BC Hydro
Power smart

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

July 30, 2024

[redacted]

[redacted]

[redacted]

RE: CEAP IR 99 - Franklin River Hydro Project - Interconnection Feasibility Study Report

Enclosed is the Interconnection Feasibility study report for the proposed Franklin River Hydro 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 $41.3 M.

Major Scope of Work Identified:

- Supply and install one 230kV transmission line position, new 230 kV circuit breaker and the associated substation equipment at BC Hydro's Malaspina Substation (MSA)
- Supply and install a new 230 kV 25 MVAr switchable shunt reactor and associated equipment at the customer's transmission line terminal at MSA
- Add and upgrade Protection, Control and Telecom
- Install fibre optic cable from Customer's Series Capacitor Bank to control building at MSA

Exclusions:

- GST
- Permits
- Right-of-Way

Key Assumptions:

- Construction by contractor
- 3 years of construction
- Early Engineering and Procurement
- Customer will provide a Series Capacitor Bank in its 230 kV transmission line, as per BC Hydro's Capacitor Bank P&C Standard

Key Risks:

- Expansion of the existing control building might be required to accommodate the new P&C panels and other equipment at MSA
- 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 increased 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 3 2031 (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,

[redacted]

Senior Manager, Transmission Interconnections
BC Hydro

Encl.: CEAP2024_IR_99_Franklin River Hydro_FeS_Report_final.pdf

[redacted]

Franklin River Hydro Project

Interconnection Feasibility Study

BC Hydro EGBC Permit to Practice No: 1002449

2024 CEAP IR # 99

Prepared for: [redacted]

[redacted]

431-APR-00010
2024 Jul 30

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Executive Summary

[redacted] the interconnection customer (IC), requests to interconnect its Franklin River Hydro Project (2024 CEAP IR # 99) to the BC Hydro system in the Sunshine Coast region. Franklin River Hydro Project has three (3) synchronous generator units, adding a total capacity of 200 MW into the BC Hydro system. The IC will build a 360km long 230kV overhead transmission line (2LXXX) to interconnect the generating plant with the BC Hydro system. The Point of Interconnection (POI) is at BC Hydro's MSA 230kV bus. The IC's proposed commercial operation date (COD) is Oct 1, 2031.

To interconnect the Franklin River Hydro Project and its facilities to the BCH Transmission System at the proposed POI, this Feasibility Study has the following observations and requirements:

1. A new 230kV line position at MSA is required to interconnect the IC's project to the BC Hydro system.
2. Shunt reactors at both terminals of the IC owned 230kV transmission line are required to control unacceptable high voltages. More detailed technical requirements, such as the exact size and locations would be proposed by the IC and reviewed/approved by BC Hydro in a later stage such as system impact study (SIS).
3. Considering the IC owned 230kV interconnection line is unusually long, to improve its voltage regulation capability at POI (MSA) and plant generator rotor angle stability, based on industry practice, a series capacitor compensation station with a degree of 40% to 50% in the middle of the line is recommended. The compensation level would be proposed by the IC and reviewed/approved by BC Hydro in a later stage such as SIS.
4. The study does not find any voltage performance violation or voltage stability concern for P0, P1 and P2 contingencies due to the integration of the IC's project under the assumption that the required shunt reactors installed at both ends of the IC owned 230kV transmission line.
5. The study finds a thermal overload on MSA T1 for loss of MSA T2 caused by the connection of IC's project. MSA T2 thermal overload for loss of MSA T1&T5 is also identified. RAS generation shedding or runback at the IC's project or operator's manual actions will be relied on to address these

issues. T1 and T2 emergency ratings need to be further investigated to determine whether the new RAS function is needed.

6. The IC's project needs to participate in the existing MSA separation RAS. It is required based on high level assessments at the feasibility study stage. Detailed RAS functional requirement study will be needed in a later stage.
7. For successful integration of the IC's project, new line protection relays will be installed at BC Hydro's Malaspina (MSA) and IC's Franklin River Hydro (P99) substations to protect 2LXXX using current differential scheme (87L). Telecommunication facilities will be required for each of the two substations. BC Hydro will provide protection only for MSA upgrades and 2LXXX line protection at BC Hydro end.

The above observations 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.

[redacted]

Contents

Appendices

[redacted]

Acronyms

The following are acronyms used in this report.

BES	Bulk-Electric System
BCH	BC Hydro
CAP2	Series Capacitor Station mid-line between P99 and MSA
CEAP	Competitive Electricity Acquisition Process
CKY	Cheekye Substation
COD	Commercial Operation Date
DTT	Direct Transfer Trip
EDM	Edmonds Office
ERIS	Energy Resource Interconnection Service
FeS	Feasibility Study
HSP	Howe Sound Pulp substation
IBR	Inverter-Based Resources
IC	Interconnection Customer
IPP	Independent Power Producer
LAPS	Local Area Protection Schemes
MDN	Meridian Substation
MPO	Maximum Power Output
MSA	Malaspina Substation
NERC	North American Electric Reliability Corporation
NRIS	Network Resource Interconnection Service
OATT	Open Access Transmission Tariff
P99	IC’s Franklin River Hydro Plant
PHR	Pender Harbour Substation
POI	Point of Interconnection
RAS	Remedial Action Scheme
SAY	Saltery Bay Substation
SEC	Sechelt Substation
TIR	BC Hydro “60 KV to 500 kV Technical Interconnection Requirements for Power Generators”
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	Franklin River Hydro Project	
Name of Interconnection Customer (IC)	[redacted]	
Point of Interconnection (POI)	MSA 230kV	
IC's Proposed COD	1st October 2031	
Type of Interconnection Service	NRIS ☒	ERIS ☐
Maximum Power Injection (MW)	180 MW (Summer)	180 MW (Winter)
Number of Generator Units	3 x 66.5 MW	
Plant Fuel	Hydro	

[redacted] the interconnection customer (IC), requests to interconnect its Franklin River Hydro Project (2024 CEAP IR # 99) to the BC Hydro system. Franklin River Hydro Project has three (3) synchronous generator units, adding a total capacity of 200 MW into the BC Hydro system. The IC will build a 360 km long 230 kV overhead transmission line (2LXXX) to interconnect the generating plant (P99) with BC Hydro system. The Point of Interconnection (POI) is at BC Hydro's MSA 230kV bus. The IC's proposed commercial operation date (COD) is Oct 1, 2031.

Figure 1-1 shows the area existing system with the proposed Franklin River Hydro Project in the Sunshine Coast and North Shore Region area. In the diagram, the existing system are represented in black color and the IC's project is highlighted in red color. MSA is a major 500/230/132 kV substation which is supplied from Cheekye Substation (CKY) via 5L30 and 5L32, and in turn supplies Vancouver Island via dual 500 kV circuits 5L29 and 5L31. There are two 230 kV circuits: 2L47 supplies Howe Sound Pulp and Paper – Port Mellon Substation (HSP), and 2L48 is the main supply to Saltery Bay Substation (SAY). There are two 132 kV transmission lines: 1L35 ties to Sechelt Substation (SEC) and Pender Harbour Substation (PHR), and 1L37 is the tie to the tems sayamkwu LP (tsLP) owned Narrows Inlet Hydroelectric Cluster generation. 1L37 is also the backup supply to SAY and is normally open at SAY. The existing CKY area RAS is designed to solve various performance issues for contingencies in that area, especially 132 kV transmission system from MSA to CKY.

There is an existing MSA separation RAS. The major purpose of the RAS is to prevent instability of MTC and ETR generators and avoid collapse of Sunshine Coast load area after 500 kV supply to MSA 230 kV system lost. It also prevents overload of 1L31/1L32 after 500 kV supply to MSA 230 kV system lost. At last, it prevents transient instability of Narrows Inlet generation for close in faults on 1L35 or loss of MSA T1/T5.

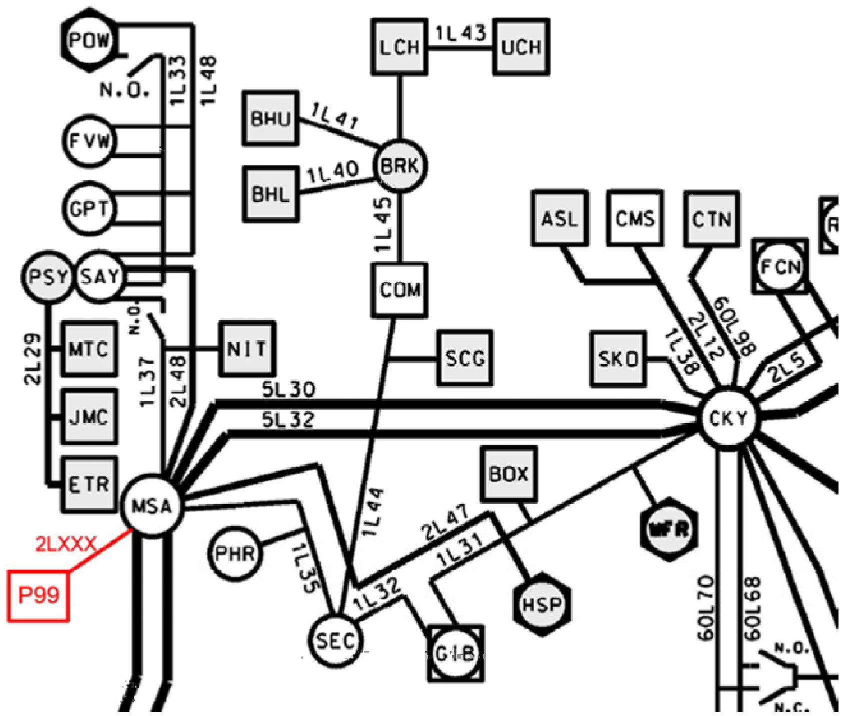

Figure 1-1: Sunshine Coast and North Shore Region 132/230/500kV Transmission System Diagram

Figure A-1 shows the more detailed connection of the IC's Project to the BC Hydro Transmission System. Note that no shunt reactor and/or series compensation are modelled in the case shown in the following Figure A-1.

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 process 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 500kV 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) The POW-SAY-MSA 132 kV and 230 kV transmission system (1L48 and 2L48) is stressed with power transfer 82 MW on 1L48 from POW to achieve firm power export to the US required by an existing customer, and full output from local IPPs including MTC, JMC, and ETR.

[redacted]

5 System Studies and Results

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 2032 light summer (32LS) 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 2032 heavy summer (32HS) and 2031 heavy winter (31HW) cases are also checked at a high level to capture any possibility of performance violations under high load conditions. In addition, the effect of adding 25 MVAR shunt reactors at each end of the customer 230kV line is also studied.

5.1.1 Branch Loading Analysis

Table 5-1 shows a summary of branch loading analysis under system normal and single contingencies (P1, P2) for various load conditions.

The study finds no transformer or line overload under system normal conditions for all three load conditions studied. Thermal overloads on MSA T1 is identified for loss of MSA T2 in 32LS and 32HS load cases after the connection of Franklin River Hydro project. MSA T2 thermal overloads are less severe for loss of T1 because MSA T1 and T5 are in the same protection, and T5 tripping would reduce the post-contingency loading on T2. Note that MSA T1 or T2 over rating is not provided in this study and its continuous ratings are used instead. RAS generation shedding or runback at Franklin River Hydro project or operator's manual actions will be relied on to address this issue. T1 and T2 emergency ratings need to be further investigated to determine whether the new RAS function is needed.

Table 5-1: Summary of Branch Loading Analysis Results

Case	IC's Plant Output	Contingency Identified		Branch Loading	
				MSA T1	MSA T2
		Category	Description	MSA 230KV -500KV	MSA 230KV -500KV
Summer Rating				600 MVA	600 MVA
32LS	199.5 MW	P0	System Normal	57 %	56 %
		P1	Loss of MSA T2	121 %	N/A
		P1	Loss of MSA T1&T5 (Note 1)	N/A	105 %
32HS	199.5 MW	P0	System Normal	57.8 %	57.6 %
		P1	Loss of MSA T2	114 %	N/A
		P1	Loss of MSA T1&T5 (Note 1)	N/A	102 %
Winter Rating				714 MVA	714 MVA
31HW	199.5 MW	P0	System Normal	43 %	43 %
		P1	Loss of MSA T2	84.7 %	N/A
		P1	Loss of MSA T1&T5	N/A	76 %

Note 1: the existing RAS actions are taken to solve thermal overloads in the 132KV transmission system from MSA to CKY.

5.1.2 Steady-State Voltage Analysis

It is specified in WECC criteria TPL-001-WECC-CRT-4 that voltages at all applicable Bulk-Electric System (BES) buses shall stay within 95% to 105% of nominal for system normal, and 90% to 110% of nominal for P1 and P2 events. It is also mentioned that voltage deviation at each applicable BES bus serving load shall not exceed 8% for P1 events.

For all the studied load conditions (32LS, 32HS, 31HW) based on the proposed project plus two additional 25 MVAR line shunt reactors with one at each end, the voltage performance under system normal condition (P0) is acceptable. For all applied P1 and P2 contingenceis, there is no voltage performance violation identified. Voltage study results of the most limiting contingency for loss of MSA T2 are presented in the following Table 5-2.

Table 5-2: Summary of Steady-State Voltage Study Results

Case	IC's Plant Output	Contingency		Bus Voltage (PU)		
		Category	Description	MSA 230 kV	MSA 500 kV	SEC 132 kV
31HW	199.5 MW	P0	System Normal	1.044	1.067	1.045
		P1	Loss of MSA T2	1.022	1.066	1.036
32HS	199.5 MW	P0	System Normal	1.03	1.054	1.05
		P1	Loss of MSA T2	1.004	1.052	1.044
32LS	199.5 MW	P0	System Normal	1.033	1.062	1.056
		P1	Loss of MSA T2	1.006	1.06	1.05

5.1.3 High Voltage Checking for Shunt Reactor Requirements

Preliminary study results for high voltage checking are summarized in the following Table 5-3. Two cases are compared in this study. The Case 1 has no shunt reactor at both terminals of the 360 km 230 KV transmission line. The Case 2 has one 25 MVAR shunt reactor installed at each terminal of the long line. In both study cases, it is assumed that only one generating unit online in operation. A pre-outage power flow diagram is provided for Case 2 in the following Figure 5-1. Circuit breaker (CB) at both line terminals is open one at a time. TYSL function in PSS/E (Switching study) is applied to check voltages at both sides of the opened CB at MSA, and steady state power flow is used for opening CB at P99 generating station side. Study results show that the voltages are unacceptable high for Case 1 without any shunt reactors, and voltage performance for Case 2 with one 25 MVAR shunt reactor at each terminal is under control. The exact size of the line terminal shunt reactors and which terminal of the transmission line chosen for shunt reactor installation will be further investigated by the IC and reviewed and determined by BC Hydro in a later stage.

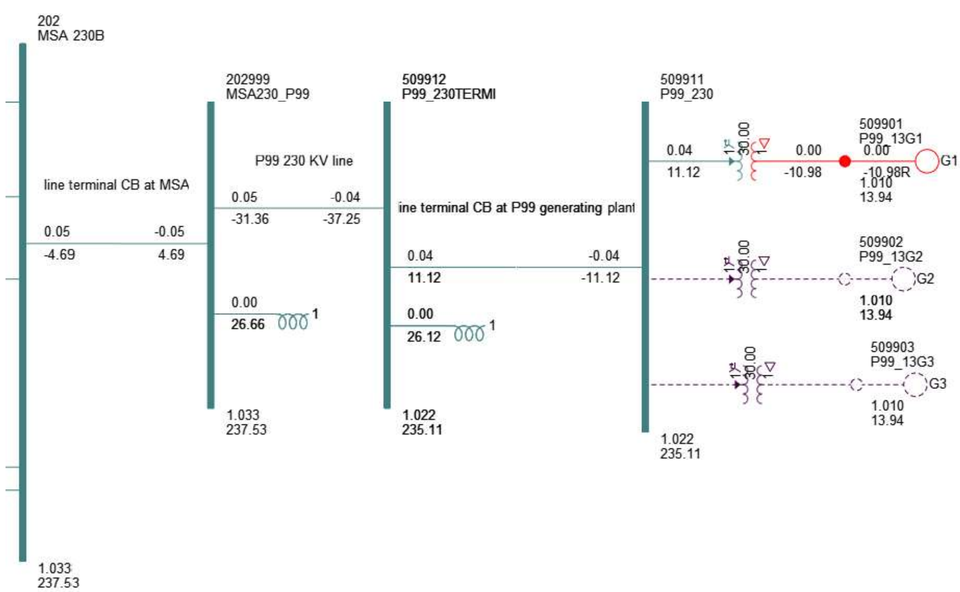

Figure 5-1: Case 2 pre-outage power flow diagram for high voltage checking study

Table 5-3: Summary of High Voltage Checking Study Results

Case	Study year	IC's Plant Output	Contingency		Bus Voltage (PU)			
			Category	Description	MSA 230 kV	P99 230 KV line terminal at MSA	P99 230 KV line terminal at generating station	P99 generating station 230 kV bus
1	2032 LS	0 MW from 1 unit	P0	System Normal	1.038	1.038	1.046	1.046
			P2	P99 230KV line open end at MSA	1.031	1.39	1.24	1.24
			P2	P99 230KV line open end at generating station	1.045	1.045	1.17	
2	2032 LS	0 MW from 1 unit	P0	System Normal	1.033	1.033	1.022	1.022
			P2	P99 230KV line open end at MSA	1.032	1.067	1.04	1.04
			P2	P99 230KV line open end at generating station	1.035	1.035	1.06	

5.1.4 High Level Assessment for Updating the Existing MSA Separation RAS

The connection of Franklin River Hydro project will aggravate most of the pre-existing issues, which are mentioned in project background session and currently addressed by the MSA separation RAS. Dynamic simulations for all contingencies and power flow studies for N-2 or N-1-1 contingencies are not conducted in this report because they are out of the feasibility study scope. Similar to other existing major IPP hydro generating plants, Franklin River Hydro project must participate in the existing MSA separation RAS as a generation shedding candidate. Detailed RAS function requirement studies will be conducted in a later SIS stage.

5.1.5 Series Compensation on the 360 km 230 kV Overhead Transmission Line

A 360km long 230kV overhead transmission line will connect the Franklin River Hydro Project with BC Hydro transmission system. The equivalent PI representation of the long line needs to be further reviewed and confirmed by the customer for the next stage study. As shown in Figure A-1, the voltage angle difference between generator terminal and MSA 230kV bus could be around 42 degrees with the IC's Plant full power output which could results rotor angle instability for system contingencies. To improve transient stability performance and system voltage control, a series compensation station with a compensation degree of 40% to 50% in the middle of the transmission line is recommended. The compensation level would be proposed by the IC and reviewed/approved by BC Hydro further reviewed and determined in a later stage such as SIS.

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

The POI of the Franklin River Hydro will be at MSA 230kV switchyard.

Following is the scope of station work in MSA:

- Add one 230kV transmission line position with a new 230 kV circuit breaker and the associated substation equipment. Refer to Appendix B MSA station one-line sketch for details.
- Expand the existing control building, if required, to accommodate the new P&C panels and other equipment.
- Terminate the Franklin River Hydro line 230 kV 2LXXX transmission line.
- Add new 230 kV 1x25 MVAr switchable shunt reactor and associated equipment at the new 230 kV Franklin River Hydro 2LXXX transmission line terminal. Refer to Appendix B MSA station one-line sketch for details. Note that exact size and locations of the shunt reactor would be proposed by the IC and reviewed/approved by BC hydro at later stage during system impact study.
- Other associated station work.
- MSA T1 transformer summer normal and summer emergency rating are 600 MVA according to operating order 5T-14 report.

Note:

All the infrastructures outside MSA substation such as 360 km long 230 kV overhead transmission line, series compensation capacitor station and shunt reactor at customer end 230 kV transmission line terminal shall be constructed by IC.

5.4 Protection & Control Requirements

For successful integration of the IC's project, new line protection relays will be installed at BC Hydro's Malaspina (MSA) and IC's Franklin River Hydro (P99) substations to protect 2LXXX using current differential scheme (87L). Telecommunication facilities will be required for each of the two substations.

The Franklin River Hydro (P99), by [redacted] to provide the following for the interconnection of P99:

- 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) at the entrance of P99 to provide protection coverage for 2LXXX. BC Hydro P&C Planning will provide core settings for these relays.
- 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 redundant protection to shunt reactor at P99 2LXXX line terminal.
- Provide redundant protection and control to the Series Capacitor Bank as per BC Hydro Series Capacitor Bank Specification.

The runback schemes or RAS requirements stated in Section 5.1 are mainly to address the overloading concerns under contingencies, which are preliminary. These RAS requirements may utilize the communication channels required for protection purposes included in the cost estimate. If the proposed project proceeds through the CEAP process, subsequent System Impact Studies may identify additional RAS requirements for this interconnection. These RAS functional requirements will include initiating events, control actions, and latency times. Depending on these supplementary requirements, additional telecommunication facilities may be needed to facilitate signal transmission between the BC Hydro substations and customer facilities.

5.5 Telecommunications Requirements

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

Requirements for Teleprotection

1. Provide WECC Level 3 64 kbps synchronous circuits between MSA and P99 for “MSA-P99 2LXXX PY DIGITAL TELEPROT” and “MSA-P99 2LXXX SY DIGITAL TELEPROT”. Physical interface shall be C37.94 optical over multimode fibre using ST connectors.

Requirements for Telecontrol

1. Provide one 2.4 kbps P99 SCADA circuit off MDN.
2. Provide one 2.4 kbps P99 REMACC circuit off EDM.

Other Requirements for Telecom

1. None identified.

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.

As noted in Section 5.3, all the infrastructures outside MSA substation towards the IC's facilities shall be constructed by the IC. Those infrastructures are not a part of the BCH's Network Upgrades and are excluded in the cost estimate or estimated schedule to be provided in the letter.

[redacted]

7 Conclusions

To interconnect the IC's Franklin River Hydro Project and its facilities to the BCH Transmission System at the POI, this Feasibility Study has identified the following observations and requirements:

1. A new 230kV line position at MSA is required to interconnect the IC's project to the BC Hydro system.
2. Shunt reactors at both terminals of the IC owned 230 kV transmission line are required to control unacceptable high voltages. More detailed technical requirements, such as the exact size and locations would be proposed by the IC and reviewed/approved by BC Hydro in a later stage such as system impact study (SIS).
3. Considering the IC owned 230kV interconnection line unusually long, to improve its voltage regulation capability at POI (MSA) and plant generator rotor angle stability, based on industry practice, a series capacitor compensation station with a degree of 40% to 50% in the middle of the line is recommended. The compensation level would be proposed by the IC and reviewed/approved by BC Hydro in a later stage such as SIS.
4. The study does not find any voltage performance violation or voltage stability concern for P0, P1 and P2 contingencies due to the integration of the IC's project under the assumption that the required shunt reactors installed at both ends of the IC owned 230kV transmission line.
5. The study finds a thermal overload on MSA T1 for loss of MSA T2 caused by the connection of the IC's project. MSA T2 thermal overload for loss of MSA T1&T5 is also identified. RAS generation shedding or runback at the IC's project or operator's manual actions will be relied on to address these issues. T1 and T2 emergency ratings need to be further investigated to determine whether the new RAS function is needed.
6. the IC's project needs to participate in the existing MSA separation RAS. It is required based on high level assessments at the feasibility study stage. Detailed RAS functional requirement study will be needed in a later stage.
7. For successful integration of the IC's project, new line protection relays will be installed at BC Hydro's Malaspina (MSA) and IC's Franklin River Hydro

(P99) substations to protect 2LXXX using current differential scheme (87L). Telecommunication facilities will be required for each of the two substations. BC Hydro will provide protection only for MSA upgrades and 2LXXX line protection at BC Hydro end.

Appendix A
Plant Single Line Diagram Used for Power Flow Study

Figure A-1 shows Franklin River Hydro Project single line diagram used for power flow study.

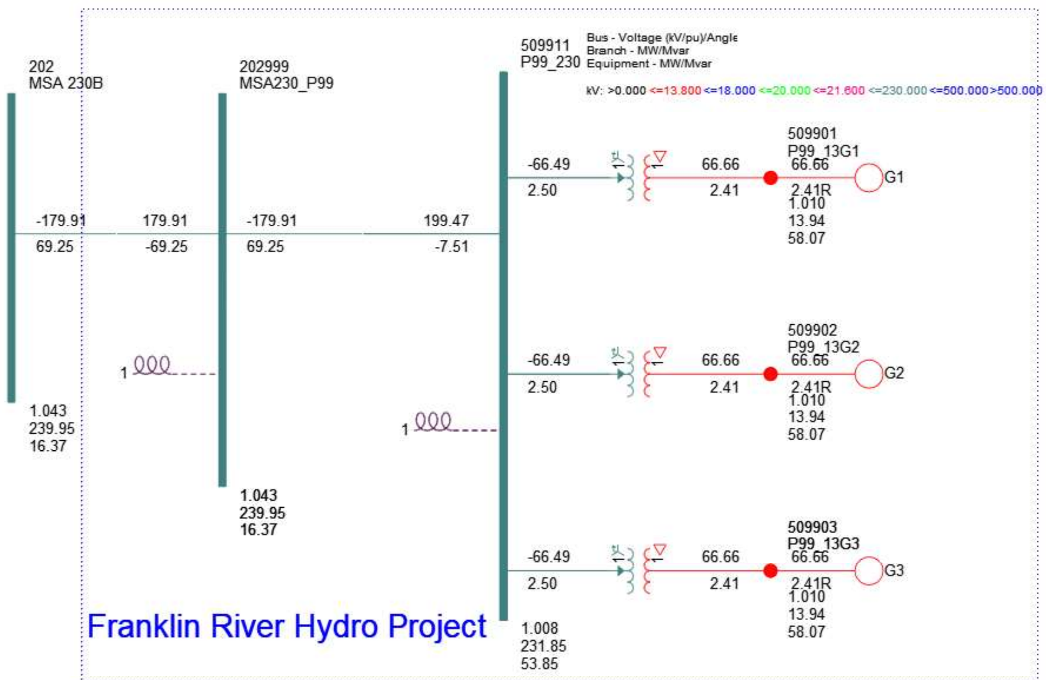

Figure A-1: Franklin River Hydro Project Single Line Diagram for Power Flow Study.

Appendix B
MSA Station One-line Sketch

Figure B-1 shows the Stations Planning One-Line Sketch for MSA station updates to interconnect IC's Franklin River Hydro Project.

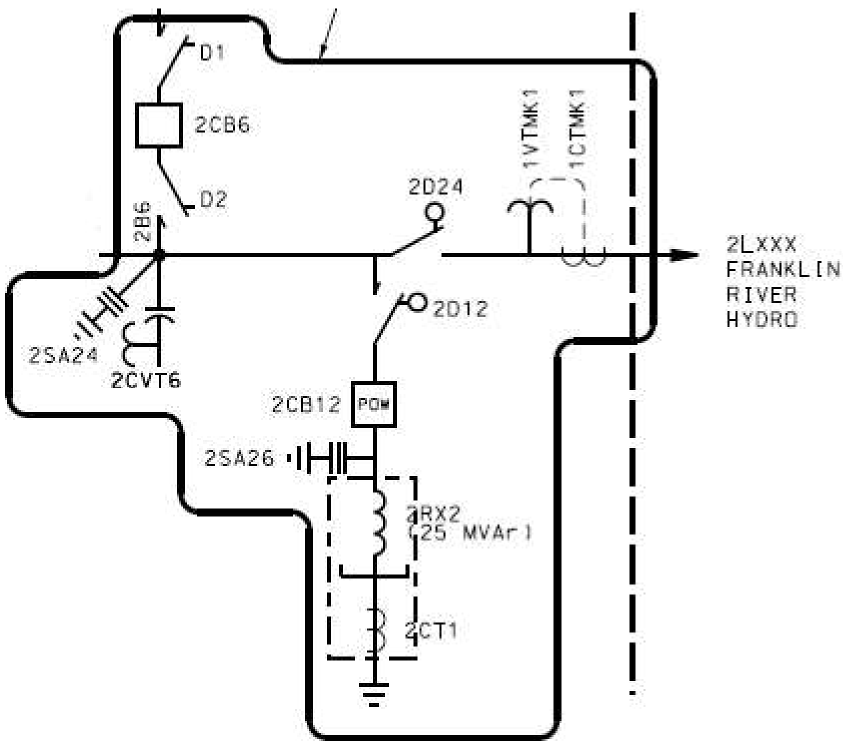

Figure B-1: Stations Planning One-Line Sketch for MSA.