

1 ENVIRONMENTAL EFFECTS METADATA SURVEY FORM

Name of person filing the form (can opt to omit from on-line form)

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Project name: Ocean Plug – Portuguese Pilot Zone

Project description:

Project Developer: ENONDAS S.A.

Technology type: test site

Resource (wave, tidal, wind): wave and wind

Project scale (test site, prototype, array, commercial): demonstration site for prototype, array and commercial scale projects

Installed capacity (MW): 250 MW

Additional Description

Project Website:

<http://www.ren.pt/SiteCollectionDocuments/Investidor/Relat%C3%B3rios%20Anuais/2010/en/Managementreport/ENONDAS.html>

Location:

Ocean/Water body: Atlantic Ocean – Portuguese coastal zone

Closest city: Marinha Grande / Leiria district

Country: Portugal

Coordinates (please use Mercator):

Points	West	North
A	09 00' 5,42"	39 57' 30"
B	09 12' 00"	39 57' 30"
C	09 12' 00"	39 47' 30"
D	09 03' 53,20"	39 47' 30"

Depth: varies between 30 to 90 m

Process status:

The Ocean Plug – Portuguese Pilot Zone is a governmental initiative which started in an inter-ministerial commission for maritime affairs regarding the definition of a National Ocean Strategy further established in the national law (Cabinet Resolution 163/2006 from 12th December). This area has been created to attract demonstration and industrial development to Portugal, to create an industrial cluster associated with wave power, to increase renewable energy production and to promote innovation supported by R&D. The Pilot Zone more recently renamed as Ocean Plug –

Portuguese Pilot Zone, has been designated in the national law in 2008 (Decree-law nº 5 /2008, 8th January), is located in the central part of the country at a distance of about 5 to 8 km from the coast of Leiria district and has an area of about 320 km². In 2008 it was also established (through Decree-law 238/2008 from 15th December) that the Ocean Plug would be granted by the public company REN (Redes Energéticas Nacionais, S. A.) who has further formed ENONDAS the company responsible for its management and operation. The concept behind the Ocean-Plug is somewhat different from other wave energy test sites in Europe since it will allow the technology to evolve from the demonstration to the commercial scale saving time and money in licensing procedures (there will be no need to move for a new location and start a new licensing process). Thus, the Ocean Plug area will be equipped with a test site zone for demonstration projects along with the infrastructures for the installation of commercial projects.

At the moment the legally required geophysical characterization has been carried out and would be finished by the end of August 2012. Collected data would be available through the Ocean Plug website (GIS platform) which would be also available by August 2012. The grid connection infrastructure (subsea hubs, cables and substation) is planned to be available in the demonstration test site area by 2013. The extension of licensing to offshore wind projects has been under study and a change of the current legal context has been planned to be available soon.

Licensing information (brief description):

The access regulation to the area is under development, and will be available soon allowing, in a first stage, the installation of demonstration projects without the need for grid connection. The pilot zone is estimated to be operational and ready to receive the first developers in August 2013.

Key Environmental issues:

The distribution in the area of the sea bird species *Puffinus mauretanicus* (Balearic shearwater) which is classified by the IUCN and Portuguese Red Lists as critically endangered (CR); and the distribution in the area of the species *Calonectris diomedea* (Cory's shearwater) which is classified as vulnerable (VU) in the Portuguese Red List. There is a conditional compatibility of ocean energy projects with sea bird conservation purposes, although the potential for the enhancement in food availability due to fisheries reduction is considered a very positive impact harmonized with general conservation objectives.

The preliminary analysis of the sediment quality showed a vestigial to slight contamination of the northern zone with Arsenic.

Environmental webpage: Not available.

Baseline and project effects studies:

General description

The summary of the surveys presented below corresponds to the preliminary report of the campaigns conducted by oceanographic ships between may and November 2011.

Receptor	Study description including question and/or objective	Design and methods	Results	Status
Physical environment	Hydrographic survey for bathymetry validation	The survey was made between 28 th May and 25 th June 2011 with multi beam sonar system following the S-44 "Standards for Hydrographic Surveys" (OHI)	Spatial data files which will soon be available through the internet.	Completed
	Geophysical survey	Was made simultaneously High-power, low-frequency, wide-band Sub-Bottom Profiler (SBP)	Spatial data files which will soon be available through the internet	Completed
	Oceanographic parameters	Wave climate (wave height, period, direction, power, temperature, pH)	Series of data have been obtained and will be soon available through the internet	Completed
	Water Quality	Analyses were made to evaluate the following parameters: temperature, pH, dissolved oxygen, salinity, suspended particulate matter, hardness, phaeopigments, chlorophyll (a, b and c), nutrients (NO ₃ , NO ₂ , NH ₄ , PO ₄ , SiO ₂), heavy metals (As, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Zn), oil and grass (O&G) and PAHs.	Analysis under way	Ongoing
	Superficial sediments characterization	Analyses were made to evaluate the following parameters: pH, nutrients (NO ₃ , NO ₂ , NH ₄ , PO ₄ , SiO ₂), heavy metals (As, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Zn), oil and grass (O&G) and PAHs.	Nutrients: concentrations are not homogeneous along the area being higher in the northern area. Heavy metal contamination: concentrations are not homogenous through the area but are generally lower closer to the coast. There's a vestigial / slight contamination with Arsenic. PAHs: No contamination with these compounds was detected.	Completed
Large vertebrates	Large vertebrate (marine mammals and other) observations for	Visual observations in parallel transects distancing about 800m from each	Cetaceans: only common dolphin (<i>Delphinus delphis</i>) has been observed in the study area during the campaign period. Dolphins have	Completed

	baseline characterization	other, covering all site area; daily observations of about 12h. The campaign run from 30th May to 20th June 2011.	been observed in groups of five or less individuals. Other large vertebrates: occasional observations of marine turtles (<i>Caretta caretta</i>) have been registered.	
Birds	Sea birds visual observations for baseline characterization	Visual observations in parallel transects distancing about 800m from each other, covering all site area; daily observations of about 12h. The campaign run from 30 th May to 20 th June 2011 and following standard European methodologies and criteria for the study of sea birds.	15 different sea bird species have been observed. The most frequent and abundant in the area were: Balearic Shearwater (<i>Puffinus mauretanicus</i>), Gannet (<i>Morus bassana</i>), Cory's Shearwater (<i>Calonectris diomedea</i>) and Yellow-legged Gull (<i>Larus michahellis</i>). All together these species represented about 96% of the sea birds observed in the study area. No specific distribution patterns have been observed for these species. However the Yellow-legged Gull, the most abundant species has been observed predominantly in the NW zone of the study area; and the Balearic Shearwater has a regular presence in the closest transects to the coast. <i>Puffinus mauretanicus</i> (Balearic shearwater) is classified by the IUCN and Portuguese Red Lists as a critically endangered (CR) species; and <i>Calonectris diomedea</i> (Cory's shearwater) is classified as a vulnerable (VU) species in the Portuguese Red List. Potential impacts of the use of the area for sea bird species conservation: - Habitat interference - Barrier effect and collision risk - Fisheries reduction in the area and potential for the increase in food availability for all sea birds in the area	Completed
Reports and papers	The ocean plug reports are currently available through the SOWFIA data management platform (http://sowfia.hidromod.com/) but will be also available through the test site website which is going to be available in August 2013			
Research projects	No environmental research projects are currently planned for the site.			