

ENVIRONMENTAL EFFECTS METADATA SURVEY FORM

Name

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Project name: Skerries Tidal Stream

Planned

In Operation

Completed

Project description:

Project Developer: Sea Generation Wales

Technology Developer: Marine Current Turbines Ltd

Technology type: Marine Current Turbines' SeaGen S

Resource (wave, tidal): Tidal current

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

Installed capacity (MW): 10 MW

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

Launch Date: TBC

Additional Description: Site selection, feasibility assessments and environmental studies began in 2006 and a newly created development company, SeaGeneration (Wales) Ltd, was set up in 2008 as a joint venture between Marine Current Turbines and RWE npower renewables to develop the project. The location for the proposed array is a 0.56km² site between the group of rocks and islands known as the Skerries and Carmel Head. The site is less than 1km from the Anglesey coast and is characterised by water depths of around 20 to 40m. The proposed array will consist of up to 9 SeaGen devices and will have a total installed capacity of up to 10 MW. The site's close proximity to Holyhead provides access to good port facilities, the national grid and transport connections. The array is expected to operate for up to 25 years, where it will serve as a test case for the development of the technology in multi device arrays.

The technology used will be the SeaGen S, a system developed by Marine Current Turbines (MCT). It is a surface penetrating device that consists of twin power trains mounted on a crossbeam 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. Power generation occurs once the tide runs faster than 1m/s and at maximum speed, the tips of the rotor move at around 12m/s.

The two rotating blades turn at approximately 14rpm and drive a gear box system¹. SeaGen S can be deployed in water depths up to 38 metres and achieves rated power in tidal 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 20m². As a whole each turbine weighs 1,000t, and is 43m wide from tip to tip.

Export cable: A single 33kV export cable will be laid to transport generated power to the shore, however the route which the cable will take has not yet been finalised. Two possible cable corridors 500m in width have been identified and assessed. The first is the shortest route, resulting in the cable coming ashore between Carmel Head and the western boundary of Hen Borth Bay. The second route runs east from the proposed array site and would come ashore within Hen Borth Bay. A final decision on the cable route will follow the grant of main consent and assessments of technical and economic impacts.

There are three available methods for the installation of the export cable. A decision as to which one will be used is yet to be made and will be dependent upon seabed conditions and the route taken. The first option involves laying the cable directly onto the seabed; this method leaves the cable vulnerable to physical damage from fishing gear and rocks / coarse sediment circulated by the strong currents. The second available option is trenching the cable using a plough. It is likely that this method would only take place in the intertidal sections of the cable route. The final option is directional drilling. A directional drill would create a hole in the bedrock from the land to a point approximately 1km from the array. The cable would then either be entrenched or covered with protective mattresses for the remainder of its route.

Onshore Infrastructure: Ancillary onshore works and works in the intertidal zone will be required to connect the array to the electricity distribution network. The landfall location for the export cable is yet to be confirmed but will be within the coastline between Carmel Head and Cemlyn Bay.

Vessel spread: Project installation methods have not yet been finalised, hence is it not possible to specify exactly what vessels will be used. Three different scenarios have been put forward using different types of vessels, these are outlined in the following tables:

Scenario 1- Jack up barge

Vessel type	Activity	Comment
Jack up barge	Installation	50x30m, 4 legs with 2m diameter
2x Tugs	Installation	30x22m
Flat top barge	Installation, to bring out large items	50x20m with tug
Crew change support vessel	Installation	10m
SeaGen install vessel	Installation	144x26m

¹ Power Technology.com, Strangford Lough Tidal Turbine, available at <http://www.power-technology.com/projects/strangford-lough/> as at 31/01/14

² Marine Current Turbines, Technology Development, SeaGen S. as available at <http://www.marineturbines.com/SeaGen-Products/SeaGen-S> as at 31/01/14

Scenario 2- Moored barge

Vessel type	Activity	Comment
Moored barge	Installation	53x20m, 4 to 8 100 tonne gravity blocks (3m x 3m) with a ground chain extending approximately 400m
2x Tugs	Installation	30x22m
Multicat or small anchor handling tug	Installation of gravity blocks and handle moorings	50x20m with tug
Crew change support vessel	Installation	10m
SeaGen install vessel	Installation	144x26m

Scenario 3- Dynamic positioning vessel

Vessel type	Activity	Comment
Dynamic positioning vessel	Installation	53x20m, Dynamic positioning holding a footprint of +/- 5m
Crew change support vessel	Installation	15m
SeaGen install vessel	Installation	144x26m

Location: Between Skerries and Carmel Head on mainland Anglesey

Coordinates: The four corners of the development site are labeled as A1, A2, A3 and A4:

	Easting	Northing
A1	395560	5919420
A2	395007	5919998
A3	395512	5920482
A4	396066	5919905

Process status: Consent for the project has been granted and grid connection for 2015 has been secured. Onshore work is underway with feasibility studies assessing options for an export cable route, landfall point and substation location. Planning applications for onshore works were submitted in 2013 and foundation installation is due to begin in 2014.

Licensing Information: A summary of the licences and consents granted is provided in the following table:

Licence	Competent Authority	Status
Section 36 (Electricity Act) Consent	TBC	TBC
Marine Licence (Marine (Scotland) Act) Consent	TBC	TBC
Licence to Disturb Marine Species	TBC	TBC
Licence to Disturb Basking Shark	TBC	TBC
Town and County Planning Permission	TBC	TBC

Key Environmental issues: The following potential impacts were identified as being potentially significant during the EIA:

- Erosion or accretion of shoreline at landfall within SSSI
- Operational noise causing disturbance and barrier effect to marine mammals
- Collision risk between marine mammals and device
- Operation of the device causing displacement of fishing activities
- Device presence disturbing seascape from a number of view points
- Collision risk of vessels transiting through the area

Mitigation measures:

The following mitigation measures were outlined in the Environmental Statement:

- Scour protection will be considered for areas where significant scour is recorded to prevent any further erosion and associated release of potential suspended sediments.
- Any trenching will be backfilled immediately to reduce impact of suspended sediment on benthos, fish and shellfish during construction.
- Marine mammal observer will be present during construction to identify disturbance or injury to marine mammals, basking sharks and marine turtles caused by noise or collision with vessels.
- Deploy and monitor strategy to protect marine mammals from the effects of operational noise, habitat exclusion, collision risk, and barrier effect of the array will be developed.

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

Baseline studies and project effects studies: SeaGen Wales 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	Geophysical survey by EMU Ltd. in 2008.	Seabed surface sediments have been investigated through geophysical and bathymetric surveys. Bathymetry, interpreted seabed surface geology and isopach were included in the survey.	The survey reported that depth variations across the site appeared to correspond not only to exposed bedrock but also fingers of mobile and static sediment within the area. Coarse sand and bedrock dominated the central and western region of the surveyed area. Surrounding this area were regions that contained cobbled silt, gravelly pebbly cobbles, sandy gravel and cobbly sand. Bedforms with a maximum wave height of 2m have been identified in the surveyed area and have their long axis generally orientated NNW-SSE. Pockets of sediment infilling the surface topography of the bedrock were clearly identified.	Completed
Intertidal ecology	MACS visual intertidal habitat survey and faunal analysis of sediment cores	A walkover survey of Carmel Head was conducted followed up with a detailed survey of Hen Borth.	The results from the intertidal survey found the coast around Carmel Head (cable route option 1) to be typically steep rock faces supporting dense communities of kelps on the lower shore, fucoid algae on the mid-shore in sheltered embayments and upper shore all along the coast, barnacles and	Completed 17/10/2008

			<p>mussels on the mid-shore on exposed headlands and lichen in the splash zone. There are occasional narrow, steep-sided embayments which end on the landward side in shores of furoid-covered boulder on the lower shore and clean shingle on the upper shore. In addition, there are several points of cave or overhang biotope which may constitute Annex I habitat.</p>	
Benthic ecology	Site specific benthic survey	Drop down camera at sites pre-determined from geophysical data. Grabs attempted but failed due to hard substratum.	The site-specific benthic survey identified fifteen biotopes (including one subdivision) in four main habitat types, plus one <i>Sabellaria spinulosa</i> biotope at one of the western reference stations and a further four identified from the potential cable route into Cemlyn Bay.	Completed (survey took place between 28 th of November and the 11 th of December)
Marine mammals	Surveys commissioned by the Welsh Assembly Government	Vessel based observations and acoustic surveys using static acoustic monitoring devices. Results provided in the report by Gordon <i>et al.</i> 2010.	Several marine mammal species occur in the region. Over twenty species of cetacean can be seen around the Welsh coastline and of these five species are known regularly to occur. These are harbour porpoises (<i>Phocoena phocoena</i>), bottlenose dolphins (<i>Tursiops truncatus</i>), short-beaked common dolphins (<i>Delphinus delphis</i>), Risso's dolphins (<i>Grampus griseus</i>) and minke whales (<i>Balaenoptera acutorostrata</i>). Two species of seal also occur on the Welsh coast, the grey seal (<i>Halichoerus grypus</i>) and harbour (or common) seal (<i>Phoca vitulina</i>). Relatively high densities of harbour	Completed (between July and August 2009)

			porpoise within the area.	
Ornithology	SeaGen commissioned vantage point surveys	Each survey consisted of 3 hours of continuous diurnal observations from two vantage points on Carmel Head. Eight surveys per vantage point per month were carried out between April and September 2009.	A total of 20 species of seabird and five species of seaduck were recorded crossing the Project Site in April – September 2009 by the Seabird surveys. The majority of birds recorded were Manx Shearwater, Auk species (Razorbill and/or Guillemot), Gannet and Herring Gull with these five species comprising over 70% of all birds counted. The majority of individual birds (84%) that were observed transiting the Project Site were flying in close proximity to the adjacent coastline.	Completed (between April and September 2009)

Monitoring and adaptive management: SeaGen Wales project

General description A Preliminary Environmental Monitoring Plan is currently being prepared for this project. The following monitoring measures are proposed within the Environmental Statement.

Receptor	Monitoring description	program	Design and methods (brief description)	Results (brief description)	Status (planned, underway, completed, with dates)

Physical Environment and Sediment Dynamics	Post installation Bathymetric swathe survey	Survey of the seabed within 100 m of each SeaGen device and along a 100 m corridor centred on all cable routes where surface laid, to be carried out pre and post construction. A further period of surveys may be deemed necessary on agreement with the Regulator if seabed instabilities are identified.		Planned
	Beach survey	Beach survey within 50 m of the landfall, to be carried out pre and post construction, if the cable is surface laid. A further period of surveys may be deemed necessary on agreement with the Regulator if ongoing beach change is predicted and deemed to be an issue.		
Intertidal ecology	Shore survey	Walk over survey and a core sample survey analysis of the softer sediments, including repetition of the sites surveyed for this assessment. Surveys will follow JNCC standard biotope methodology. Results will be published and submitted to the statutory authorities.		Planned
Benthic ecology	Camera or diver surveys	Camera or diver survey in combination with benthic grabs for areas of soft-sediments of the main site and cable route (inshore sites only where sediment type is feasible for grabs). These surveys will be undertaken as a baseline and repeated during and after construction.		
	Chemical sampling of any soft sediment present	To test for contaminants which may be released into the marine system during construction e.g. trenching of the cable at inshore areas.		
	Camera or diver surveys	A survey using camera or divers to record evidence of colonisation of the structure, rock armour and scour protection and also to record any evidence of scour.		
Fish, Shellfish and Marine turtles	TBC	Monitoring will be discussed and agreed with the statutory authorities prior to construction.		Planned
Marine mammals	Visual monitoring	Visual monitoring of marine mammal activity around the array pre and post installation to look for evidence		Planned

		of changes in use of the area.		
	Acoustic monitoring	Passive acoustic monitoring of echo locating species using the area of the development as well as the 'coastal corridor' to the south of the proposed array.		
	Visual sea surveys	Surveys of local grey seal haul out sites along with pup production surveys.		
	Strike detection monitoring	On-going remote monitoring of SeaGen rotor strike detection system. This will provide an incident alarm if there are any collisions with the rotor, with the ability for remote shutdown should a mammal strike be confirmed.		
Ornithology	No monitoring required given the predicted negligible impact and low bird abundance on the site.			
Commercial fisheries	Regular interviews with commercial fishermen	To determine: whether the additional vessel traffic associated with the array has an adverse effect on fishing activity; the status of commercial fisheries in the area relative to current conditions to assess any indirect effects of array; and if the array has had an adverse effect on the use of pots in adjacent waters.		Planned
Shipping and navigation	Review of operation hazards	Regular review of the operation and hazards will be undertaken and any necessary modification to procedures will be carried out.		Planned
Seascape, Landscape and Visual impact assessment	No future monitoring measures are proposed.			