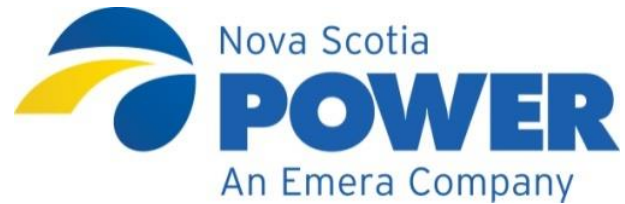


NOVA SCOTIA POWER INC.

TRANSMISSION & DISTRIBUTION ENGINEERING DEPARTMENT



**FACILITIES STUDY INFRA-STRUCTURE REPORT
FOR**

**IR#516 – BLACK ROCK HYDRO: Establishing a 69 kV System Interconnection at
37N- Parrsboro Substation for 90N – FORCE Substation – Addition of 5MW of
Tidal Generation**

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Date: June, 2015

Rev. 0: 2015-07-22

Executive Summary

This study outlines the requirements to establish a 69 kV system connection for a 5 MW tidal powered generation facility (IR 516) located on the West Bay Rd. outside the town of Parrsboro.

The Point-of-Change-in-Ownership (POC) is at the line terminal structure at 90N-FORCE Substation. The defined Point-of-Interconnection (POI) will be the existing 69 kV bus at NSPI's 37-N Parrsboro Substation. The existing line between 37N and 90N has been built to 138 kV but is currently operating at 25 kV. Therefore, it does not require any upgrades other than being turned into a new 69 kV bay at 37N.

NSPI will be installing revenue metering at the POI. At 90N, revenue metering is required for each individual berth holder connected to the 13.8 kV switchgear as well as the station service supply. The facility for remote interrogation of the revenue meters shall be provided by the Interconnection Customer (IC).

NSPI is responsible for supplying and installing the 69 kV additions, all primary equipment, protection and control, and telecommunications equipment required between 37N and 90N as well as 37N to 30N-Maccan, 74N-Springhill and Ragged Lake (RAL). NSPI will also be responsible for the new SCADA RTU and the final line connections at 37N to affect the 69 kV operation of the existing line to 90N coincident and coordinated with the associated upgrades at 90N. As a result, NSPI will review the protection control at 90N as it pertains to the interconnection to the system.

Adding a new 69 kV line terminal requires a small expansion, approximately 600 m² to the existing substation area. It also requires one 69/138 kV circuit breaker, two 69/138 kV disconnect switch structures, six 69/138 kV bus support structures, one of 3-ph 69 kV revenue metering combo PT/CT support structure, 3-ph lightning arrester support structure, 1-ph PT support structure, and 3-ph PT support structure. A control building and associated trench/conduit to new equipment in the substation yard, and a radio tower is needed as well.

The primary equipment that are necessary to be added to 37N are one 138 kV, 1200 A, 650 kV BIL, SF⁶ circuit breaker, two 138 kV, 1200 A, 350 kV BIL, alum vertical break disconnect switches (1 to have integral ground disconnect), three 69 kV 1-ph revenue metering PT/CT combo units, three 60 kV (48 kV MCOV) station class lightning arresters, three 69 kV bus PTs, and one 69 kV line PT.

Tele-protection facilities shall be installed at 90N and 37N to provide line differential, transfer trip and permissive trip channels to 37N and breaker status to 37N, 30N, and 74N, and to 90N, respectively. Tele-protection facilities at 90N and 37N shall also receive transfer trip from 37N, 30N, and 74N, and transfer trip and permissive trip to 90N as well as 30N, respectively. Islanding protection shall be installed at 37N and L-5029 to transfer trip the 90N generation when the 69 kV breaker 37N-582 and the L-5550/L-5029 breaker 30N-529 is opened while breaker 30N-579 remains closed. The islanding and reclosing logic will require the status of the 90N Substation breaker. Protection facility upgrades at 30N and 74N shall be installed as necessary to facilitate islanding protection.

To serve both SCADA and tele-protection requirements, NSPI will establish new communication links between the 90N and 37N, and NSPI's Energy Control Center at RAL via NSPI's existing radio site at Kirkhill.

The estimated cost of this project is \$1,728,832.00 (including AO, HST excluded).

The expected In-Service date for IR 516 is Nov. 15, 2016.