



**System Impact Study Report
Report GIP-IR516-SIS-R0**

**Generator Interconnection Request #516
5 MW Tidal Generating Facility
Cumberland County, NS**

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Executive Summary

This report presents the results of a System Impact Study (SIS) for a proposed 5 MW tidal turbine generating facility interconnected to the NSPI transmission system. The study analysed the impact the proposed development would have on the NSPI power grid. System studies, including short circuit, power factor, voltage flicker, steady state, stability, Bulk Power System analysis, under-frequency operation, low voltage ride through and loss factor were performed. NSPI and NPCC planning criteria were applied.

This tidal facility will be interconnected to the 69kV substation 37N-Parrsboro. Transmission line L-5550 serves to transmit power from the 30N-Maccan substation to the 37N-Parrsboro substation and is designed to 138kV specifications but it is presently operated at 69kV. Therefore, transmission facility upgrades associated with the generator interconnection must also be built to 138kV standards to accommodate future system upgrades to 138kV in this area. One new 69kV circuit breaker will be required at 37N-Parrsboro substation complete with associated switches and protection. These facilities must be designed to be capable of future 138kV operation.

The increase in short circuit levels are within the capability of the associated breakers in the vicinity of 37N-Parrsboro. There are no concerns with regard to increased short circuit levels. Reactive power capability of the generating facility was not provided by the IC. This SIS estimates that, proposed generating facility should be capable of delivering approximately 1.8 MVAR and absorbing 1.4 MVAR of reactive power. Voltage flicker was not calculated due to insufficient generator data. However, the IC is expected to meet NSPI's requirement for voltage flicker and harmonic distortion.

Increased generation from this newly proposed generation facility will not have any significant adverse impact on the local transmission. No thermal loading violations were found under normal states and single contingency conditions. Stability analysis was not performed as a dynamic model for the generator was not available at the time of the study. However, this 5 MW of inverter based generation is not expected to cause system instability. Interconnecting substation 37N-Parrsboro is not classified as part of the Bulk Power System. IC is required to meet the requirements of Low Voltage Ride Through and Under Frequency operation. The system loss factor for this facility is -2%. This SIS identifies a risk of this generating facility being islanded with NSPI customers for certain contingencies. Hence, an anti-islanding scheme needs to be installed.

The total high level estimated cost for Interconnection Costs and Network Upgrades is \$1,650,000. As there are two generating facilities utilizing these interconnection facilities and Network Upgrades (IR #516 and IR #517), both IC's will share these costs equally (\$825,000 each). However, should IR#517 not proceed, then IR #516 will become responsible for the entire amount. The Facility Study will provide a more detailed cost estimate. All costs of associated facilities required at the Interconnection Customer's substation and generating facility are in addition to this estimate.