ENVIRONMENTAL EFFECTS METADATA SURVEY FORM

Name	Date submitted
Tom Clements/Ian Hutchison	March 14, 2014

Project name: North West Lewis Wave Array

☒ Planned ☐ In Operation ☐Completed

Project description:

Project Developer: Lewis Wave Power Limited

Technology Developer: Aquamarine Power

Technology type: Oscillating Wave Surge Converter (Oyster)

Resource (wave, tidal): Wave

Project scale (test site, prototype, array, commercial): Pre-commercial wave array of between 40 to 50 devices

Installed capacity (MW): 40 MW (Planned)

Project Website: www.aquamarinepower.com/projects/north-west-lewis/

Launch Date: TBC

Additional Description: Lewis Wave Power plans to develop a wave energy array, using Aquamarine's Oyster wave energy converter (WEC) technology, off Staca Mhic Cubhaig, approximately 2km north of Siadar, Lewis, Scotland. The array will have a generation installed capacity of up to 40MW and connect to the national grid. The array will consist of between 40 and 50 Oyster devices; depending on the design and therefore final power rating of the devices used. These devices will be positioned according to the best understanding of available wave resource, water depth, and seabed gradient and seabed protrusions[1]. The wave array will be configured in a linear formation running roughly parallel to the coast and will run a distance of up to 3.2km from end to end[2].

The Oyster wave power device is a buoyant, hinged flap which is attached to the seabed in the nearshore environment at depths of between 10 and 15 metres, around half a kilometre from the shore. Oyster's hinged flap, which is almost entirely underwater, pitches backwards and forwards driving two hydraulic pistons which push high pressure water onshore via a subsea

[1] Royal Haskoning, 2012, Lewis Wave Power Environmental Statement

[2] Environmental Impact Assessment Consent Decision (Marine Scotland and the Scottish Government www.scotland .gov.uk).

pipeline to drive a conventional hydro-electric turbine. Essentially Oyster is a wave-powered pump which pushes high pressure water to drive an onshore hydro-electric turbine.

Figure 1.1 Oyster 1 device being tested at EMEC

Pre installation of the device, four mooring anchors in the form of rock bolts will be installed to aid securely lowering the device onto the monopile and for future maintenance. The device will then be towed to site and ballasted down to the pile in combination with a winch system using the mooring anchors. The device will mechanically engage with the pile, it will not be grouted into place. Once the device is in place, a landing platform will be installed on the shoreward side of the device. It will be pinned to the sea floor using 20 large rock bolts. Grout bags may be required to support the landing platform, these will also be secured by rock bolts.

Pipelines: Each device will be connected to the next via a common pipeline. This will run the full length of the array, with a maximum length of 3.5km. There will be a connection to the shore pipeline at up to eight separate locations along the common pipeline. The shore pipeline will consist of one high and one low pressure pipeline and will transport hydraulic fluid to the shore. In terms of installation, there are two options for the shore pipelines. They can either be laid on the surface of the seabed and secured using stabilisation anchors or laid under the seabed using horizontal directional drilling. Alternatively a combination of both techniques could be used; a decision on this is yet to be finalised.

Onshore infrastructure: Onshore development is due to occur in two stages, the first of which involved the construction of a 3 MW hydroelectric power station that began in August 2013. Phase two is due to begin in May 2014 and will see the construction of a second building which will accommodate the equipment for the additional 37 MW of power generation.

Vessel spread: It is proposed that the following vessels will be required for phase one of construction:

Activity	Vessel Type	Days on Site (per device)

Pipeline preparation and installation	Tug	3
	2x Multi-cat	Multi-cat A - 20 Multi-cat B - 3
	Dive boat	20
Pilling operations	Jack up barge	14 (for 3 piles)
	Tug	3
Device installation	Tug	3
	2x Multi-cat	Multi-cat A - 20 Multi-cat B - 3
	Dive boat	20
Installation of Latching Anchors	Multi-cat	20
	Dive boat	20
Routine maintenance	Multi-cat	Per 5 years – extended 20 day maintenance period
	Dive boat	10 days every 6 months
Decommissioning	Tug	3
	Multi-cat	20
	Dive boat	20

Source: 40 MW Oyster Wave Array North West Coast, Isle of Lewis: Environmental Statement.

Location: The north-west coast of the Isle of Lewis, the Western Isles, Scotland.

Coordinates:

58.41267°, -6.473167°
58.40033°, -6.4905°
58.43317°, -6.442833°
58.41483°, -6.487167°
58.43483°, -6.445667°
58.41267°, -6.447667°

Process status: An agreement for lease was granted by the Crown Estate to Lewis Wave Power for a 40 MW wave farm in May 2011. The Environmental Statement (ES) indicates that installation of the devices will occur in four phases over a 4 to 6 year period and anticipates that the first stage will begin in 2014 with a 3 MW installation. Subsequent stages will see a 7 MW, 15 MW and 15MW installation in 2015, 2016 and 2017 respectively. Pile installation for the first phase is due to commence in May 2014.

Licensing Information:

As electricity is generated onshore, a Marine Licence is required for the offshore components. A Licence was issued by Marine Scotland in May 2013.

Licence	Competent Authority	Reference
Section 36 (Electricity Act) Consent	Scottish Ministers	TBC
Marine Licence (Marine (Scotland) Act) Consent	Marine Scotland	04475/13/0. This Licence is valid from 15 May 2013 to 31 December 2021.

Licence to Disturb Marine Species	Marine Scotland	TBC
Licence to Disturb Basking Shark	Marine Scotland	TBC
Controlled Activities Regulations (CAR) Licence	Scottish Environment Protection Agency	TBC

The following Conditions were included within the Marine Licence issued by Marine Scotland:

1. The Licensee must notify the licensing authority of the date of commencement and the date of completion of all operations relating to the licence. Separate notifications are required at the times of commencement and completion.

2. The Licensee must ensure that all substances or objects deposited during the execution of the works are inert and do not contain toxic elements which may be harmful to the marine environment, the living resources which it supports or human health.

3. The Licensee must ensure that any debris or waste materials arising during the course of the works are removed from the site of the works as soon as is practicable for disposal at an approved location above the tidal level of Mean High Water Springs.

4. The Licensee must, within 28 days of completion of the works or within 28 days of the date of expiry of the licence, whichever is the sooner, submit a written report to the licensing authority stating the nature and quantity of all substances and articles deposited below Mean High Water Springs under authority of the licence. Where appropriate, nil returns must be provided.

5. The Licensee **must** notify Source Data Receipt, The Hydrographic Office, Admiralty Way, Taunton. Somerset, TA1 2DN (Email: sdr@ukho.gov.uk; Tel; 01823 337900 of both progress and on completion of the works supply a copy of the licence, and wherever possible, 'as built plans', in order that all necessary amendments to nautical publications are made.

6. The works must be marked and/or lighted as required by the Northern Lighthouse Board and the marking to be continued unless and until the licensing authority rescind this direction.

7. The Licensee must inform the licensing authority and the Northern Lighthouse Board as soon as practicable after the works have been completed and the marking established.

8. If the Licensee wishes to display any marks or lights not required by this licence then details of the additional markings or lightings must be submitted to the Northern Lighthouse Board and their ruling must be complied with. The display of unauthorised marks or lights is prohibited.

9. The works must be maintained at all times in good repair.

10. No deviation from the schedule specified in the licence shall be made without the further written consent of the licensing authority.

11. No radio beacon or radar beacon operating in the Marine frequency bands shall be installed or used on the Works without the prior written approval of the licensing authority

12. If, in the opinion of the licensing authority, the assistance of a Government Department, including the broadcast of navigational warnings, is required to deal with any emergency arising from:

a) The failure to mark and light the works as required by licence.
b) The maintenance of the works.
c) The drifting or wreck of the works.
The Licensee is liable for any expenses reasonably incurred in securing such assistance.

13. An officer of HM Coastguard, or any other person authorised by the licensing authority, must be permitted to inspect the works at any reasonable time.

14. The Licensee must inform the licensing authority and the lighting authority as soon as practicable after the works have been completed and the marking established.

15. The Licensee must ensure that copies of the licence are available for inspection by any authorised Enforcement Officer at any reasonable time at:

a) The premises of the Licensee;
b) The premises of any agent acting on behalf of the Licensee; and
c) The site of the works.

16. In the event of the Licensee becoming aware that any of the information on which the issue of the licence was based has changed, the Licensee must immediately notify the licensing authority of the details of the changes.

17. The Licensee is not permitted to transfer the licence without the prior written authorisation of the licensing authority on application being made by the Licensee. The licensing authority may transfer a licence (with or without conditions) or refuse such authorisation as they may, at their own discretion, see fit. The licence cannot be transferred otherwise than in accordance with the foregoing procedure.

18. The construction and operation of the Development must be undertaken in accordance with the terms of the Application and the accompanying Environmental Statement, the Supplementary Environmental Information Statement, the Construction Method Statement, the Project Environment Monitoring Programme, the Pipeline Laying Strategy, Navigational Safety Plan, Vessel Management Plan and any other relevant plan as required except in so far as amended by the terms of the licence or by direction of the licensing authority.

19. In the event that any installed and commissioned wave energy convertor (WEC) fails to pump water to the onshore generating station(s) for a continuous period of twelve months then, unless otherwise agreed in writing with the licensing authority, following consultation with the Planning Authority and Scottish Natural Heritage, such WECs, associated monopiles and any other fitments shall be deemed to have ceased to be required. All infrastructure which is so deemed to cease to be required (the WEC and all ancillary equipment) must be dismantled and removed from the Site by the Licensee within the following six month period, or as otherwise agreed in writing with licensing authority, and the Site must be fully reinstated by the Licensee to the specification and satisfaction of the licensing authority after consultation with the Planning Authority and SNH.

20. The licensing authority reserves the right to vary or attach additional conditions to this licence in light of:

a) The results of monitoring studies required under the terms of the Schedule to this Licence; or

b) Any other observed effects considered to be directly associated with the works permitted by this licence.

Construction

21. Prior to the Commencement of Development a Construction Method Statement ("CMS") must be submitted by the Company to the licensing authority and approved, in writing by the licensing authority, following consultation with Scottish Natural Heritage, Scottish Environment Protection Agency, the Marine and Coastguard Agency, the Planning Authorities, Northern Lighthouse Board, and any such other advisors as may be required at the discretion of the licensing authority. Unless otherwise agreed in writing by the licensing authority, construction of the Development must proceed in accordance with the approved CMS. The CMS must include, but not be limited to, information on the following matters:

- Commencement dates;
- Working methods including methods, scope, frequency, hours of operations;
- Duration and phasing information of key elements of construction e.g. soft start procedure,
- diurnal timing of piling, mobilising plant, delivery of materials including WEC structures, foundations, WEC locations, inter-array pipelines and pipelines up to the level of mean high water springs;
- Method of installation including techniques and equipment and depth of pipe laying and pipe landing sites;
- Proposals for micro-siting the WEC;
- Pipeline monitoring;
- Layout location for each phase and each WEC location;
- Offshore lighting requirements;
- Report writing and dates of monitoring reports;
- Design Statement.

The CMS must be cross referenced as a minimum with the Project Environmental Monitoring Programme the Vessel Management Plan and the Navigational Safety Plan.

22. The Licensee shall provide licensing authority with Third Party Verification of the device(s) and substructures three months prior to the commencement of installation works.

Monitoring

23. No later than three months prior to the commencement of pipeline laying, a Pipeline Laying Strategy must be submitted to, and approved by the licensing authority in consultation with such other advisors required at the discretion of the licensing authority. The Pipeline Laying Strategy must include details of the location, the construction methods including minimum depths and protection where appropriate, and the monitoring methods (including post laying of the pipelines) for the pipelines and landfall site. The Strategy must also include the survey results of an inter-tidal habitat and relevant species survey which will help inform the pipeline routing location. The Development must be constructed and operated in accordance with the Pipeline Laying Strategy.

24. Prior to the Commencement of Development, a Construction Noise Management Plan must be submitted to, and approved by, the licensing authority, in consultation with any such advisors as identified at the discretion of the licensing authority.

25. Prior to the Commencement of the Development, a Project Environmental Monitoring Programme (PEMP) must be submitted to, and approved by, the licensing authority in consultation with SNH and any other ecological, or such other advisors as required at the discretion of the licensing authority. The PEMP must detail measures through all phases of the WEC construction (before, during and after the construction work) to prevent adverse impacts on water quality, marine mammals, birds, commercial fish, fishing, migratory fish, habitats, coastal processes, other users and uses of the area and include species protection plans where appropriate and necessary. Where appropriate and reasonable, the PEMP must take account of, and implement recommendations from, the Construction Noise Management Plan, the Pipeline Laying Strategy, the Construction Method Statement, the Fisheries Mitigation Strategy, the Marine Pollution Contingency Plan, the Vessel Management Plan and the Navigational Safety Plan and from the Company's Environmental Statement and Supplementary Environmental Information Statement.

The PEMP must be implemented at all times as approved (including any modifications approved following review) and in accordance with any timescales prescribed therein.

26. Prior to the Commencement of Development, the Licensee must submit to the licensing authority a Fisheries Mitigation Strategy developed in conjunction with Western Isles Fishermans Association (WIFA) and the Outer Hebrides Fisheries Trust (OHFT), the objective of which is to minimise the impacts the Development may have on fishing and fisheries interests and agree appropriate mitigation and where appropriate monitoring. No part of the Development shall be commenced until the licensing authority has approved the Fisheries Mitigation Strategy in writing. All works forming part of the Development must be carried out in accordance with the Fisheries Mitigation Strategy.

27. If the licensing authority consider it necessary, the Licensee must appoint a suitably qualified and experienced Marine Mammal Observer (MMO) or Observers and ensure that the licensing authority is notified of their identity and credentials before any construction work commences. Should an MMO be appointed then the MMO must maintain a record of any sightings of marine mammals within the mammal monitoring zone and action taken to avoid any disturbance being caused to them.

28. Prior to the Commencement of the Development, a Vessel Management Plan must be submitted to, and approved by, the licensing authority in consultation with SNH and any such other ecological or other advisors as may be required at the discretion of the licensing authority. The Vessel Management Plan must include, but is not limited to, the following issues:

a) Individual vessel details;
b) Number of vessels;
c) Whether ducted propellers will be in operation;
d) How vessel management will be coordinated, particularly during construction but also during operation;
e) Location of working port(s), how often vessels will be required to transit between port(s) and the site and the routes used.

The Development must be constructed and operated in accordance with the Vessel Management Plan which must be cross-referenced with the Project Environmental Monitoring Programme, the Construction Method Statement, the Pipeline Laying Strategy, Construction Noise Management Plan and the Navigational Safety Plan.

Navigation

29. Prior to the Commencement of the Development, a Navigational Safety Plan must be submitted to, and approved by, the licensing authority in consultation with the Maritime and Coastguard Agency, the Northern Lighthouse Board and any other navigational advisors, or such other advisors, as may be required at the discretion of the licensing authority. The Navigational Safety Plan must include, but is not limited to, the following issues:

- Navigational safety measures;
- Exclusion zones;
- Notice(s) to Mariners and Radio Navigation Warnings;
- Buoyage;
- Anchoring areas; and
- Lighting.

The Development must be constructed and operated in accordance with the Navigational Safety Plan at all times.

30. Prior to the construction of the Development, the location of the Development must be made available for inclusion in the Clyde Cruising Club Sailing Directions and Anchorages - Part 4 Outer Hebrides.

31. No works comprised in the Development shall commence until the site is marked using marker boards adjacent to the most northerly and southerly extremities of the site. The marker boards must be diamond shaped with a width of 1.5 metres and a length of 2.5metres, painted yellow with the inscription 'Wave Energy Site' painted horizontally in black.

These structures must be mounted no less than 2 metres above ground level and be clearly visible from seaward. A yellow light, flashing once every 5 seconds (Fl Y 5s), with a range of 2 nautical miles must be mounted at the centre of the diamond.

Chemical Usage

32. All chemicals utilised in the drilling operation must be selected from the List of Notified Chemicals assessed for use by the offshore oil and gas industry under the Offshore Chemicals Regulations 2002 (this list can be viewed/downloaded at (www.cefas.co.uk). Should any system other that a water-based mud be considered for use in the drilling operation written approval and guidance of disposal of any arising will be required from the licensing authority.

33. The Licensee must ensure that any chemical agents placed within the void of any of the WEC bases including biocides, corrosion inhibitors etc. are selected from the List of Notified Chemicals. The use of any chemical not contained on this list requires prior consent from the licensing authority.

34. The Licensee must ensure that all protective coatings; paints etc. used are suitable for use in the marine environment and, where necessary and appropriate, are approved by the Health and Safety Executive. Such coatings must only be utilised in accordance with best environmental practice.

35. The Licensee must ensure that the storage, handling and transportation of fuels, lubricants and chemicals etc. on vessels and equipment, should be such as to prevent any releases to the marine environment.

Removal of Debris and Temporary Works

36. The Licensee must ensure that any debris and temporary works that have been placed below MHWS are removed on completion of each WEC construction or installation programme as authorised by this Licence. Any Drill cuttings, arising and associated with the use of water-based drilling muds, are permitted to remain on the seabed but only provided that they are situated within the boundaries of the site.

Auditing and Reporting

37. The Licensee must create, maintain and submit to the licensing authority a detailed transportation audit sheet each calendar month, for all aspects of the WEC construction. The audit sheet must include information on the loading facility, vessels, equipment, shipment routes, schedules and all materials listed in the marine licence (e.g. piles, pipelines, WEC components, chemicals). Any changes to the components of this audit sheet must be notified to the licensing authority by the Licensee as soon as practicable if the licensing authority becomes aware that any materials on the audit sheet are missing it will contact the Licensee advising that the Licensee must undertake a side scan sonar survey in grid lines (within operational and safety constraints), across the area of development (to include WEC array, pipeline route, and any vessel access routes from local service port(s) to the construction site). All obstructions found on the seabed as a result of said scan sonar survey must be plotted. If the licensing authority is of the view that any newly discovered obstructions are associated with the construction works, then the obstructions must be removed by the Licensee as soon as is practicable and at the Licensee's expense.

38. If any serious health and safety incident occurs requiring the Licensee to report it to the Health and Safety Executive, then the Licensee must also notify the licensing authority of the incident within 24 hours of the incident occurring.

39. The Licensee must ensure that details of the works are promulgated prior to commencement, in the Kingfisher Fortnightly Bulletin to inform the Sea Fish Industry of the vessel routes, timings and locations.

40. The Licensee must ensure that a suitably qualified and experienced liaison officer or officers are appointed (primarily but not exclusively for environmental liaison) and the licensing authority notified of their identity and credentials before any construction work commences, to establish and maintain effective communications between the Licensee, contractors, stakeholders, conservation groups and other users of the sea during the works.

41. The Licensee must ensure that information is made available and circulated in a timely manner through the liaison officer(s) to minimise interference with stakeholders, conservation groups and other users of the sea during the works.

42. The Licensee must stipulate that the liaison officer's environmental remit includes:

a) Monitoring compliance with the commitments made in the Environmental Statement, addendum and the Project Environmental Monitoring Programme including providing regular (frequency to be agreed) updates to the licensing authority.
b) Providing a central point of contact for the monitoring programme.
c) Liaison with fishermen, conservation groups and other users of the sea concerning any amendments to the method statement and site environmental procedures.
d) Inducting site personnel on site / works environmental policy and procedures.

43. The Licensee must submit all reports, studies and surveys timeously (timescales and frequency to be agreed with licensing authority six months before Commencement of Development) to the licensing authority to allow the licensing authority to consider what, if any, resulting actions may be required as a consequence. The Licensee must advise the licensing authority, in writing, if circumstances suggest that there will be a delay in the submission of reports.

The reports must include an assessment, conclusions and an executive summary and the data within all reports must consist of its processed and unprocessed forms. Subject to the law on data protection and freedom of information, these reports must be made publically available.

Marine Pollution Contingency Plan

44. The Licensee must produce a Marine Pollution Contingency Plan for spills and collision incidents occurring during the construction and operation of the Development. The Contingency Plan must be adhered to in the event of any such spill or collision. The Licensee must submit the Contingency Plan to the licensing authority no later than three months prior to the Commencement of the Development for their approval. The Contingency Plan must take into account existing plans for all offshore operations. Practices used to refuel vessels at sea must conform to industry standards. The Contingency Plan must provide that in the event of any oil leaks within the WEC then the Licensee must, as soon as is practicable after the leak has been discovered, ensure that repair works are undertaken to the WEC.

Key environmental issues: The following potentially significant impacts were identified during the EIA:

- Disturbance to otter populations from construction works;
- Collisions between the developments structures and vessels or between vessels; and
- Visual disturbance to seascape during construction and operation.

The proposed works did not require an appropriate assessment under Regulation 48 of the Conservation (Natural habitats, &c.) Regulations 1994. The following mitigation measures are proposed within the Environmental Statement:

Fish and shellfish
Mitigation of displacement / loss of nursery and feeding grounds:

- To mitigate against disturbance to fish and shellfish during construction, vessel movements will be kept to the minimum practical number and will be limited to defined transit corridors.

Mitigation of increased substratum / benthic habitat:

- During operation, there is opportunity for the design of the gap fillers to be modified to produce suitable benthic habitat for fish and shellfish species. In particular if the eventual design for the gap filler had suitable sized holes for lobsters to use as burrows it could be assumed that the lobster population within the development site would increase.

Intertidal ecology

Mitigation of disturbance or loss or disturbance of important intertidal habitats and species:

- The construction contractor will provide and implement a construction method statement that adopts the relevant good practice guidance set out in CIRIA "The Coastal and marine environmental site guide" (C584) and include the following mitigation measures:
    - Intertidal construction footprint on the shore will be kept as small as possible;
    - Construction activities, materials, machinery and vehicles will be limited to defined construction areas and routes, minimising the footprint to prevent disturbance of nearby habitat;
    - Where possible surface laid pipework will be attached to rock rather than boulders;
    - Construction material will be removed from site; and
    - If material is removed from the intertidal habitat it will be stored and replaced within the same intertidal zone.

Mitigation of impacts on otters at all stages of development:

- Construction, operation and maintenance activities will maintain a strict footprint of works, and construction vehicles and equipment will not be active on, or stored by, the coastline for longer than is essential. This will minimise disturbance to the shore;
- Construction operation and maintenance work will be undertaken during daylight working hours (excluding horizontal directional drilling works). Where artificial light is required, lights will be directed away from otter sensitive areas to allow them to migrate through the area undisturbed. During summer months, construction may continue later into the evening without the need for artificial lighting;
- Whilst the location of the development works avoids areas suitable for otter it is important to protect the otter's food resource by avoiding pollution to the watercourses. Construction areas will be left in a safe condition during periods of inactivity, with chemicals and construction materials stored safely with appropriate bunding in accordance with SEPA's Pollution Prevention and Chemical Guidelines (PPG2 - Above ground oil storage tanks, and PPG5 – Works in, near or liable to affect watercourses);
- Key measures to further mitigate disturbance to otters on site will include capping all pipes, covering all trenches or providing a means for otter to escape should they enter a trench;
- Construction of the access road network will adhere to design Manual of Roads and Bridges (DMRB) Volume 10 Section 1 Part 9 HA 81/99 (Nature conservation advice on relation to otters) and The Scottish Wildlife Series publication 'Otters and Development';
- Offshore operation and maintenance procedures manuals will include good practice guidance for boat operators aimed at avoiding disturbance to otters during operation and maintenance activities;

- A speed limit of 15 miles per hour (mph) will be implemented on the access road during all phases of development;
- Prior to the commencement of operations an otter survey will be undertaken within the proposed footprint of construction plus a 50m buffer zone around it (200m buffer along any watercourse coastal area), to confirm the extent of use at the time of construction (otters may increase their use of the site in the interim period between the current survey and the commencement of construction);
- If pipework is surface laid and work in the intertidal area confirmed, the outcomes of the otter survey will be discussed with SNH and otter mitigation measures, where necessary, for the site will be agreed with SNH prior to construction and will be detailed within the EMP for the development;
- A sediment management plan and pollution management plan will be developed in consultation with SEPA and SNH in accordance with SEPA's PPG guidelines PPG 5 (Works in, near or liable to affect watercourses) and PPG 6 (working at construction and demolition sites). Both plans will be incorporated within the Construction Method Statement;
- Any otter casualties occurring during construction will be retained and SNH will be notified; and
- Construction will adhere to The Scottish Wildlife Series publication 'Otters and Development'.

Shipping and navigation

Mitigation drawn from Navigation Risk Assessment:

- Emergency response procedures, Emergency Response Cooperation Plan (ERCoP) plan will be developed in liaison with Maritime and Coastguard Agency and Royal National Lifeboat Institution;
- Outcomes of device design testing and lessons learned from the Oyster Project at Billia Croo, Orkney will be applied before similar devices are deployed in Lewis;
- Hazard Workshop for operational phase with key project personnel/vessel masters etc.;
- Liaison/dialogue with local fishermen during major maintenance operations;
- Maintenance operations will be planned around weather window;
- Weather forecasting and monitoring conditions will be undertaken continuously;
- Vessels on site will be tasked with monitoring shipping/fishing in the area to warn them of the operations;
- Navigational warnings will be broadcasts e.g., Navtex and information will be marked on UKHO charts;
- Continued liaison will be maintained with Harbour Masters, local coastguard and fishermen operating in the area;
- Oyster devices will be marked to meet the requirements of the Northern Lighthouse Board (NLB) prior to installation;
- Navigational Aids will be installed and maintained as directed by NLB;
- The site will be marked on hydrographic charts and Kingfisher charts as well as FishSAFE
- Coordinates of site and devices will be provided to local fishermen and canoe / kayak clubs;
- Operating procedures will be in place, including safety requirements as well as wider site management measures;
- The devices will be monitored through a control and instrumentation system (SCADA system) to ensure early detection of device malfunction, allowing the operators to alert other users and regulators regarding significant changes in operation or status of the site;

- A safety/exclusion zone will be applied for the operational phase; and
- Lewis Wave Power will develop an ERCoP which will have the provision to alert the Coastguard if there is a risk that a device has broken free from its foundations in order for navigational safety warnings to be issued to shipping in the area.

Mitigation of hazards drawn from Navigation Risk Assessment: Eleven hazards were identified in the NRA with the potential to occur during the operational phase. The following mitigation measures, proposed by the in the NRA, will decrease the risk of these hazards and the impact of increased pressure on search and rescue services:

- Devices will be clearly marked;
- Notices to mariners will be issued regularly;
- Local notices will be posted as appropriate;
- Hydrographer broadcasts will be made;
- The site will be designed as a no anchorage zone
- Ongoing fisheries liaison measures will be put in place;
- Pilot books will be updated as appropriate;
- An emergency response plan will be developed and tested;
- Method statements and risk assessments will be produced for activities;
- Life jackets will be worn by all offshore personnel during maintenance activities;
- A clear policy for working in adverse weather will be developed;
- A marine safety management system will be put in place;
- Only experienced and trained crews will be used for maintenance activities ; and
- A voluntary agreement will be sought with local fishermen not to lay and recover their potting gear in and around the devices.

<u>Environmental webpage:</u>

Baseline studies and project effects studies: Lewis Wave Power Project				
General description	The following field surveys were undertaken (or commissioned by) the developer to inform baseline characterisation.			
Receptor	**Study description**	**Design and methods** (brief description)	**Results** (brief description)	**Status** (planned, underway, completed, with dates)
Physical Environment and Sediment Dynamics	Metocean survey by Hebridean Marine Energy Futures.	Three wave rider buoys were deployed near study area to measure oceanographic and meteorological parameters (wave height, wave period and wave orientation etc).	Results are presented graphically in Appendix 7.2 of the Environmental Statement. The data has been processed and cleaned on a high level only at this stage, and in particular peak values for the wave heights should be treated with caution. Poor signal quality was occasionally observed during storm events and this was likely caused by steep and collapsing waves. In some instances the recorded wave heights under those circumstances were in excess of 25m and a more detailed quality check is required before this values should be taken as real. These data have been through a first pass processing were values that appeared to be distorted due to poor signal reception have been filtered out.	Completed 2011 (between October and December 2011)
	Offshore geophysical survey by Aspect Surveys.	Geophysical survey including multibeam bathymetry and sub-bottom profiling across development area. Maps and charts including bathymetry and seabed features were created.	The MBES survey shows clearly the rocky nature of the seabed over the majority of the site and is being used to focus attention on the processing of the sub bottom information to the isolated areas where sand lenses may be present. The sub bottom survey shows that most of the area is characterised by rock outcropping or rock near to the surface of the seabed overlain by either sand or gravel.	Completed 2010 (between August and September 2010)

Benthic ecology	Seabed survey by Envision.	Presence, distribution and character of potential Annex I habitats and Annex II species within the deployment site characterised by a drop down video survey.	The dominant substrate within both of the survey areas is rugged bedrock, consistent with a high-energy marine environment. The dominant habitat at both sites consists of the kelp Laminaria hyperborea - either as kelp forest (in particular, at Siadar) or as kelp park. None of the species observed from the video footage obtained is included on the SNH Priority Marine Features, or on the UK BAP species lists.	Completed 2011 (between 23rd and 30th August)
Ornithology	Vantage point survey by Natural Research Projects Limited.	Vantage point (VP) surveys were conducted from two VPs, giving total coverage of the development area. Data were collected on the distribution, abundance and behaviour of birds using screenshot scans and timed flying bird watches.	Twenty one species of seabirds and other water birds were regularly recorded (seen on more than three occasions) in the vantage point survey area during baseline surveys. A number of less common species were also recorded. The status and importance of the species recorded during Only two species merit categorisation as high priority for the EIA, namely cormorant and white-tailed eagle. Four species merit categorisation as medium priority for the EIA, namely red-throated diver, shag, goosander and grey heron.	Completed 2011 (from September 2010 to September 2011)
	Walkover surveys by Natural Research Projects Limited.	Conducted on six occasions bi-monthly throughout the year to survey shoreline for scarce breeding birds, and none breeding birds of conservation importance.		Completed 2011 (from September 2010 to September 2011)
Marine mammals and basking sharks	Vantage point surveys by Natural Research Projects.	VP surveys between September 2010 and September 2011. Methods used were based on SNH draft guidance on survey and monitoring in relation to marine renewables deployment in Scotland.	The most commonly recorded species was grey seal. Records of seal behaviour show no evidence of the survey areas being of used for haul out or breeding behaviour. No clear seasonal variation in seal use of the site was detected. Cetaceans were recorded occasionally. Most species were recorded in spring and summer except for harbour porpoise which were recorded throughout all seasons.	Completed 2011 (from September 2010 to September 2011)
Reports or papers	• Lewis Wave Power Limited- 40MW Oyster Wave Array: Environmental Statement			
Research projects	N/A			

Monitoring and adaptive management: Lewis Wave Power Project				
General description	The environmental statement (ES) indicates that monitoring will follow a 'deploy and monitor' strategy in consultation with Marine Scotland Licensing and Operations Team (MS-LOT) and Scottish National Heritage. The ES states that environmental monitoring will be an extension of the baseline surveys previously carried out, with surveys occurring before during and after deployment of the array.			
Receptor	**Monitoring program description**	**Design and methods** (brief description)	**Results** (brief description)	**Status** (planned, underway, completed, with dates)
Intertidal ecology	Identification of potential change in the intertidal community.	Two transects will be established, one within the area of influence and one on a similar type of shore close to the area of potential influence. Baselines will be taken in spring, summer and autumn at each site to determine what type of substrate and biotope is present. Video and photographs will be used to document the shore at each location. Full details will be confirmed with SNH before commencement.		Planned
Ornithology	Continuation of pre deployment surveys.	A second year of bird surveys will be carried out, the results and implication of which will be discussed with SNH and MS-LOT.		TBC
Marine mammals	Continuation of pre deployment surveys.	A second year of bird surveys will be carried out, the results and implication of which will be discussed with SNH and MS-LOT.		TBC
Reports or papers	• Lewis Wave Power Limited- 40MW Oyster Wave Array: Environmental Statement			
Research projects				