BC Hydro
Power smart

6911 Southpoint Drive (B03)
Burnaby, BC
V3N 4X8

July 30, 2024

[redacted]

[redacted]

[redacted]

RE: CEAP IR 28 - Fort George 2 200MW Generation Station Project - Interconnection Feasibility Study Report

Enclosed is the Interconnection Feasibility study report for the proposed Fort George 2 200MW Generation Station Project submitted under Attachment M-2: Transmission Service and Interconnection Service Procedures for Competitive Electricity Acquisition Process (CEAP) of the Open Access Transmission Tariff (OATT). This letter provides a non-binding good faith estimate of the cost and time to construct the facilities required to interconnect your project to BC Hydro's Transmission System, being the Network Upgrades, based on the findings of the Interconnection Feasibility study.

Open Access Transmission Tariff

The OATT defines Network Upgrades as additions, modifications, and upgrades to BC Hydro's Transmission System required at or beyond the Point of Interconnection to accommodate the interconnection of the Generating Facility to the BC Hydro's Transmission System. Pursuant to the OATT, BC Hydro will design, procure, construct, install, and own the Network Upgrades. While BC Hydro will pay the costs for the Network Upgrades, the Interconnection Customer provides security for such costs.

Cost Estimate

Based on the Interconnection Feasibility study, the non-binding good faith estimated cost (typical accuracy range of +150%/-50%) for Network Upgrades required to interconnect your project is $15.0 M.

Major Scope of Work Identified:

- Supply and install 230kV structures, conductors and disconnect switches for tap connection on 2L97
- Supply and install microwave tower, waveguides, antennas, and other required telecommunications equipment
- Supply and install protection relays and other required protection equipment

Exclusions:

- GST
- Right-of-Way or Property costs
- Permits

Key Assumptions:

- Construction will be done by contractor
- 2 years of construction is considered
- Early Engineering and Procurement
- No station work required
- No piles or ground improvements will be required
- No contaminated soil will be encountered during construction

Key Risks:

- Additional Right of Way or acquisition of more property may be required
- Transmission routing may be different than assumed, including number of disconnect switches and structure types may change
- No defined supply chain strategy, construction costs may increase depending on delivery method.
- Project schedule may be longer than expected, leading to increase costs
- Costs may be affected by market conditions and escalation

Please note that the Revenue Metering requirements and associated costs required to interconnect your project have not been determined at this stage and, therefore, not included in the above estimate. Revenue Metering costs that are attributable to the Interconnection Customer are to be paid in cash. For more details on Revenue Metering requirements and responsibilities, please refer to:

https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/distribution/standards/ds-rmr-complex-revenue-metering.pdf.

Schedule

Based on the Interconnection Feasibility study, the non-binding good faith estimated in-service date for your project's Network Upgrades is Quarter 4 2030 (calendar year). To achieve this timeline, we may need to expedite certain activities, including engineering design and procurement of long-lead equipment.

Timely actions required from you to minimize risks to the schedule:

- Submission of additional technical data required for the System Impact Study and Facilities Study
- Submission of any required information or document such as demonstration of Site Control
- Execution of Combined Study Agreement and Standard Generator Interconnection Agreement
- Financial commitments and securities

Please note that changes to your interconnection request, delays in data submission, or financial commitments may also impact the target in-service date.

Next Steps

In September 2024, we will issue a final invoice for the Feasibility Study costs. This invoice will reflect the total amount due, taking into account the $15,000 Feasibility Study deposit you have already paid and any remaining amount on the non-refundable $15,000 Interconnection request deposit that we did not spend in reviewing and validating your interconnection request.

If you have any questions, please contact the BC Hydro CEAP Team at ceap2024@bchydro.com.

Sincerely,

Senior Manager, Transmission Interconnections

BC Hydro

Encl.: CEAP2024_IR_28_Fort George 2 200MW Generation Station_FeS_Report_final.pdf

[redacted]

Fort George 2 – 200 MW Generation Station

Interconnection Feasibility Study

BC Hydro EGBC Permit to Practice No: 1002449

2024 CEAP IR # 28

Prepared for: [redacted]

[redacted]

Report Metadata

Header:	Fort George 2 – 200 MW Generation Station
Subheader:	Interconnection Feasibility Study
Title:	Fort George 2 – 200 MW Generation Station
Subtitle:	2024 CEAP IR # 28
Report Number:	850-APR-00008
Revision:	0
Confidentiality:	Public
Date:	2024 Jul 30
Volume:	1 of 1

Prepared for:

[redacted]

Related Facilities:	Williston Substation (WSN), 2L97
Additional Metadata:	Transmission Planning 2024-049 Filing Subcode 1350

Revisions

Revision	Date	Description
0	2024 Jul	Initial release

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Executive Summary

[redacted] the interconnection customer (IC), requests to interconnect its Fort George 2 - 200 MW Generation Station Project (2024 CEAP IR # 28) to the BC Hydro (BCH) system. Fort George Biomass Generation Project has five (5) synchronous generators adding a total capacity of 200 MW into the BC Hydro system. The Point of Interconnection (POI) is at a new tap structure on BC Hydro 230 kV line 2L97 approximately 14 km from Salmon Valley (SVY) substation and connected back to customer site via 1 km customer built 230 kV line. The IC's proposed commercial operation date (COD) is October 30, 2030.

To interconnect the Fort George 2 - 200 MW Generation Station Project and its facilities to the BCH Transmission System at the proposed POI, this Feasibility Study has identified the following conclusions and requirements:

1. The T-tap connection on the BCH's existing circuit 2L97 is acceptable for interconnecting the IC's generating project to the BCH system.

2. At the POI, BCH will design and build the tap that will include a tap structure and a switch structure on the tap side. A 253kV rated disconnect switch will be installed to isolate the IC's facilities from the BCH system. Additional Right-of-Way (ROW) may be required to accommodate the tap.

3. The connection of Fort George 2 - 200 MW Generation Station Project does not cause any performance violation (i.e. thermal overload, voltage performance violation or voltage stability concern) under system normal and single contingency conditions.

4. Fort George 2 - 200 MW Generation Station will be islanded with SVY substation for the contingencies such as no-fault opening 230 kV line 2L97 at Williston (WSN) 230 kV bus, loss of both WSN T2 and T4, and loss of both WSN T6 and T7. An Anti-islanding Transfer Trip Scheme is required to trip the entrance circuit breaker of the IC under this potential islanding scenario. Also, the IC is required to install anti-islanding protection within their facility to disconnect the biomass plant from the grid when an inadvertent island with the local loads forms.

5. BC Hydro will provide line protection relays as the replacement of those on the existing line 2L97 at WSN and SVY (BC Hydro ends only). As part of the line protection for the new line, telecommunication facilities will be

required for each of the three substations. The IC shall provide required relays, telecom facility and associated equipment at its facilities to accommodate the new protection schemes.

6. As per the operating order 3T-KDS-01, this Feasibility Study assumes that the line 1L365, the substation SVY, and 2L97 with the IC will only connect radially to the WSN 230 kV bus.

The above conclusions are made based on the IC's input data and study assumptions listed in Section 4, which represent the best available information on May 22, 2024.

A non-binding good faith estimated cost and time to construct the Network Upgrades required to interconnect the proposed project will be provided in a separate letter to the IC.

Contents

Appendices

Acronyms

The following are acronyms used in this report.

BCH	BC Hydro
WSN	BC Hydro Williston Substation
SVY	BC Hydro Salmon Valley Substation
CEAP	Competitive Electricity Acquisition Process
COD	Commercial Operation Date
DTT	Direct Transfer Trip
ERIS	Energy Resource Interconnection Service
FeS	Feasibility Study
FVO	Fraser Valley Office
IBR	Inverter-Based Resources
IC	Interconnection Customer
LAPS	Local Area Protection Schemes
MPO	Maximum Power Output
NERC	North American Electric Reliability Corporation
NRIS	Network Resource Interconnection Service
OATT	Open Access Transmission Tariff
POI	Point of Interconnection
RAS	Remedial Action Scheme
SIO	South Interior Office
TIR	BC Hydro “60 KV to 500 kV Technical Interconnection Requirements for Power Generators”
TBR	Tabor Microwave Station
WECC	Western Electricity Coordinating Council

1 Introduction

Table 1-1 below summarizes the project reviewed in this Feasibility Study.

Table 1-1 Summary of Project Information

Project Name	Fort George 2 - 200 MW Generation Station Project	
Name of Interconnection Customer (IC)	[redacted]	
Point of Interconnection (POI)	A new Tap structure on 230 kV line 2L97	
IC's Proposed COD	30 October 2030	
Type of Interconnection Service	NRIS ☒	ERIS ☐
Maximum Power Injection [1] (MW)	200 MW (Summer)	200 MW (Winter)
Number of Generator Units	5 x 40.0 MW	
Plant Fuel	Biomass	
Note 1: The maximum achievable power injection at the POI is approx. 195 MW after accounting for MW losses and service load which matches with the IC proposed value.		

[redacted] the interconnection customer (IC), requests to interconnect its Fort George 2 - 200 MW Generation Station Project (2024 CEAP IR # 28) to the BC Hydro (BCH) system. Fort George Biomass Generation Project has five (5) synchronous generators adding a total capacity of 200 MW into the BC Hydro system. The proposed Point of Interconnection (POI) is at a new tap structure on the BC Hydro 230 kV line 2L97 approximately 14 km from Salmon Valley (SVY) substation and connected back to customer site via 1 km customer built 230 kV line. The IC's proposed commercial operation date (COD) is October 30, 2030.

Figure 1-1 shows the Central Interior Regional transmission system diagram. Williston substation (WSN) is a major substation in this area with two 500/230 kV transformers (WSN T2 and WSN T4). Salmon Valley substation is supplied by a 230 kV line 2L97 from WSN 230 kV bus. Another 230 kV line 2L96 from WSN 230 kV system connects with Barlow Substation (BLW) to supply loads in the CI regional system. With connection of the IC'S project, less supply is required from WSN 500 kV for local area loads.

SVY substation has three 230/138 kV transformer and supplies loads at Mcewan (MWN) substation via 138 kV line 1L365. Line 1L365 is normally open (N.O.) at KDS substation.

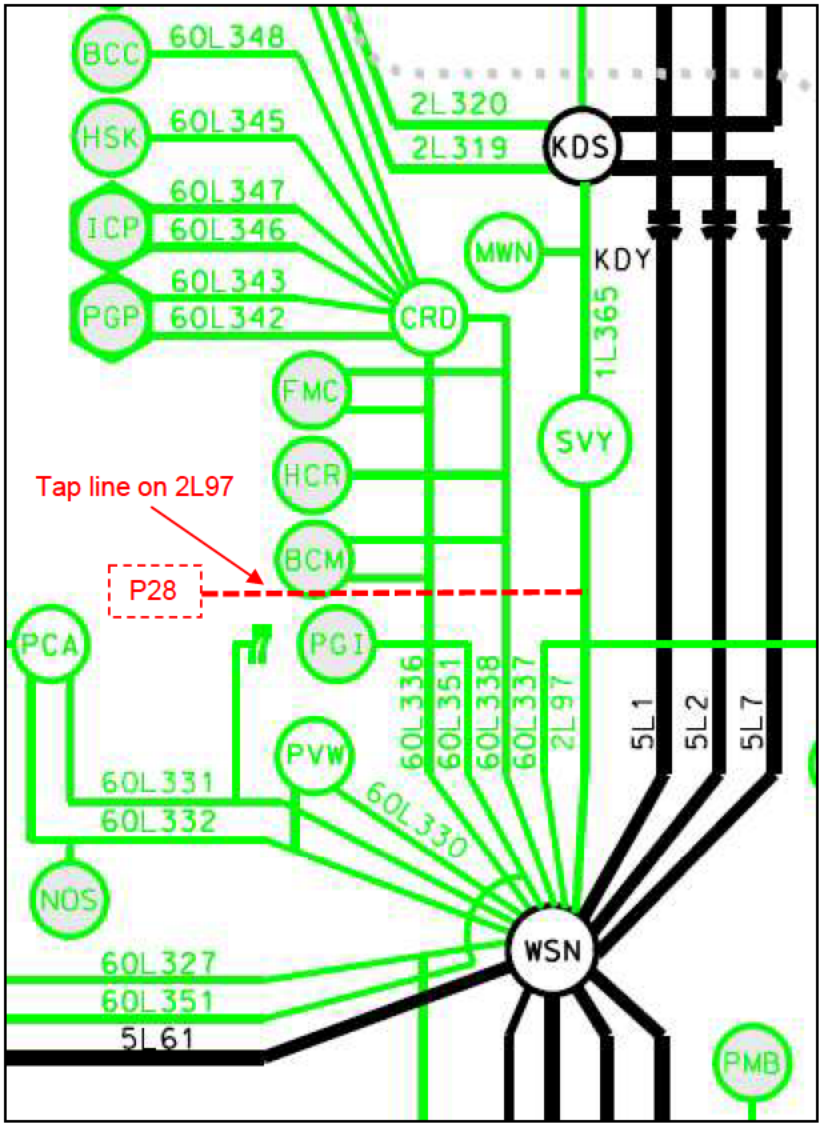

Figure 1-1: Central Interior Regional Transmission System Diagramin 2024 with the Proposed Fort George Generation Interconnection

2 Purpose and Scopes of Study

This Feasibility Study is a preliminary evaluation of the system impact of interconnecting the proposed project to the BC Hydro system based on power flow and short circuit analysis in accordance with BCH's Open Access Transmission Tariff (OATT). A non-binding good faith estimated cost of required Network Upgrades and estimated time to construct will be provided.

Per OATT, the Feasibility Study is performed individually for each of the participating projects in the CEAP and focuses specifically on the BC Hydro regional transmission system where the proposed generating project is proposed to be constructed. An assessment of the incremental effect on the 500 kV bulk transmission system is beyond this study scope.

This is a "limited scope" study which is restricted to power flow studies of P0, P1 and P2 planning events as defined in TPL-001-4 and short circuit analysis. The study does not address other technical aspects such as transient stability and switching transients and impact of multiple contingencies. These subjects would be addressed in subsequent System Impact Study if the project is a Successful Participant of the CEAP.

In case impact to the adjacent external systems to BC Hydro is observed, such impact would be addressed in subsequent detailed and coordinated studies with the relevant adjacent entities if the proposed interconnection proceeds further.

3 Standard and Criteria

The Feasibility Study is performed in compliance with the North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) reliability standards, and the BCH interconnection requirements in the TIR, and upon the ratings of the existing BCH transmission facilities described in Operating Orders, specifically:

- NERC standards: TPL-001-4 and FAC-002-3 relevant to the scope of this Feasibility Study.
- WECC criteria TPL-001-WECC-CRT-4 Transmission System Planning Performance, July 1, 2023.
- BC Hydro's 60 kV to 500 kV Technical Interconnection Requirements for Power Generators.
- BC Hydro Operating Order 5T-10, Ratings for All Transmission Circuits 60 kV or Higher, April 16, 2024.
- BC Hydro Operating Order 5T-14, Ratings for All Transmission and Distribution Transformer, November 8, 2022.
- BC Hydro System Operating Order 7T-22 System Voltage Control, September 19, 2023.

4 Assumptions and Conditions

This Feasibility Study is performed based on the IC's submitted data and information available to BC Hydro on May 22, 2024 for the study purpose. Appendix A shows the plant single line diagram for the IC's project used in the study model. Certain assumptions were, as set out below, made to the extent required.

The power flow study cases used in this Feasibility Study are established based upon the BC Hydro's base resource plan and load forecasts available at the time of performing the study, which includes existing and future generations, transmission facilities, and loads in addition to the subject interconnection project in this study. Applicable seasonal conditions and the appropriate study years for the study planning horizon are also incorporated.

Additional assumptions are listed as follows.

1) The regional generation are dispatched to the patterns that stress the transmission system in the study area. In these patterns, the regional generations are typically set to their Maximum Power Outputs (MPO) unless otherwise specified.

2) This Feasibility Study assumes the IC's Fort George will only be operated continuously with connection to WSN 230 kV, rather than via Kennedy Substation (KDS) 138 kV system.

5 System Studies and Results

The existing line 2L97 will become part of BC Hydro Bulk Electric System (BES) and needs to be compliant with applicable MRS requirements. The proposed Tap line from POI to the Fort George generation station will be an IC's BES element and the IC will be responsible for the compliance with the NERC MRS standards requirements.

5.1 Power Flow Study Results

Power flow studies were performed to evaluate whether the IC's generating project would cause any unacceptable system performance (e.g. equipment overloads, steady-state voltage violation and voltage instability) and to determine the reinforcement requirement based on steady state performance analysis.

The study focuses on the 2031 light summer (31LS) system load condition which is typically a stressed condition for a generation interconnection project, taking into considerations of factors such as load conditions, seasons and generation patterns. The 2030 heavy winter (30HW) and 2031 heavy summer (31HS) cases are also studied to capture any possibility of performance violations under high load conditions.

5.1.1 Branch Loading Analysis

For all the studied load conditions there is no branch or transformer overload identified under system normal condition (P0) and single contingency conditions (P1 and P2) caused by the addition of the IC.

Table 5-1 below shows loadings on existing BC Hydro facilities with the IC at maximum output.

Table 5-1: Summary of Branch Loadings

Case	Contingency		Overloaded branch and %		
	Category	Description	2L97 (WSN-Tap)	2L96	WSN T2
30HW	P0	System Normal	39%	31%	15%
30HW	P1	2L97	39%		10%
30HW	P1	WSN T4	39%	29%	28%
30HW	P1	2L354	39%	30%	11%
30HW	P2	WSN 2CB7	39%		18%

Case	Contingency		Overloaded branch and %		
	Category	Description	2L97 (WSN-Tap)	2L96	WSN T2
31HS	P0	System Normal	48%	38%	21%
31HS	P1	2L97	48%		20%
31HS	P1	WSN T4	48%	34%	24%
31HS	P1	2L354	48%	15%	20%
31HS	P2	WSN 2CB7	48%		22%
31LS	P0	System Normal	49%	17%	19%
31LS	P1	2L97	49%		21%
31LS	P1	WSN T4	49%	18%	26%
31LS	P1	2L354	49%	11%	21%
31LS	P2	WSN 2CB7	49%		31%

5.1.2 Steady-State Voltage Analysis

For all the studied load conditions there is no voltage Issues identified under system normal condition (P0) and single contingency conditions (P1 and P2) caused by the addition of the IC.

5.1.3 Anti-Islanding Requirements

An Anti-islanding Transfer Trip Scheme is required to trip the entrance circuit breaker of the IC to prevent the potential islanding operations with BC Hydro loads under the following system contingencies.

- No-fault opening 2L97 at WSN
- Loss of both WSN T6 and T7
- Loss of both WSN T2 and T4

In addition, the IC is required to install anti-islanding protection within its facility to disconnect the IC's biomass plant from the grid when an inadvertent island with the local load forms.

5.2 Fault Analysis

The short circuit analysis in the FeS is based upon the latest BC Hydro system model, which includes the generating facility information and associated

impedance data provided by the IC. A more detailed study will be performed at the system impact study stage if needed.

5.3 Stations Requirements

No station work is required.

5.4 Transmission Line Requirements

No transmission line upgrade has been identified for this project.

At the POI, BCH will design and build the tap that will include a tap structure and a switch structure on the tap side. A 253 kV rated disconnect switch will be installed to isolate the IC's facilities from the BCH system. Additional Right-of-Way (ROW) may be required to accommodate the tap.

5.5 Protection & Control Requirements

For successful integration of the new IC, the line protection relays at BC Hydro's WSN and SVY substations for 2L97 will be replaced. As part of the line protection replacement, telecommunication facilities will be required for each of the three substations.

The IC is to provide the following for the interconnection of Fort George 2 - 200 MW Generation Station project:

- Entrance protection that complies with the latest version of the "60 kV to 500 kV BC Hydro Technical Interconnection Requirements for Power Generators."
- Provide two SEL-411L-1 relays (firmware and options specified by BC Hydro) relays at the entrance of Fort George 2 Generation Plant to provide protection coverage for 2L97. BC Hydro P&C Planning will provide core protection settings for these relays to protect transmission line 2L97 during a transmission line fault. Non-core protection such as local breaker failure, auto-reclosing, backup protection for station elements will not be provided by BC Hydro P&C Planning.
- The IC is responsible for NERC PRC-related tasks, settings to compliance standards within their facilities.

- The IC is responsible for providing a communications link for remote interrogation of the line protection relays and PPIS equipment by BCH servers.
- Provide anti-islanding protection as stated in Section 5.1.

5.6 Telecommunications Requirements

BC Hydro performed a high-level feasibility assessment of a telecom solution to meet the following requirements.

Teleprotection Requirements for Telecom

- WECC Level 3 PY & SY, WSN – SVY, with C37.94 interfaces.
- WECC Level 3 PY & SY, WSN – P28, with C37.94 interfaces.
- WECC Level 3 PY & SY, SVY – P28, with C37.94 interfaces.

Telecontrol Requirements for Telecom

- One P28 SCADA circuit to FVO and SIO.

Other Requirements for Telecom

- PY & SY T1s between P28 – TBR
- PY & SY T1s between SVY – TBR
- MPLS links and LSPs for new SVY MPLS nodes

Certain assumptions were made for determining a potential telecom solution. Details of the telecom solution (e.g. assumptions made, alternatives investigated and work required for BCH and the IC) would be provided at the next study stage.

6 Cost Estimate and Schedule

The non-binding good faith estimated cost and time to construct the Network Upgrades required to interconnect the proposed project will be provided in a separate letter to the IC.

7 Conclusions

To interconnect the Fort George 2 - 200 MW Generation Station Project and its facilities to the BCH Transmission System at the proposed POI, this Feasibility Study has identified the following conclusions and requirements:

1. The T-tap connection on the BCH's existing circuit 2L97 is acceptable for interconnecting the IC's generating project to the BCH system.

2. At the POI, BCH will design and build the tap structure, including a tap structure and a switch structure on the tap side. A 253 kV rated disconnect switch will be installed to isolate the IC's facilities from the BCH system. Additional Right-of-Way may be required to accommodate the tap.

3. The connection of Fort George 2 - 200 MW Generation Station Project does not cause any performance violation (i.e. thermal overload, voltage performance violation or voltage stability concern) under system normal and single contingency conditions.

4. Fort George 2 - 200 MW Generation Station will be islanded with SVY substation under system contingencies, such as no-fault opening 230 kV line 2L97 from WSN, loss of both WSN T2 and T4, and loss of both WSN T6 and T7. An Anti-islanding Trsnsfer Trip Scheme is required to trip the entrance circuit breaker of the IC under those potential islanding scenario. In addition, the IC is required to install anti-islanding protection within their facility to disconnect the biomass plant from the grid when an inadvertent island with the local loads forms.

5. BC Hydro will provide line protection relays as the replacement of those on the existing line 2L97 at WSN and SVY (BC Hydro ends only). As part of the line protection for the new line, telecommunication facilities will be required for each of the three substations. The IC shall provide required relays, telecom facility and associated equipment at its facilities to accommodate the new protection schemes.

7. As per the operating order 3T-KDS-01, this Feasibility Study assumes that the line 1L365, the substation SVY, and 2L97 with the IC will only connect radially to the WSN 230 kV bus. .

Appendix A
Plant Single Line Diagram Used for Power Flow Study

Figure A-1 shows Fort George 2 - 200 MW Generation Station Project single line diagram used for power flow study.

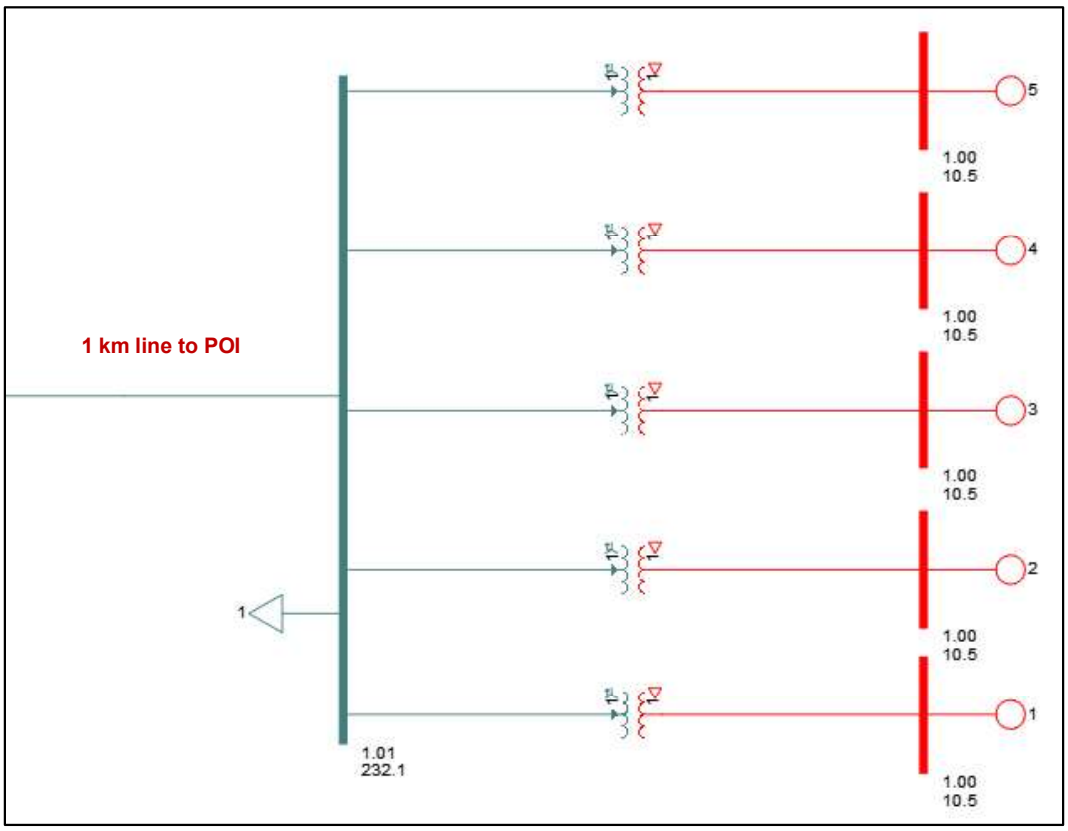

Figure A-1: Fort George 2 - 200 MW Generation Station Project Single Line Diagram for Power Flow Study.

As seen in the diagram, Fort George 2 - 200 MW Generation Station Project has five main power transformers dividing the plant into five parts each connecting to 40 MW unit.