Grand Passage 700 kW MRE Permit Application

12.0 SUPPORTING DOCUMENTS

Project Overview

Sustainable Marine Energy (Canada) Ltd. (SMEC) is proposing an electrical grid-connected tidal energy project at Grand Passage, located between the communities of Westport and Freeport in Digby County, Nova Scotia. The project will begin with the connection of the PLAT-I 4.63 tidal energy platform (outfitted with 4 tidal turbines) that is currently installed at Grand Passage to the Nova Scotia electrical grid in spring 2020 (shown in Figure 1). This will be followed by the installation of a second PLAT-I device near the current location of PLAT-I 4.63. The second device, a PLAT-I 6.40, will be similar in size to PLAT-I 4.63 with 6 tidal turbines and a larger generating capacity. Both devices will be connected to the electrical grid via a subsea cable grid. The proposed demonstration will be the first electrical grid-connection of the PLAT-I technology in the world.

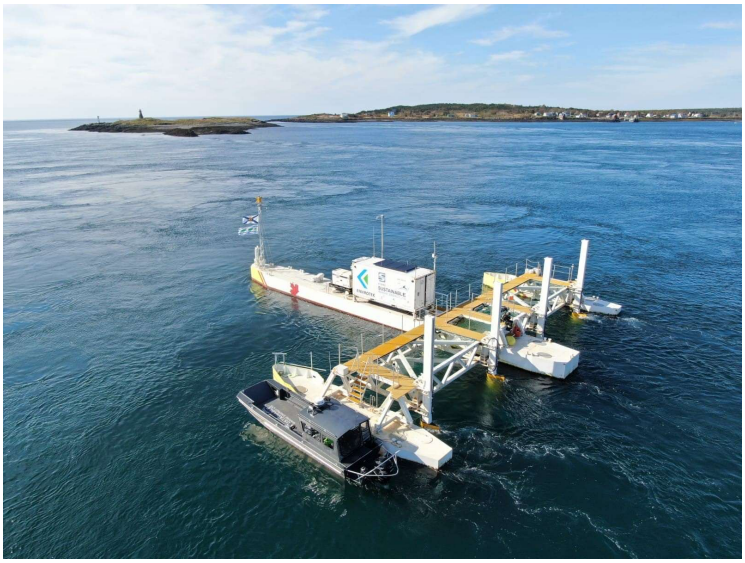

Figure 1: PLAT-I installed at Grand Passage with SMEagol Service Vessel

SMEC proposes to install the two PLAT-I devices at the locations shown on the map (Figure 2). This location has the great advantage of having strong tidal currents but also allowing easy access to the platform. The easy access will help technicians and engineers monitoring the device and allow SMEC to provide tours to stakeholders.

The PLAT-I system consists of a single, slender hull with a perpendicular bridge located near the stern and supported by two outriggers. The PLAT-I 4.63 unit is equipped with four 6.3m-diameter turbines, and a PLAT-I 6.40 unit is equipped with six 4.0m-diameter turbines. The turbines are located along the bridge, mounted on retractable turbine support structures. This innovative feature allows rapid, cost-effective access to the turbines at site for routine inspection and maintenance.

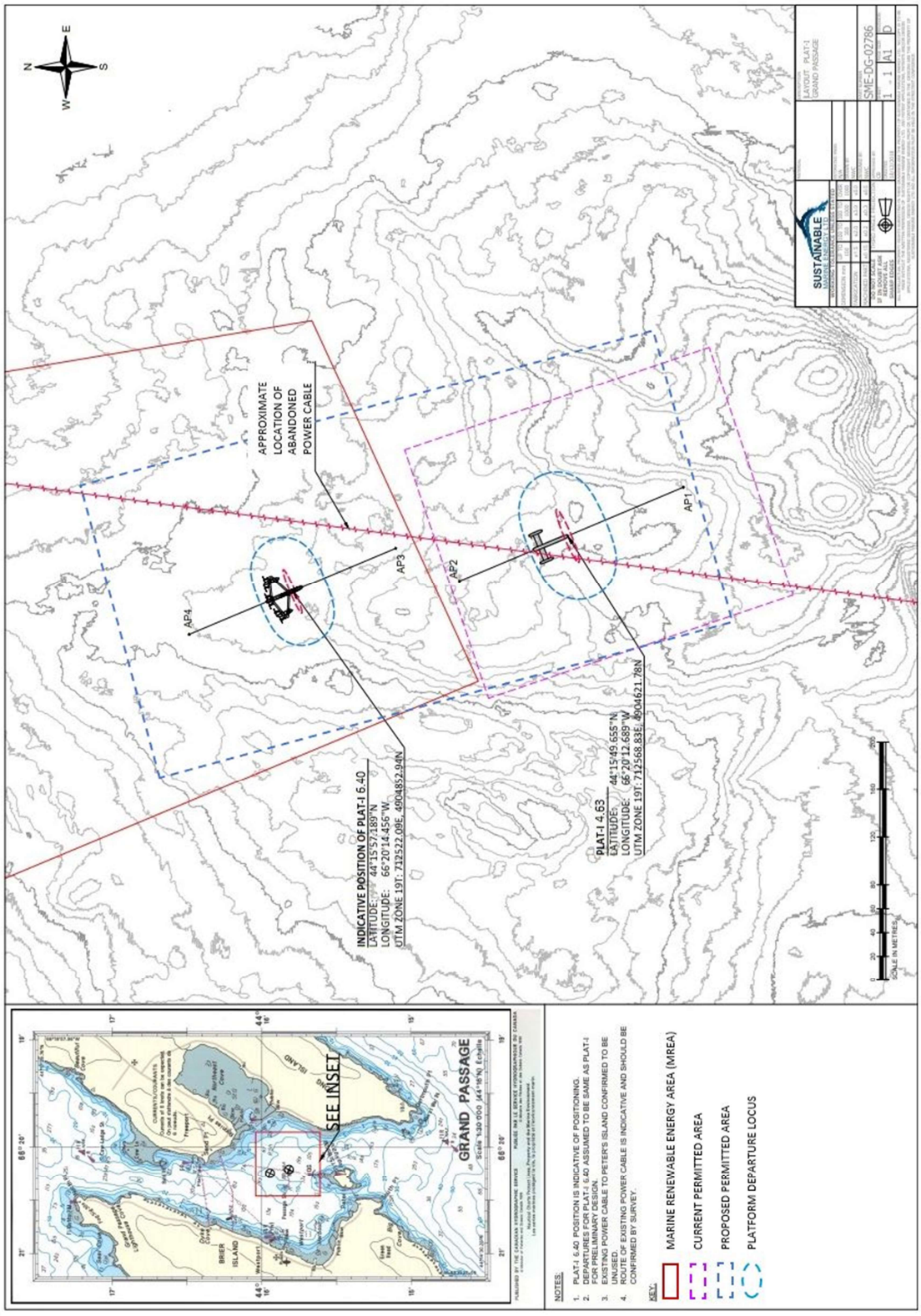

Figure 2: Map showing proposed project layout

Within the tidal energy industry, floating tidal energy platforms offer lower operating and maintenance costs when compared with seabed-mounted concepts. This is due to both the accessibility of the turbines and electrical systems (less downtime, easier preventative maintenance, lower repair costs and increased operational hours), and the practical design (fewer repairs, easier maintenance).

Through this project SMEC intends to continue its progressive development of community and utility-scale floating tidal energy devices that can be installed in rivers and tidal currents around the world to provide clean, renewable electricity for remote communities, industrial facilities, and utilities.

TECHNOLOGY

PLAT-I 4.63

The PLAT-I 4.63 is 32m long, with a beam (width) of 27m, and hosts four SIT250 turbines. The platform's modular design can be broken down for shipping and assembled close to site, the shallow draft configuration also permits launch and tow out with limited port infrastructure. The trimaran design of the platform was designed to provide low resistance and enhanced stability.

A mooring turret located near the bow of the PLAT-I allows the platform to passively rotate 360 degrees with the natural water currents and align with the flow. The turbines have been configured for maximum power extraction in shallow water channels and have a swing-up mechanism that allows easy access for maintenance.

PLAT-I 6.40

The PLAT-I 6.40 is 30m long trimaran with a beam (width) of 27m. Like the PLAT-I 4.63, the PLAT-I 6.40 pivots on a turret connected to a two-point mooring spread and passively aligns with the natural flow of the tidal currents. The structure is largely constructed from high tensile steel and modular to allow for easy assembly.

The mooring system for PLAT-I consist of two drag embedment anchors. Stud link mooring chains are connected to each anchor and to the base of the turret at the bow of the platform. The mooring spread holds the turret in a geostationary position while simple aluminium bronze bearings allow the platform to freely yaw around the turret and align with the flow.

PLAT-I 6.40 is equipped with six SIT250 turbines with 4m diameter rotors and is rated at 420kW electrical power in 2.7m/s of tidal current. Swing-up SIT Deployment Modules (SDMs) allow maintenance to the SITs at the water surface for inspection and maintenance. Overload relief allows the turbines to kick-up to reduce loading on the platform and mooring spread in extreme conditions. The same kick-up system allows for trapped debris to be cleared and for protection of the turbines against ice impact.

The electrical power produced by the individual turbines is conditioned onboard in the mid-section of the centre hull. An onboard transformer steps up the voltage before it is exported off the platform via the dynamic export cable running through the centre of the turret to the seabed. A simple slip ring on

top of the turret allows for electrical and fibre optic passes from the PLAT-I 6.40 to the export cable and prevents twisting of the export cable as the platform turns with each ebb and flood tide.

Grid Connection

Cables from both devices will be connected to a subsea cable via an underwater junction. The subsea cable will convey electrical energy to switching gear housed in an on-shore cabinet and then to a pole-mounted electrical transformer and the Nova Scotia electrical grid.

ENVIRONMENTAL EFFECTS MONITORING PROGRAM

PLAT-I's Environmental Effects Monitoring Program (EEMP) is a fundamental part of SMEC's project. The EEMP for this project will build on the results of the demonstration undertaken by SMEC at Grand Passage in late 2018 and early 2019. SMEC will continue to monitor turbine performance and marine animal activity in the vicinity of the device, while working with Nova Scotian and international researchers to test new technologies and methods for evaluating marine animal behavior around tidal energy devices. The fact that the PLAT-I is a floating platform means that sensors can be easily accessed, which is a great advantage for research and development of effective environmental monitoring systems. The results of this work will be openly provided to regulators, indigenous groups, fishers, and the public.

PARTNERS

Prior to installation, Nova Scotia companies will be engaged in site assessment, permitting and planning for the project. This will include professional services such as mechanical and electrical engineering, marine geoscience, permitting, and legal and financial services. Local companies will be engaged in all aspects of this work including various trades contractors in the assembly and testing of the PLAT-I, and marine services companies in marine operations.

Throughout the project SMEC will maintain its Halifax-based team and augment that team with field technicians who will be stationed at Grand Passage to operate, monitor and maintain the platform.

More than 30 Canadian companies have been contracted by SMEC since its inception in 2013, and many have approached SMEC about getting involved. This project will contribute to the training of highly qualified personnel in specialized areas related to tidal energy. As further PLAT-I units are built and installed in additional locations, many jobs will be created in Canada with the fabrication of the platforms, marine operations, maintenance of the platforms and in overall management positions.

SCHEDULE

SMEC proposes to connect the PLAT-I 4.63 that is currently installed at Grand Passage to the electrical grid in spring 2020. Meanwhile, fabrication of PLAT-I 6.40 will begin in early 2020, with launch, installation and commissioning taking place in mid-2020.