

ENVIRONMENTAL EFFECTS METADATA SURVEY FORM

Name

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Project name: Kyle Rhea Tidal Stream Array Project

Planned

In Operation

Completed

Project description:

Project Developer: Sea Generation (Khle Rhea) Ltd.

Technology Developer: Marine Current Turbines Ltd.

Technology type: MCT's SeaGen S

Resource (wave, tidal): Tidal

Project scale (test site, prototype, array, commercial): Demonstration array

Installed capacity (MW): Up to 8 MW

Project Website: <http://www.seagenkylerhea.co.uk/index.php>

Launch Date: TBC

Additional Description: The proposed array will consist of four SeaGen S devices, giving a combined capacity of up to 8 megawatts (MW). Infrastructure including intra-array and export cables, ancillary onshore works and works in the inter-tidal zone will be required to connect the array to the electricity distribution network. The infrastructure needed to produce grid compliant electricity is contained within the SeaGen system itself, requiring no external power conditioning. Initial studies indicate that the grid connection point would likely be on the Isle of Skye. The aim of the project is to serve as a test case for the development of the technology, with this particular array operating for up to 25 years¹.

The SeaGen S system, developed by Marine Current Turbines (MCT), consists of twin power trains mounted on a crossbeam which is supported by a monopole. The cross beam can be raised above the water by winching it up the monopole support structure. Rotor blades are positioned in the top third of the water column and can be pitched through 180 degrees, allowing them to operate in bi-directional flows. Previous trials have shown that the SeaGen S is capable of achieving more than 48% efficiency over a broad range of current velocities. SeaGen S can be deployed in water depths up to 38 metres and achieves rated power in tidal

¹ SeaGen Kyle Rhea, Project Description. Available online: <http://www.seagenkylerhea.co.uk/description.php> Accessed 31/01/14

currents of greater than 2.4m/s. The developers have recently updated the design, giving each machine an operational capacity of 2MW and increasing the rotor diameter from 16 to 20m.²

Foundations: Each device will have either a tripod or quadropod foundation structure with each ‘foot’ terminating in a pin-pile (up to 2m diameter), drilled and grouted into a rock socket in the seabed. A quadropod structure is considered in the impact assessments throughout the Environmental Statement as a worst case scenario. Each rock socket may be up to 11m deep and up to 2.2m in diameter, providing a worst case seabed footprint of up to 15.2m² for each quadropod. The foundations will also support access ladders, J-tubes (to prevent export cable damage), corrosion protection equipment and a boat landing platform. The decision on final foundation design will be subject to data derived from geotechnical and geophysical surveys, metocean conditions, barge availability, installation and operations methodology, and life-cycle cost.

Export Cables: The array will be joined in a daisy chain formation using intra-array cabling. The intra-array cables will be 33kV, typically 3-core copper conductors with insulation/conductor screening and steel wire armouring. A single AC subsea export cable rated at 33kV is required to bring generated electricity from the array to the project substation. The export cable will be directionally drilled from the substation location to a ‘break out’ point as close as possible to the array. The cable will have a polypropylene outer sleeve with an external diameter of approximately 140mm and will include internal fibre optic communication links for control purposes. The total length of the export cable is up to 500m.

Onshore infrastructure: An assessment of the grid infrastructure in the vicinity of the project has indicated that the connection options suitable for the project are all on Skye rather than on Scottish Mainland. The grid network in the vicinity of the project is currently at full capacity; however there is a planned upgrade to the transmission network with a new high voltage direct current (HVDC) link to the Western Isles which will free-up sufficient capacity on Skye in 2015 which ties in the commissioning phase for the project (see Chapter 5, Project Description). A small substation containing electrical switchgear (around 6m x 3m footprint by 3m high) will be required for the project. A prefabricated container will be used to house the substation. Each SeaGen device contains a separate transformer within its structure, so that the onshore substation size can be kept to a minimum.

Vessel spread: The installation method has not yet been finalised. It is therefore not possible at this time to specify exactly what vessels will be used. However three installation scenarios are currently being considered:

Aspect of installation scenario	Installation scenario		
	Jack up barge scenario	Moored barge scenario	Dynamic positioning scenario
Size of vessel	150m x 45m	100m x 30m	155m x 30m

² Marine Current Turbines, Technology Development, SeaGen S. Available online: <http://www.marineturbines.com/SeaGen-Products/SeaGen-S> Accessed 31/01/2014.

Footprint of mooring system	4 triangular lattice legs with circa 40m ² foot area	4 to 8 100 tonne gravity blocks (5m x 5m) or drag anchors (3m x 5m) with some anchor chain catenary, estimated at 80m length on seabed at 1m diameter	Dynamic positioning holding a footprint of +/- 5m
Number of tugs required	Jackup vessel is typically self-propelled, but possible single tug required for initial positioning (30x22m)	Possible that barge will have DP for assisting with initial positioning while laying anchors, however possible X2 tugs (30m x 22m)	n/a
Anchor handling vessel	n/a	Multicat (c.25m LOA) or small AHV to install gravity blocks and handle moorings	n/a
Flat top barge (to bring out large items)	n/a	n/a	n/a

Location: Kyle Rhea, between the Isle of Skye and the west coast of Scotland.

Coordinates: The array area is bound by four corners with the following positions:

- 57.23504 -5.66358;
- 57.23500 -5.66099;
- 57.22953 -5.66102;
- 57.22952 -5.66361.

Process status: Sea Generation (Kyle Rhea) Ltd has spent the last 2 years carrying out surveys and studies to inform the feasibility and design of the project and the Environmental Impact Assessment (EIA). The EIA is now complete and an application for a Marine Licence has been submitted to Marine Scotland. An Environmental Statement detailing the findings of the EIA has been submitted in support of the application. Marine Scotland conducted a formal consultation process where bodies such as SNH, MCA, Northern Lighthouse Board and RSPB were consulted on the project. The consultation process ran from the 22nd of February 2013 to the 5th of April 2013. Marine Scotland aimed to make a recommendation with regard to the consenting of projects within approximately 9 months.³

Licensing Information:

Licence	Competent Authority	Status
Section 36 (Electricity Act) Consent	Scottish Ministers	TBC
Marine Licence (Marine (Scotland) Act) Consent	Marine Scotland	TBC
Licence to Disturb Marine Species	Marine Scotland	TBC
Licence to Disturb Basking Shark	Marine Scotland	TBC
Town and County Planning Permission	District of Skye and Lochalsh – Highland Council	TBC

³ SeaGen Kyle Rhea, Project Progress. Available online: <http://www.seagenkylerhea.co.uk/progress.php> Accessed 31/01/14

Key Environmental issues: The following potential impacts were deemed to be potentially significant during the EIA process:

- The introduction of marine non-native species during construction;
- Destruction, obstruction or damage to otter breeding sites, places of rest or shelter and disturbance or reckless injury and killing;
- Collision risk between marine mammals and the device during operation;
- Mortality or physical injury to fish and shell fish as a result of pollution from routine and accidental discharges during construction and operation.
- Adverse effects on local commercial fisheries due to restricted access to fishing grounds on either side of the array.
- Adverse effects on the local seascape and the coastal character of the area.
- Collisions between vessels operating in the area and vessel collision with the array.⁴

Mitigation measures: The following key mitigation and best practice measures to be applied are outlined in the Environmental Statement:

- Development of an Environmental Management Plan (EMP) to be agreed with the Highland Council, SEPA, SNH and Marine Scotland, following submission of this ES. The EMP will be a working document detailing the environmental actions highlighted in the ES, all activities to be carried out on site, responsibilities for those activities, environmental risks and the management protocols to be put in place to control these, as well as identification of personnel responsible for each element of the EMP;
- An Environmental Monitoring and Adaptive Management Plan (EMAMP), to be agreed with Marine Scotland (MS) and Scottish Natural Heritage (SNH);
- A detailed Construction Method Statement (CMS) and a Pollution Control and Spillage Response Plan to be prepared and agreed with SEPA, SNH and MS-LOT prior to commencement of construction;
- All work will be undertaken to an overarching Health, Safety and Environmental Management System (HSEMS), which will include the CMS, the PIRP and the Environmental Management Plan. The project will be supervised in accordance with the Construction Design and Management Regulations (2007);
- Pollution Control and Spillage Response Plans to be developed and included in the EMP;
- A Construction Traffic Management Plan (CTMP) will be developed in consultation with the Highland Council which will include details of the construction vehicles proposed (size; weight; number of axles); construction programme; swept path analysis, preferred route to access the project site; details of any deflectograph surveys required pre and post-construction, temporary signal control during construction, and protocols for Abnormal Indivisible Loads (AILs);

⁴ The Kyle Rhea Tidal Stream Array, Volume II, Environmental Statement. Available [Online] http://77.68.107.10/Renewables%20Licensing/MCT_Kyle_Rhea_Offshore_Tidal_Array/ES/KRTSA%20Vol%20II%20ES.pdf Accessed 20/03/14.

- Site Waste Management Plan to be developed and agreed with SEPA and Marine Scotland
- Horizontal Directional Drilling (HDD) utilised to reduce or remove the pathway for impacts to many receptors.
- Area of disturbance associated with all works will be kept to a minimum.
- Substation and drilling rig footprints will be sited outside of the SAC and SSSI boundary to reduce impacts on sensitive features; and
- An Environmental Clerk of Works (ECoW) will be appointed, to be present on site and oversee the construction phase. The clerk of works will have responsibility for overseeing the implementation of ecological mitigation measures agreed with the key regulators, SEPA, SNH and Marine Scotland.⁴

Environmental webpage: <http://www.seageneration.co.uk/environmentalaspects.php>

Baseline studies and project effects studies: MCT Kyle Rhea 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	Doppler Current Profiler Survey by Partrac Ltd.	Acoustic Doppler Current Profiler use to determine flow rates within Kyle Rhea.	Flood tide = max flow speed of 4m/s, approximately 1m/s faster than the peak flow during the ebb tide. The highest energy flows occurred in the centre of the channel. The area just south of the proposed device locations experienced the highest velocities for the longest duration.	Completed 2012 (time in year not specified in environmental statement)
Intertidal ecology	Extended Phase 1 Habitat Survey and Otter Survey by Royal Haskoning	This survey used the JNCC methodology for the mapping of habitats and invasive species, and included the assessment of habitats for the presence of protected species. The Otter Survey was undertaken concurrently with the Extended Phase 1 Habitat Survey. The methodology used conformed to SNH guidance.	No features or habitats regarded as being rare or particularly sensitive were recorded during either survey.	Completed 2012 (between 7 th and 8 th of May and again on 27 th of November)
Ornithology	Bird survey commissioned to Natural Research Projects Ltd.	Vantage point watches, Snap-shot scans and flying bird watches. The survey design took into consideration the draft SNH guidance on survey and monitoring for wet renewable developments.	The results show that, with the exception of shag and cormorant the survey area is generally of low importance for seabirds, waders and wildfowl species. Nevertheless, several species of	Completed 2012 (one year survey from July 2011 to July 2012)

			high conservation value were recorded, but in all cases relatively infrequently and in small numbers	
Marine mammals and basking sharks	Marine mammal survey commissioned to Royal Haskoning	Two vantage points were used which provide optimal views of the majority of Kyle Rhea, and fully encompass the proposed development area. The survey methodology is informed by the SNH draft guidance on survey and monitoring in relation to marine renewables deployments in Scotland.	Grey seal appear to leave Kyle Rhea during breeding season; Harbour seal are present at the site during the breeding season however the number of sightings of juvenile seals (<1 year) was relatively low; Most seals are recorded resting or hauled out close to the shore although they also use the whole of the Kyle, including the proposed array site; <0.5% of the recorded harbour seal behaviour was diving; no grey seals were recorded diving / feeding; Small numbers of harbour porpoise were recorded, most likely transiting through Kyle Rhea; and only 3 basking sharks were recorded.	Completed July 2012 (one year survey)

	<p>Statistical analysis of the year 1 VP survey data by DMP Statistical Solutions.</p>	<p>Year 1 data were analysed to establish: statistical models for marine mammal densities; relationships between available covariates and animal densities; and the power to detect changes in animal densities of various sizes.</p>	<p>There were sufficient sightings of harbour and grey seals to model density surfaces. Harbour porpoise were observed too infrequently to develop density models.</p>	<p>Completed 2012 (using data collected in survey from July 2011 to July 2012)</p>
<p>Benthic ecology</p>	<p>Benthic survey commissioned to Envision Mapping.</p>	<p>Drop down video survey to characterise seabed within the study area in terms of: distribution and abundance of marine habitats and communities; identify habitats or species of conservation importance; and determine the substrate type at all locations sampled.</p>	<p>Four species have been identified as being of some conservation importance, namely maerl, spurdog, common seal and sandeel. The substrate type at each of the video sampling stations has been identified and mapped.</p>	<p>Completed (June 2012)</p>

Monitoring and adaptive management: MCT Kyle Rhea Project

General description SeaGeneration (Kyle Rhea) Ltd is committed to working with Marine Scotland and SNH to develop an appropriate Environmental Monitoring and Adaptive Management Plan (EMAMP) to monitor potential effects of the devices following installation.⁵

Receptor	Monitoring program description	Design and methods (brief description)	Results (brief description)	Status (planned, underway, completed, with dates)
Marine Mammals	Vantage Point surveys	To monitor use and behaviour in the array area.	TBC	Planned
	Active Sonar	To monitor near field behaviour of marine mammals passing close to the devices.	TBC	Planned
	Passive Acoustic monitoring	To monitor use of the Kyle by cetaceans and ensure passage is maintained.	TBC	Planned
	Carcass surveys	Surveys of the local area to identify any washed up marine mammal carcasses.	TBC	Planned
Ornithology	Monitoring studies to quantify changes in the distribution, abundance and behaviour of diving seabirds within the project area	Monitor: cormorant and shag diving behaviour for evidence of avoidance response; foraging behaviour and success of white tailed eagle; and potential benefits to bird species through provision of perches on surface piercing towers and any	TBC	Planned

⁵ The Kyle Rhea Tidal Stream Array, Volume III, Appendices, Appendix 24.1. Available [Online] http://77.68.107.10/Renewables%20licensing/MCT_Kyle_Rhea_Offshore_Tidal_Array/ES/KRTSA%20Vol%20III%20Appendices.pdf Accessed 20/03/14.

		associated enhanced feeding opportunities.		
Benthic ecology	Habitat monitoring	Randomised or stratified randomised visual sampling within Kyle Rhea, using remote methods such as drop video and acoustic seabed mapping.	TBC	Planned