

## ADMIRALTY INLET PILOT TIDAL PROJECT

Name of person filing the form

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Date submitted

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Project name: Admiralty Inlet Pilot Tidal Project

Project description

*Project Developer:* Public Utility District No. 1 of Snohomish County, Washington

*Technology type:* Axial flow turbine

*Resource:* MHK (tidal)

*Project scale:* array of devices

*Installed capacity (MW):* 1 MW

*Additional Description:* Project would consist of: **Phase 1** – two 10 m, 500 kW Open-Centre Turbines supplied by OpenHydro Group Ltd. mounted on completely submerged gravity foundations; **Phase 2** – two 250 m service cables connected at a subsea junction box or spliced to a 0.5 km subsea transmission cable, connecting to a cable termination vault about 50 m from shore; **Phase 3** – two 81m long buried conduits containing the two DC transmission lines from the turbines and connecting to a power conditioning and control building; **Phase 4** – a 140 m long buried cable from the control building to the grid; and **Phase 5** – appurtenant facilities for operation and maintenance. The estimated annual generation of the project is 383,000 kW h.

*Project Website:* <http://www.pstidalenergy.org/>

Location: east side of Admiralty Inlet in Puget Sound, Washington, about 1 kilometre west of Whidbey Island, entirely within Island County, Washington.

Process status: On June 30, 2010, the District informed the Commission that, through facilitated discussions, it had resolved many of the outstanding disputes (adequacy of baseline information for aquatic resources, installation and operation protective measures for SRKW, and a timeline for the development of monitoring plans and an adaptive management process). The PUD proposed to file a file license application by October 31, 2010, but staff's additional information request requires more time to complete. The PUD intended to file most of the information staff requested with the final license application, but staff needs the information to grant the waivers and complete is environmental analysis. An updated schedule and extension to time to respond to staff's AIR is expected soon. In a best-case scenario, installation will begin sometime in 2012 and be completed later in the year.

Licensing information: Pilot licensing procedure; December 28, 2009 – [Draft Application](#) filed; March 4, 2010 – [Notice of Technical Meeting](#) issued; April 12, 2010 – [Transcript of Technical Meeting](#) issued; May 6, 2010 – [Letter Modifying Pre-filing Schedule](#) issued; July 8, 2010 – [Successive Preliminary Permit](#) issued; August 6, 2010 – [Additional Information Request](#) issued; January 3, 2011 – Snohomish County

PUD No. 1 Progress Report #1; July 7, 2011 – Snohomish County PUD No. 1 Progress Report #2; December 30, 2011 - Snohomish County PUD No. 1 Progress Report #3; March 1, 2012 – Final License Application of Public Utility District No.1; April 19, 2012 – Structural Design and OpenHydro Tidal Technology Preliminary Design Report for Snohomish County PUD No. 1;

Environmental survey issues: Major issues: (1) harm due to blade strike on southern resident killer whale (SRKW) and listed salmon and steelhead, (2) noise disturbance and displacement of SRKW; (3) electromagnetic field (EMF) effects on SRKW and listed rockfish; (4) habitat alteration for listed rockfish; and (5) navigation impairment by towboats. Licensing as a pilot project will likely hinge on getting a no jeopardy biological opinion from NMFS, which will require that the project be able to detect and avoid any harmful interaction with the SRKW.

Baseline and project effects studies: Admiralty Inlet pilot tidal project				
General description		Studies conducted in development of DLA		
Receptor	Study description	Design and methods	Results	Status
Physical environment	Underwater noise studies (Appendix O)	Deployed underwater noise measuring equipment in proposed project area. Modelling of anticipated underwater noise effects using ambient data collected from project site conditions together with noise outputs of a similar Open Hydro 10-meter turbine in the Bay of Fundy and its 6-meter turbine at EMEC facilities to determine anticipated pilot project acoustic effects on marine mammals.	When taken in the context of pre-installation ambient noise, the noise from turbine operation is not likely to be routinely detected by marine animals at distances greater than a few hundred meters from the project.	Completed
Benthos	Characterization of benthic substrate and habitats. (Appendix L-8)	Observations made aboard the support vessel and barge using Global Diving's Remotely Operated Vehicle (ROV) <i>Seaeye Cougar-XT</i> .	Based on these observations and organism counts it appears that the turbine site can be characterized as a coarse-grained, cobble, pebble, boulder habitat for encrusting organisms and Sculpin, although some rockfish appear to use the habitat as well. Epifauna such as sunfish and urchins also use the habitat.	Completed

Fish and Fisheries	Hydro-acoustic fisheries investigations	Mobile hydro-acoustic surveys to determine fish densities in deployment area. Also deployed acoustic tag receiver on the seabed to collect information on presence and use of the project area by tagged species, such as the federally listed green sturgeon and several salmon species.	Preliminary results indicate minimal to moderate use of deployment area by fish; however, methods do not allow determination of use by species.	Completed
	The effects of turbine noise on Chinook Salmon. (Appendix P)	Test organisms were collected and exposed to a range of sounds associated with turbine noise. Fish were assessed at four different time points for tissue damage and changes in hearing sensitivity.	Overall, the sound level from this study would be an extreme exposure situation for migrating Chinook salmon and the results indicated low levels of tissue injury and no effects on hearing.	Completed
Marine mammals	Southern resident killer whale (SRKW) observations (Appendix L-7)	Shore and boat-based observations, coupled with acoustic monitoring of whale echolocation using hydrophones, to determine timing and extent of use of the federally listed endangered SRKW in deployment area.	There were an average of 60.5 whale days per year in Puget Sound from 2001-2008, and 70% of these whale days were concentrated in the months of October through January.	Completed
Marine Uses / Users	Assessment of Marine Safety Risk (Appendix L-13, page 26)	2010 AIS tracking statistics used to analyze frequency of ship collisions. Proximity to shipping lanes and the presence of commercial fishing or recreational diving also explored.	The District's tidal energy project should present little or no hazard to Puget Sound navigation safety.	Completed
Other	Water Quality (Appendix L-5)	A combination of survey cruises and bottom-mounted instrumentation have been deployed in Admiralty Inlet in the region surrounding a prospective tidal energy device deployment.	Measurements and comparison to longer time series indicate significant temporal variability in water quality on tidal, seasonal, and annual time scales. Depending on the season, there may be considerable vertical variations.	Completed
Reports or papers	<ul style="list-style-type: none"> <li>• <a href="http://www.snopud.com/Site/Content/Documents/tidal/ai_final/AppK_KillerWhaleStrike.pdf">http://www.snopud.com/Site/Content/Documents/tidal/ai_final/AppK_KillerWhaleStrike.pdf</a></li> <li>• <a href="http://www.snopud.com/Site/Content/Documents/tidal/ai_final/AppP_%20Turbi">http://www.snopud.com/Site/Content/Documents/tidal/ai_final/AppP_%20Turbi</a></li> </ul>			

	<ul style="list-style-type: none"> <li><a href="#">neNoise.pdf</a></li> <li><a href="http://www.snopud.com/Site/Content/Documents/tidal/ai_final/AppO_TidalTurbineNoise.pdf">http://www.snopud.com/Site/Content/Documents/tidal/ai_final/AppO_TidalTurbineNoise.pdf</a></li> </ul>
<b>Research projects</b>	N/A

<b>Monitoring and adaptive management: Admiralty Inlet pilot tidal project</b>				
<b>General description</b>				
Post-license monitoring plans				
<b>Receptor</b>	<b>Study description</b>	<b>Design and methods</b>	<b>Results</b>	<b>Status</b>
Benthos	Changes in the benthic habitat (Appendix B, page 2)	Observations will be taken of six sampling sites and the two turbine sites with a Remotely Operated Vehicle (ROV). Fish abundance and size will also be recorded.	Not available yet.	Planned
Fish and Fisheries	The effects of turbine noise on Chinook Salmon. (Appendix P, section 7.0)	Experiments similar to those completed on the Chinook Salmon will be performed on a local physoclistous species for evaluation of physiological response to exposure from tidal turbine sound. The leading candidate at this time is a rockfish because they are likely to live in close proximity to the turbines.	Not available yet.	Planned
Marine mammals	Marine mammal and fisheries interactions	Post-deployment monitoring using multi-beam acoustic camera and lighted video to detect and observe marine species interactions between pilot project turbines and fish/marine mammals; deployment of digital broadband hydrophone that allows real-time measurement of turbine noise and collection of marine mammal use of project area. Details of monitoring plans still under agency consultation and review. SRKW protection plans tied to Pacific Northwest National Lab efforts to define monitoring protocol.	Not available yet.	Planned
Other	Measure of Water Quality (Appendix D)	Turbidity, spills, leaching, conductivity, temperature, dissolved oxygen, and pH will be monitored during all stages of construction and operation.	Not available yet.	Planned
<b>Reports or papers</b>	-			
<b>Research projects</b>	-			