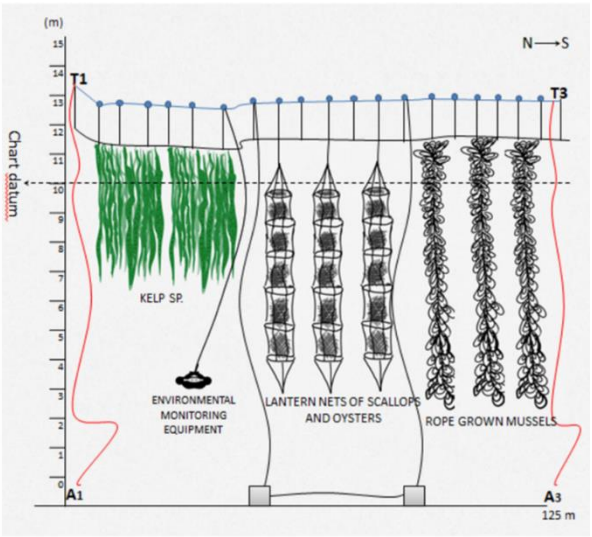


Figure 5. Representation of side view/cross section of submerged crops and infrastructure.

Maintenance to ensure all site equipment remains at location, posing no drift threat to marine traffic (or wildlife)

Câr-y-Môr will undertake a close visual inspection of the buoys fortnightly in the summer months (May to September) and weekly between October and April (weather depending). Batteries will be replaced in marker lights in accordance with manufacturers specification, and/or as required.

The lines, anchoring, floats, fixtures and fastenings will be inspected for wear and tear monthly and/or after any storm or large swell, both at the surface and with a PK Aqua PoleKam (underwater pole mounted). Anchoring will be installed by Robust Boats marine contractors, who have decades of detailed knowledge of local conditions. Robust Boats maintain and service the Porthstinian Boat Owners moorings that are located by the lifeboat stations. These marine contractors have done this so, without issue, for decades. A condition log will be kept on the Câr-y-Môr service barge (see appendix for a copy of our log from the trial sites. copy). Abrasion, epiphytic load, corrosion, perishing etc. to be noted and either suitably fixed on site or replaced if deemed beyond repair. All equipment will be replaced at the correct service intervals using manufacturers guidelines. Only certified equipment to be deployed.

A marine live streaming system built by robotics engineer (and Câr-Y-Môr member) Dr Christian Berger (details attached) has been successfully tested over the past five months at our trial sites. Live images and video are planned to be relayed in real time to the Car Y Mor office, where a specific monitor (viewed multiple times daily) will relay the continuous feed. An updated version of this system will be attached to the new St Justinian's site to include GPS positioning data - with alerts sent to key staff mobiles should any significant movement arise. Battery state will also be relayed back to the office as part of the livestream. An onboard memory card stores information if the transmission signal is interrupted or too weak. The camera lens is routinely cleaned as required during maintenance trips and the onboard battery has an attached weather resistant solar charger. A 128 GB memory card will be removed and downloaded monthly, for data analysis. If movement is detected, then the work platform is deployed to carry out required work when it is safe to do so.

Commercial potting activity is near daily during the summer and just one <7m fishing boat for the rest of the year when weather allows. The full-time skipper and two part time fishermen are Cär-y-Môr members. They will provide additional eyes for anything out of the ordinary, (damaged lines, entangled flotsam and jetsam etc.) at the proposed new farm site. They have done this for our trial sites over the last 18 months, providing a strong additional line of defence. All the fisherman will be offered a Cär-y-Môr contact card on board, with contact information for the relevant parties.

Many of the local commercial boat operators are also supporters or members of Cär-y-Môr Community Benefit Society and are fully aware of the trial farms and the new proposed farm site. Several of the tour boats now divert to the trial farms, to show and explain to their customers the community seaweed and shellfish farms, from a safe distance, and discuss numerous benefits this style of low impact multi trophic aquaculture brings. All skippers will also be offered a laminated card with contact details to report anything untoward.

Cär-y-Môr also have a managed presence on social media, checked multiple times daily by staff and members, with links to bird watching and shore fishing social media groups. Several fishermen have reported that rod and line fishing has improved around the trial farms, due to a new ecosystem being created which boosts nearby marine life. And bird watchers have reported increased seabird activity around the sea farms. Our social media presence gives an instant forum for much of this feedback, while also giving members of the public a simple fool proof method to contact us should they witness anything of concern. Hence, we have multiple interlocking monitoring channels and are confident any change in the condition or position of the installations will be noticed very quickly so appropriate action can be taken.

While it has proven rare on our trial sites, when any part of the farm structure has become slack or misaligned after very strong winds (force 5 and above) and/or a World Meteorological Organisation (WMO) sea state of 5 and above, with the above monitoring in place, this has been noticed within a few hours and rectified on our trial sites. Any small changes can be easily seen because all sites (including the new proposed site) are positioned in exact straight lines. One of the fundamental purposes of the years trials has

been to test the moorings and gear. This has successfully highlighted issues resulting in the upgraded mooring and gear design for the proposed farm. Additionally, the plan to include GPS markers on the new proposed site, will generate audible alerts to be received by multiple members, enabling an even faster response, at first light, if necessary.

Car-Y-Mor staff will visit the site after any large swell. GPS tracking devices to be fitted to each marker buoy, with automated alerts enabled and set to be triggered if any buoy moves beyond its tethered area. The sites will be checked by the operators by scuba diving (3 monthly) and underwater monitoring systems (camera mounted onto a remote operated vehicle (ROV). Further, as this is a community farm, many locals go out specifically to check the farm from the coastal paths or by boat - especially after bad weather - and report back. The methods of reporting back to Car Y Mor can be via the social media pages (Facebook, Instagram, WhatsApp), by telephone or email. These contact addresses will be placed on community notice boards and in Oriel y Parc Visitor centre, St Davids. The Coastal Community wishes the farms to succeed - to date we have had no negative feedback.

Upon a shore based binocular assessment of the severity of any problems with the farm, the Car Y Mor workboat will be launched immediately with tools to fix damage, retrieve lost gear etc. If the sea state is too large for barge maintenance , then one of the members RIBs will be used, if possible, to make the installation safe until our work platform with a crane can safely access the site.

If the problem is considered a threat to shipping or life threatening, then the coast guard and harbour master will be informed and a UKHO Warning to Navigation will be issued.

If the project goes into administration or is not decommissioned fully the Society has Marine Aquaculture insurance with Fowler Penfold, the policy purchased covers the costs of decommissioning the trial sites. The proposed site will have the same insurance cover.

Conditions (Decommissioning)

1. The undertaker must during the whole period from commencement of construction of the authorised project to the completion of decommissioning seaward of MHWS exhibit such lights, marks, sounds, signals and other aids to navigation, and take such steps for the prevention of danger to navigation as Trinity House may from time to time direct.

2: In case of damage to, or destruction or decay of, the authorised project or any part thereof the undertaker shall as soon as reasonably practicable and no later than 24 hours following the undertaker becoming aware of any such damage, destruction or decay, notify MMO, MCA, Trinity House and the UKHO.

3: The undertaker must provide reports to Trinity House on the availability of aids to navigation using the reporting system provided by Trinity House.

4: The undertaker must notify the UKHO of the completion (within 10 days) of the authorised project or any part thereof in order that all necessary amendments are made to nautical charts.

users and wildlife. Any future owner, or receiver, (The Undertaker) is liable to make the area safe and not abandoned

Risk Control Log

Table 2. Hazard register. Individual risks. Risk consequence and likelihood, gauged with stakeholder engagement. *see appendix*

HAZARD	MITIGATION	RISK LIKELIHOOD		RISK CONSEQUENCE: PEOPLE		RISK CONSEQUENCE: INFRASTRUCTURE	
		BEFORE MITIGATION	AFTER MITIGATION	BEFORE MITIGATION	AFTER MITIGATION	BEFORE MITIGATION	AFTER MITIGATION
Leisure vessels (yachts) running into farm. Pilot error.	Trinity House marker buoys, lit at night with Fl.Y.5s, Marked on Admiralty charts. Local notification i.e. tourist office, local harbour notice board	**F4**	**F3**	**C3**	**C1** (Propellor fouling on ropes, no concrete/steel structures to compromise hulls.)	**C2**	**C1**
Leisure vessels (yacht) running into farm. (Loss of steering, power, drifting etc.)	Trinity House marker buoys, lit at night with Fl.Y.5s. Buoys can be lashed to by stricken vessel (Riser chains to Trinity house navigation marker Buoys: Grade 30 Self colour 16mm x 68mm open link chain).	**F2**	**F2**	**C1** Ropes of farm act like a net, catching rudder/propellor, slowing vessels course onto nearby rocky shore.	**C1** As before mitigation, with added mooring points on buoys.	**C2**	**C1**

HAZARD	MITIGATION	RISK LIKELIHOOD		RISK CONSEQUENCE: PEOPLE		RISK CONSEQUENCE: INFRASTRUCTURE	
		BEFORE MITIGATION	AFTER MITIGATION	BEFORE MITIGATION	AFTER MITIGATION	BEFORE MITIGATION	AFTER MITIGATION
Large commercial vessel coming into contact with farm infrastructure	Trinity House marker buoys, lit at night with Fl.Y.5s, Marked on Admiralty charts. Farm depth 10m at chart datum, close to rocky shore. Farm location not near any shipping lanes	**F2**	**F1**	**C3**	**C1**	**C4**	**C1**
Moorings dragging	Installed by Robust Boats marine contractors (been installing moorings in the sound for decades) Main Anchors are 400kg minimum weight AC14 type ships anchors, Trinity house chain, 30 - 35mm open link Ground chain between Anchors to form trot type mooring for lines.	**F2**	**F1**	**C2**	**C1**	**C3**	**C1**

HAZARD	MITIGATION	RISK LIKELIHOOD		RISK CONSEQUENCE: PEOPLE		RISK CONSEQUENCE: INFRASTRUCTURE	
		BEFORE MITIGATION	AFTER MITIGATION	BEFORE MITIGATION	AFTER MITIGATION	BEFORE MITIGATION	AFTER MITIGATION
Loss, or movement, of navigation marks	Trinity House marker buoys, lit at night with Fl.Y.5s, Marked on Admiralty charts. GPS tracking fitted, automated alert if buoy moves out of place. Riser chains to Trinity house navigation marker Buoys: Grade 30 Self colour 16mm x 68mm open link chain. Buoys labelled/numbered with 'Pot Buoy' paint.	**F2**	**F1**	**C3**	**C1**	**C4**	**C1**
Farm structure becomes slack or misaligned	Installed by Robust Boats marine contractors (been installing moorings in the sound for decades) Misalignment visible from shore. Crane up the anchor buoy and drag back into place.	**F2**	**F1**	**C2**	**C1**	**C2**	**C1**

Emergency Response Plan

Câr-y-Môr's Emergency Response Plan is stand-alone document that will be circulated to local HM Coastguard and RNLI stations, local vessel users, local houses and on a signpost overlooking the site from shore. We include it here for reference.

Emergency scenarios and response

• vessel stranding – in the event of a vessel entering the Câr-y-Môr licenced area, colliding with the Farm structure, the first concern is the safety of the vessel and crew 999 and/or radio channel 16 should be called and the HMCoastguard/RNLI informed if there is a risk to life.

Car-Y-Mor should also be contacted (number below) if there is no risk to life and the entangled vessel will be freed by staff and repairs to the Farm structure will be enacted.

• large fauna entanglement – in the unlikely event of a seal, whale, dolphin or basking shark

becoming entangled in the Seaweed and bivalve Farm lines, The British Divers Rescue Hotline; 01825765546 should be called – https//bdmlr.org.uk/. Car-Y-Mor staff to undertake marine mammal rescue course.

• float loss – This will not degrade the integrity of the Farm structure, but Car-Y-Mor should be contacted (number below) so the float can be recovered and then replaced back where it came from. Each buoy has the business name, id number and letter painted on with 'Pot buoy' paint.

• Storm damage/loss of integrity of the structure – the design of the Seaweed and shellfish Farm is such that multiple anchor lines hold the structure in place and the loss of several of these lines would not degrade the integrity of the Farm. After every storm the site is checked, from shore with binoculars and by boat when safe to do so. If any damage or mis alignment is serious enough that it is a threat to shipping then the relevant authorities will be informed (999, ch16). A recovery mission launched using a vessel or vessels with suitable power.

Car-Y-Mor should also be contacted (number below) and emergency repairs to the Farm structure will be immediately enacted, using a rib or work platform, sea state dependant. The ropes, floats and other equipment held in preparation for such emergency repair at Car-Y-Mor shore base which is presently at

Clegyr Uchaf, St Davids, Pembrokeshire. SA62 6QN.

Car-Y-Mor Contact details (to be contacted in all scenarios).

Conclusion

The proposed Câr-Y-Môr St Justinian's restorative ocean farm site will present some navigational risks as it is a fixed structure in the water. The mooring methodology has been confirmed by a year of trials to be fit for purpose for the site conditions, minimising danger from loss and drift. Site monitoring is particularly strong, with multiple channels and more than 100 individual members and stake holders. And the chosen location is known to local waterway users, and away from any significant nonlocal traffic. The risks that exist are limited and can be successfully managed with the correct procedures and equipment. A summary of the pertinent points for the proposed site are:

- not on any of the main vessel routes
- fixed in position by multiple anchor points, tested over multiple years to be sufficiently strong for the location.
- visibly marked with yellow Trinity House buoys, illuminated at night, at the four corners, and midway on each line; fitted with FI.Y.5s and smaller seaweed marker line buoys
- Continuously GPS tracked and live video streamed at two locations, with alerts going to multiple society members if significant movement is detected. This significantly improves our ability to immediately observe changes, track equipment failures, entanglement or theft.
- located 150m away from the coasts rocky shore so that fishing boats have ample room to continue to work around the edges of the Ramsey Sound
- well publicised as it is supported and equally owned by many of the local community who have a vested interest in reducing any risk and ensuring the site is a success
- there are various active ways of communicating with Car-Y-Mor all of these methods will be advertised and be given to regular water users in the area.
- modern technologies such as GPS trackers, Livestream/recording cameras and ROVs can improve the ability to observe changes and track equipment failures, entanglement and theft.
- as with all farms, the crops will be tended and the equipment physically and visually checked in accordance with a logged inspection regime, this will be done by the staff,

crew and volunteers of Car-Y-Mor and their boats. The log will be held in a paper book and will move onto a digital platform. All records will be kept for a minimum of five years.

Contact details

Steve Rees: 07833 117046. steve@robustboats.co.uk

Martin Charlton: 07776 188713 martin.charlton@hotmail.com

Owen Haines: 07399 21 01 63. owen@carymor.wales

Robert Lewis: 07746 36 31 36. bert@carymor.wales

Facebook messenger: Car-Y-Mor

Car-Y-Mor, Clegyr Uchaf, St Davids, Haverfordwest, Pembrokeshire, SA62 6QN

Facebook messenger: Car-Y-Mor

Appendix.

i/ Hazard risk consequence and likelihood guide.

Risk Consequence

Cat.	People	Property/ Infrastructure	Environment	Business
C1 Negligible	Possible very minor injury (e.g. bruising)	Costs <£10K	No effect of note Tier 1 may be declared but criteria not necessarily met Costs <£10K	Costs <£10K Negligible information security breach (e.g. low no. of data subjects, personal data)
C2 Minor	Single minor injury	Minor damage Costs £10K - £100K	Tier 1 - Tier 2 criteria reached Small operational (oil) spill with little effect on environmental amenity Costs £10K - £100K	Bad local publicity, minor loss of reputation Complaint possible, remote litigation risk Reduced hours or loss of income Disciplinary Minor information security breach (e.g. medium no. of data subjects, personal data) Costs £10K - £100K
C3 Moderate	Multiple minor or single major injury	Moderate damage Costs £100K - £1M	Tier 2 spill criteria reached but capable of being limited to immediate area within site Costs £100K - £1M	Bad widespread publicity, moderate loss of reputation Temporary suspension of operations or prolonged restrictions Complaint likely, litigation possible Job loss 1 – 10 Dismissal Moderate information security breach (e.g. high no. of data subjects, personal data or low no. of data subjects, sensitive data) Costs £100K - £1M
C4 Major	Multiple major injuries or single fatality	Major damage Costs £1M - £10M	Tier 3 criteria reached with pollution requiring national support Chemical spillage or small gas release Costs £1M - £10M	National publicity, major loss of reputation Temporary closure Serious complaint anticipated, litigation expected Job loss 10 – 50 Criminal investigation – employee Major information security breach (e.g. medium no. of data subjects, personal and sensitive data) Costs £1M - £10M
C5 Catastrophic	Multiple fatalities	Catastrophic damage Costs >£10M	Tier 3 oil spill criteria reached International support required Widespread shoreline contamination Serious chemical or gas release Significant threat to environmental amenity Costs >£10M	International media publicity Operations seriously disrupted for more than two days, ensuing loss of revenue Litigation expected Job loss > 50 Criminal investigation – employee and third party Catastrophic information security breach (e.g. high no. of data subjects, personal and sensitive data) Costs >£10M

Risk Likelihood (Frequency)

Scale	Description	Definition
F5	**Frequent**	One or more times in a year
F4	**Likely**	One or more times in 10 years 1-10 years
F3	**Possible**	One or more times in 20 years 11-20 years
F2	**Unlikely**	One or more times in 50 years 21-50 years
F1	**Remote**	One or more times in 100 years 51-100 years

ii/ E-mail responses to NRA

Email from assistant Harbour Master of Milford Haven. NRA amended as advised.

David Lockwood <dharl@mail.com>
To: martin charlton
Cc: growalternative@yahoo.co.uk, Owen Haines

Tue, 24 Aug at 18:47

Dear Martin,

I think that the Risk Assessment that you have provided are a really good start to the process, and in reality dont need to much additonal inforamtion added, just a little polishing into what NRW are looking for.

I would recommend that you need to produce a HAZARD REGISTER which lists all the idvidual risks that might happen to the Seaweed and Shellfish farm and then list the mitigations to avoid the risk or hazard ocuring.

For example some Hazards might be:

1. Leisure vessel running into Seaweed and Shellfish farm
2.Commercial vessel running into Seaweed and Shellfish farm
3. Moorings dragging
4. Loss or movement of navigation marks
5....etc etc etc

Once you have your hazard register then rate each one by the likely frequency of the hazard occuring, vs the consequence of such a hazard ocuring. Have a look at the link from the Ship Owners P&I Club which explains this in a little more detail, have also included as examples some of the frequency and consequence rattings that we use at the port (please use as an example).

With your hazard identified I would then list your control measures that you have or will put in place to avoid such hazard occuring.

Implementing risk assessments - The Shipowners' Club (shipownersclub.com)

I hope that this gives you a bit of further helping hand? I will be away for a few days, but back on Friday if you want to chat further.

Kindest

David

kind regards

David Lockwood MNI MBA
0783707330

Email from Trinity house. NRA amended as advised.

Martin Thomas <martin.thomas@trinityhouse.co.uk>
To: Robert Lewis

Tue, 24 Aug at 09:05

Hi Bert,

Thank you for the update. We are satisfied with the proposals. The only comment I would make is to change the reference from marking with 'Trinity House Buoys' to 'marking with IALA (International Association of Lighthouse Authorities) compliant buoys as per Trinity House requirements and IALA Guidelines O-139" This means that the buoys can be sourced from anywhere as long as they are compliant.

You should also consult with the Maritime Coastguard Agency in Southampton.

Finally, once the farm has been built, we will need contact details so that we can advise when we undertake our annual inspection of aids to navigation in the area.

Best regards

Martin

iii/

MARINE EMERGENCY ACTION CARD

For CÂR-Y-MÔR

Development summary 3Ha aquaculture installation. Phase1; 8x125m buoyed long lines. Phase 2; ; 8x125m buoyed long lines. In parallel, north to south. 15m gap between. Main Anchors are reclaimed 400kg minimum weight AC14 type ships anchors. Reclaimed Trinity house chain, 30 - 35mm open link Ground chain between Anchors to form trot type mooring for lines. Riser chains to Trinity house navigation marker Buoys: Grade 30 Self colour 16mm x 68mm open link chain.

Emergency Contact One of the following or a combination of both, must be 24/7	
Duty Holder name	**Stephen Rees**
Primary number	**07833117046**
Secondary number	**01437729355**
Media relations (if applicable)	
Coastguard	01646 690909
Police	**999**

Insert a picture/drawing of the device
n/a

Development location	
Range & Bearing from land	West 150m
Dimensions of the area	300m x 100m
Number of devices	6

Device Specific information *(adapt to suit the device)*			
Heights/depths (m and ft)		**Lights / Markings**	
Height above sea level	0m	Lights	Fl.Y.5s yellow flashing
Depth below surface	Anchored 10m Chart datum	Marks	6xYellow IALA marker buoys
Height above seabed	Can fill whole water column		

Electronic monitoring.

Reolink

Weekly: seeding, maintenance, harvesting Positional monitoring 6 Monthly March & September : Diver / ROV checking of mooring equipment.	6-person limit on work boat. Radio fitted, life jackets worn. Crane for lifting. Ladder on transom. Ropes and life ring onboard. First aid trained staff with first aid box.

Details of vessels operating to/from the development – include name, callsign, description, communications (e.g., channels used), number of crew, operating limits, etc.

Vessel 1: GRAFTER, Call sign : MIQC6. Robust boats Model FB700. Purpose built Flat bottom mooring barge with 200kg line hauler and 2000kg anchor lifting winch, Coded 6 personnel, cat 4 20 miles in favourable weather & Daylight. DSC VHF Radio: Channels 16 & 06 are main channels.
Vessel 2: Endeavour, Call Sign: . Robust boats Model Robust 19c, Centre console general workboat duties. Coded 6 personnel, cat 4 20 miles in favourable weather & Daylight. DSC VHF Radio: Channels 16 & 06 are main channels.

Personal SAR Locating Device Make & Model				
Functions: yes/no	**COSPAS-SARSAT**	**AIS**	**DSC**	**121.5MHz**

See attached for detailed description of farm

The design of the farm is to be installed in two phases. Phase 1 and Phase 2 are represented by 125 m marine grade aquaculture long-lines in 8 (4 seaweed lines and 4 shellfish lines intercalated) rows to make a 125 m x 100 m area site. 11 fifteen inch A floats for the seaweed lines and 5 250L pencil floats for the shellfish lines, respectively. A total of 88 fifteen-inch A floats and 40 pencil floats.

- The seaweed farm is oriented long-line running north to south.

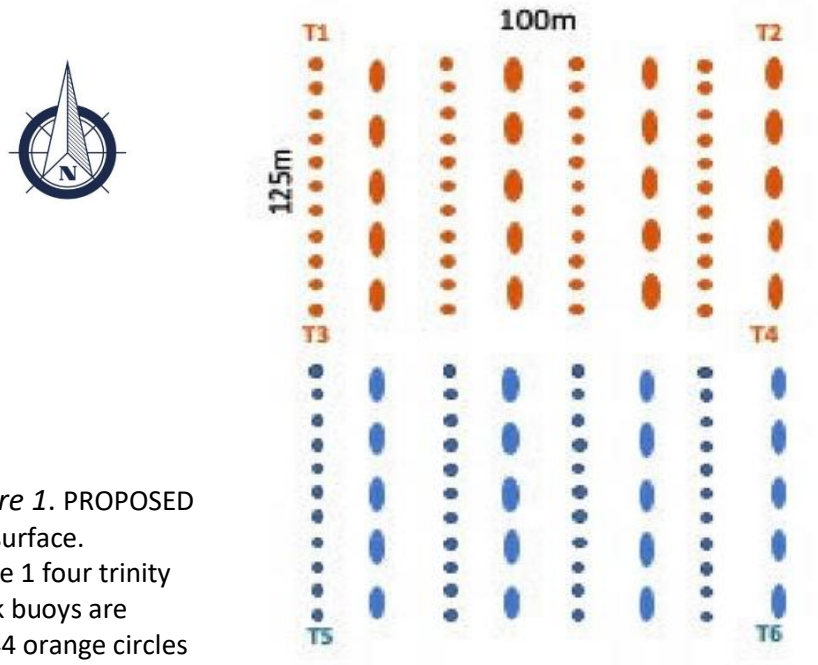


Figure 1. PROPOSED FARM : Plan view of sea surface.
Phase 1 four trinity house yellow special mark buoys are represented by T1-T4. 44 orange circles represent 4 seaweed lines each with 11 fifteen-inch yellow A floats. 20 orange shapes represent 4 shellfish lines each with 5 pencil floats (250 litre)
Phase 2 two trinity house special marks buoys are represented by T5-T6.
44 blue circles represent 4 seaweed lines each with 11 fifteen-inch A floats .
20 blue shapes represent 4 shellfish lines each with 5 pencil floats (250 litre).

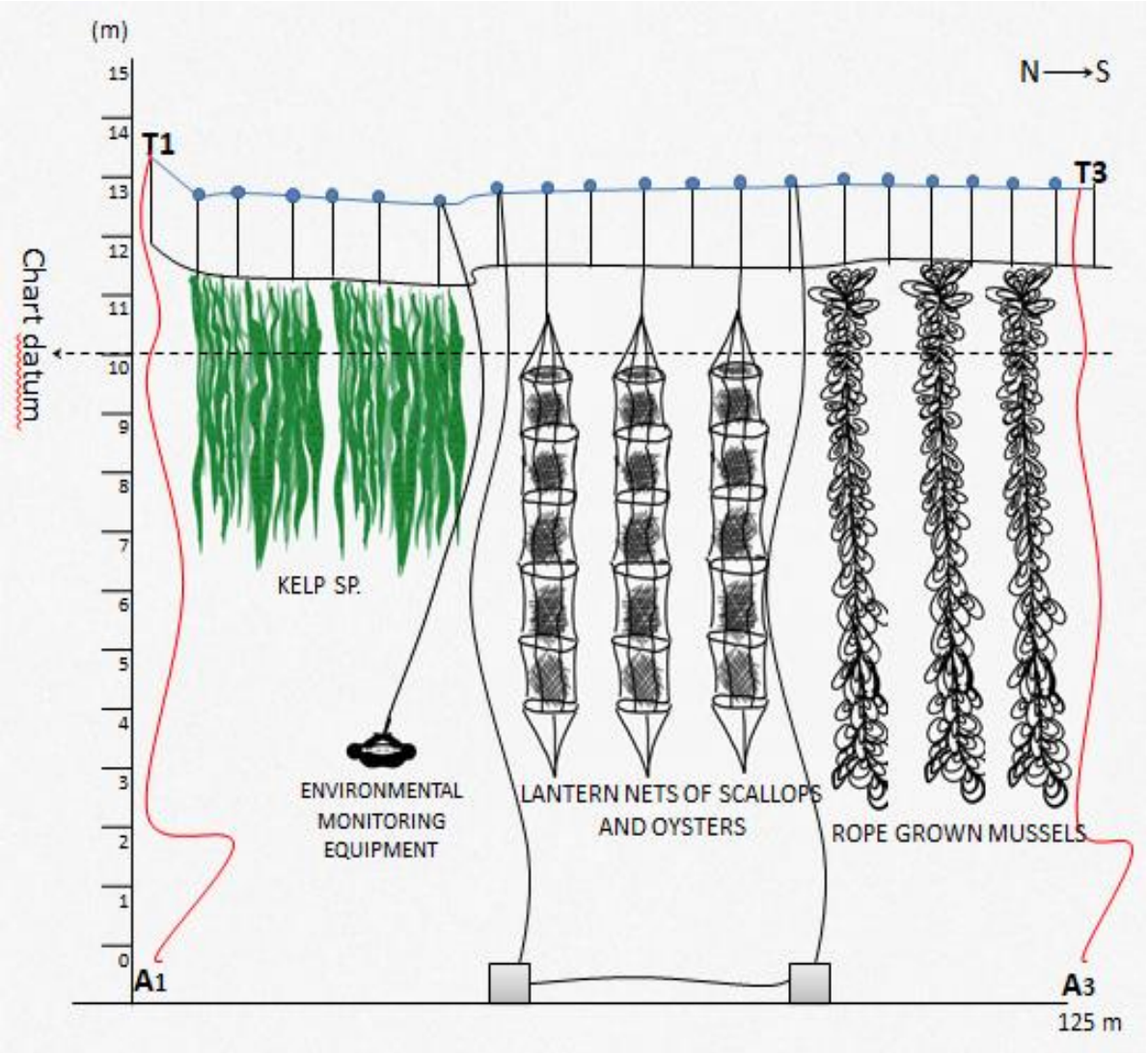


Figure 2. PROPOSED FARM: Underwater view of side elevation showing all different structures planned to be used on the lines
The vertical red lines represent the riser chain (16mm). Examples of Seaweed and bivalves that will be suspended and grown off the header lines (2 metres below the surface.)

1)Main Anchors are reclaimed 400kg minimum weight AC14 type ships anchors,
2)Reclaimed Trinity house chain, 30 - 35mm open link Ground chain between Anchors to form trot type mooring for lines.
3)Riser chains to Trinity house navigation marker Buoys: Grade 30 Self colour 16mm x 68mm open link chain.
4)All shackles conform to BS 3032 grade High tensile, self-colour.