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

July 30, 2024

[redacted]

[redacted]

[redacted]

**RE: CEAP IR 58 - Cowie Creek Wind Project - Interconnection Feasibility Study Report**

Enclosed is the Interconnection Feasibility study report for the proposed Cowie Creek Wind 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 $10.4M.

**Major Scope of Work Identified:**

- Supply and install a new 230kV tap structure near Str 16-01 of the existing transmission line 2L312
- Supply and install one disconnect switch with structure
- Supply and install protection relays and other required protection equipment
- Supply and install required telecommunication equipment

**Exclusions:**

- GST
- Right-of-way
- Permits

**Key Assumptions:**

- Construction will be done by contractor
- 2 years of construction is considered
- No expansion of existing stations or control buildings to accommodate new equipment
- Early Engineering and Procurement
- No ground improvements will be required
- No piles will be required for construction
- 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
- Cost of construction may increase based on geotechnical condition of the actual project site.
- Project schedule may be longer than expected, leading to increased costs
- Cost of materials and major equipment 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_58_Cowie Creek Wind_FeS_Report_final.pdf

[redacted]

# Cowie Creek Wind Project

# Interconnection Feasibility Study

**BC Hydro EGBC Permit to Practice No: 1002449**

**2024 CEAP IR # 58**

Prepared for: [redacted]

[redacted]

# Report Metadata

| | |
|---|---|
| Header: | Cowie Creek Wind Project |
| Subheader: | Interconnection Feasibility Study |
| Title: | Cowie Creek Wind Project |
| Subtitle: | 2024 CEAP IR # 58 |
| Report Number: | 1000-APR-00026 |
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| Confidentiality: | Public |
| Date: | 2024 Jun 30 |
| Volume: | 1 of 1 |
| | |
| Prepared for: | [redacted] |
| [redacted] | [redacted] |
| | |
| Related Facilities: | 2L312, SNK |
| Additional Metadata: | Transmission Planning 2024-070<br>Filing Subcode 1350 |

# Revisions

| Revision | Date | Description |
|---|---|---|
| 0 | 2024 Jul | Initial release |

 [redacted]

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# Executive Summary

[redacted] the interconnection customer (IC), requests to interconnect its Cowie Creek Wind Project (2024 CEAP IR # 58) to the BC Hydro (BCH) system. Cowie Creek Wind Project has twenty-five (25) [redacted] 6.0 MW type-4 wind turbine generators, adding a total installed capacity of 150 MW and a maximum power injection of 144.65 MW into the BC Hydro system at the POI. The proposed Point of Interconnection (POI) is on BC Hydro's 230 kV line 2L312, approx. 16.2 km from Sukunka (SNK) 230 kV station. The IC's project will connect to the POI via a 0.06 km 230 kV interconnection line. The IC's proposed commercial operation date (COD) is Oct 1, 2031.

To interconnect the Cowie Creek Wind 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 2L312 is acceptable for interconnecting the IC's generating project to the BCH system.
2. The connection of Cowie Creek Wind Project does not cause any performance violation (i.e. thermal overload, voltage performance violation or voltage stability concern) under system normal conditions.
3. The connection of Cowie Creek Wind aggravates the pre-existing thermal overload on the BC Hydro lines 2L308 and 2L312 under single contingencies or breaker contingencies (i.e., 2L308, 2L312, SLS 2CB11, SLS 2CB12). These overloads are presently addressed by the Peace Region generation shedding Remedial Action Scheme (RAS). The new Cowie Creek wind project is required to participate in the existing Peace Region generation shedding RAS.
4. With the addition of Cowie Creek Wind generation in the area, it is noted SNK 2CB12, SLS 2CB14, SGB 2CB6, or SGB 2CB7 breaker faults, also overloads 2L308 in light / heavy summer and heavy winter loading conditions. Also, it is noted that a contingency on 2L309, overloads 2L312-2 (P58 POI-SLS 230) in light / heavy summer loading conditions and 2L308 in heavy winter loading condition. These issues can be addressed by requiring the Cowie Creek Wind project to participate in the existing Peace Region generation shedding RAS and by adding these contingencies as

[redacted]

input signals to trigger generation shedding. The exact requirements will be determined in subsequent studies if the project proceeds.

5. Cowie Creek Wind may be islanded with other generations and BC Hydro loads after certain critical contingencies, which may result in unacceptable over-voltages. The IC's project is required to participate in the existing peace region anti-islanding direct transfer trip (DTT) scheme. A list of contingencies is provided in Section 5.1.4. In addition to entrance protection and 2L312 protection, as a back up the IC is required to install anti-islanding protection within their facility to disconnect the wind farm when an inadvertent island with the local load forms.

6. 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 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.

7. BC hydro will provide 2L312 line protection relay replacement at SLS and SNK. As part of the line protection replacements for each of the three substations, telecommunication facilities will be required. The IC shall provide required relays, telecom facility, and associated equipment at its facilities to accommodate the protection requirement.

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 |
| CEAP | Competitive Electricity Acquisition Process |
| COD | Commercial Operation Date |
| CWWx | Cowie Creek Wind (unofficial site code, IPP customer owned) |
| 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 |
| P58 | Cowie Creek Wind Project (2024 CEAP Project Code: # 58) |
| RAS | Remedial Action Scheme |
| SIO | South Interior Office |
| TIR | BC Hydro “60 KV to 500 kV Technical Interconnection Requirements for Power Generators” |
| WECC | Western Electricity Coordinating Council |
| WTG | Wind Turbine Generator |

[redacted]

# 1 Introduction

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

Table 1-1 Summary of Project Information

| | | |
|---|---|---|
| Project Name | Cowie Creek Wind Project | |
| Name of Interconnection Customer (IC) | [redacted] | |
| Point of Interconnection (POI) | on 2L312 at 16.2 km from SNK | |
| IC's Proposed COD | 1st October 2031 | |
| Type of Interconnection Service | NRIS ☒ | ERIS ☐ |
| Maximum Power Injection [1] (MW) | 144.65 MW (Summer) | 144.65 MW (Winter) |
| Number of Generator Units | 25 x 6.0 MW WTGs | |
| Plant Fuel | Wind | |
| Note 1: The maximum achievable power injection at the POI is approx. 144.65 MW after accounting for MW losses and service load which is the same as the IC proposed amount. | | |

[redacted] the interconnection customer (IC), requests to interconnect its Cowie Creek Wind Project (2024 CEAP IR # 58) to the BC Hydro system. Cowie Creek Wind Project has twenty-five (25) [redacted] 6.0 MW type-4 wind turbine generators, adding a total installed capacity of 150 MW and a maximum power injection of 144.65 MW into the BC Hydro system at the POI. The IC's proposed Point of Interconnection (POI) is on BC Hydro's 230 kV line 2L312, approx. 16.2 km from Sukunka (SNK) 230 kV station. The IC's project will connect to the POI via a 0.06 km 230 kV interconnection line. The IC's proposed commercial operation date (COD) is Oct 1, 2031.

Figure 1-1 shows the peace region transmission system diagram, including P58 interconnection. The study area – south Peace region 230/138 kV network has six existing IPPs, several transmission voltage customers, and BC Hydro distribution substations. The 230kV transmission lines 2L337, 2L313, 2L309, and 2L308 deliver surplus power from QTY, MLW, MKL and DKW to GMS. The surplus power is also delivered to the Peace 230/138kV area loads via 2L312. P58 adds additonal power to 2L312. 1L377 is normally open between PLD and ET3, which separates the north Peace 138 kV regional network from the south 230/138kV regional network.

[redacted]

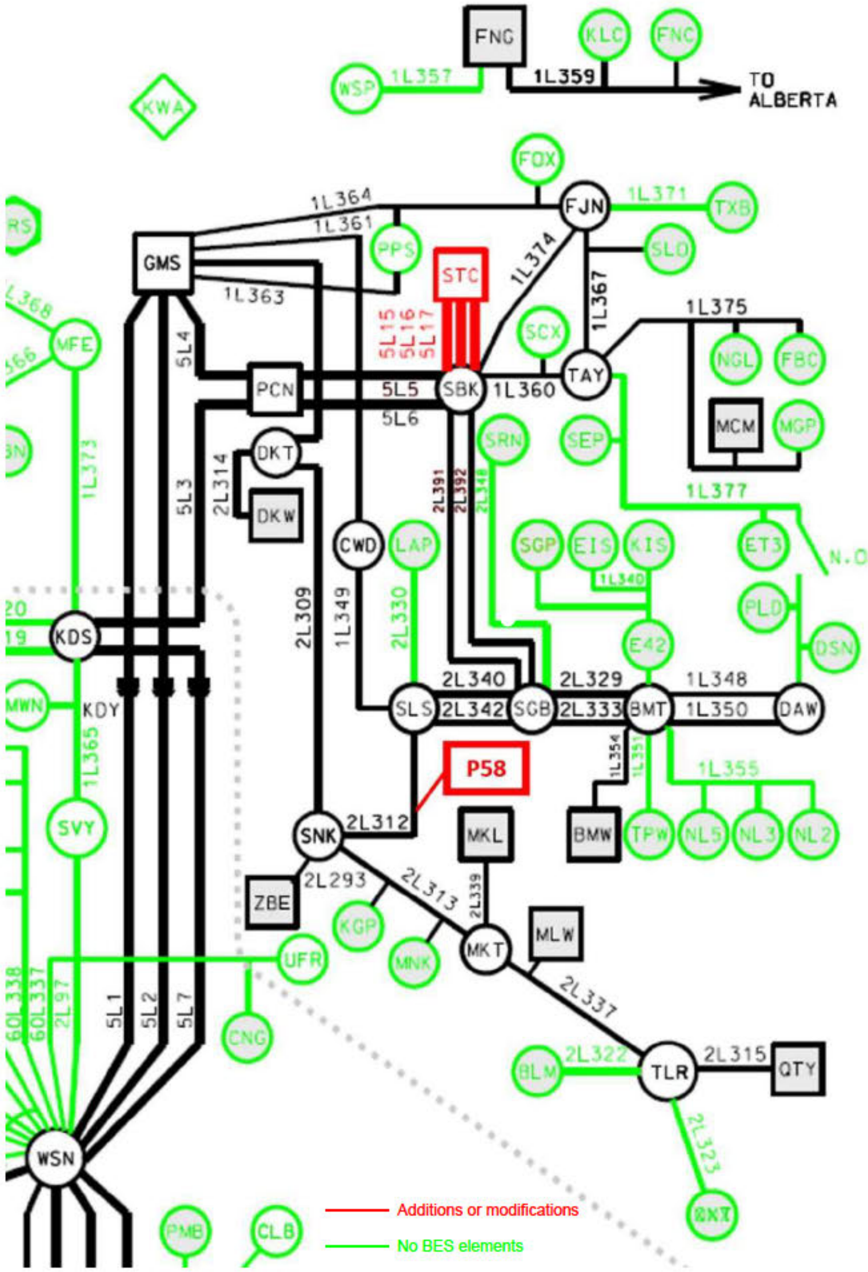


Figure 1-1: Peace region 138/230 kV Transmission System Diagram

There are six existing wind farms in the 230/138 kV network of south Peace region as follows:

- Moose Lake Wind Farm (MLW) has a total capacity of 15 MW and is tap connected on the line 2L337

- Zonnebeke Wind Farm (ZBE) has a total capacity of 30 MW and is connected to SNK via the line 2L393.
- Meikle Wind Farm (MKL) has a total capacity of 184.6 MW and is connected to MKT via 2L339.
- Quality Wind Farm (QTY) has a total capacity of 142.2 MW and is connected to TLR via 2L315.
- Dokie Wind Farm (DKW) has a total capacity of 144 MW and is connected to DKT via 2L314.
- Bear Mountain Wind Farm (BMW) has a total capacity of 105.4 MW and is connected to BMT via 1L354.

There are major network upgrades being planned in the peace region are as follows.

- Site C generating project will add six hydroelectric generators with a total installed capacity of 1200 MW. Two parallel 500 kV lines (5L5 and 5L6) to Peace Canyon substation (PCN) came to service in 2023. Based on the current schedule, the Site C project will be completed by end of 2025.

- A new 230 kV/138 kV transformer at BMT (i.e. BMT T4) is planned to be installed in June 2026 to accommodate load addition.

# 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) Based on the latest information at the time of this study, the projected in-service date for BMT T4 project is June 2026, which is before the projected in-service date of this IC.

3) Based on the schedule available at the time of this study, the Site C project will be completed by end of 2025.

4) This study is based on 1D6L377 normally open between PLD and ET3 for 1L377. Change of this configuration could affect the study and results.

# 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.

### 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.

In the light and heavy summer conditions (32LS, 32HS), the study finds Cowie Creek Wind Project aggravates the pre-existing thermal overload on 2L308 and 2L312 under single contingencies or breaker contingencies (i.e. 2L308, 2L312, SLS 2CB11, SLS 2CB12). These overloads are presently addressed by the Peace Region generation shedding remedial action scheme (RAS). The new Cowie Creek Wind Project is required to participate in the existing Peace Region generation shedding RAS[1].

With the addition of Cowie Creek Wind Project generation in the area, it is noted that SNK 2CB12, SLS 2CB14, SGB 2CB6, or SGB 2CB7 breaker faults, also overload 2L308 in light / heavy summer and heavy winter loading conditions. Also,

[1] The Peace regional transmission system is developed with generation shedding capability to mitigate the impact of various contingencies. Loss of certain transmission element(s) under certain generation, loading and network conditions, will trigger the selected generations to be shed to prevent performance violations.

the line section 2L312-2 (P58 POI – SLS 230 kV) would get overloaded upon loss of 2L309 in the 32LS and 32HS load conditions and upon loss of 2L308 in the heavy winter 31hw load condition. This issue can be addressed by requiring the Cowie Creek Wind Project to participate in the existing Peace Region generation shedding RAS and by adding these breaker contingencies as input signals to trigger generation shedding. The exact requirements will be determined in subsequent studies if the project proceeds.

Table 5-1: Summary of Branch Loading Analysis Results

| Case | IC's Plant Output | Contingency | | Branch Loading | | | |
|---|---|---|---|---|---|---|---|
| | | | | 2L308 | 2L309 | 2L312-1 | 2L312-2 |
| | | Cat. | Description | GMS-DKT | DKT-SNK | SNK - P58 POI | P58 POI - SLS |
| Winter Rating | | | | 478 MVA | 539.4 MVA | 538.2 MVA | 538.2 MVA |
| 31HW | 150 MW | P0 | System Normal | 52% | 20% | 45% | 71% |
| | | P1 | 2L308 | N/A | 27% | 90% | 116% |
| | | P2 | SGB 2CB6, 2CB7, or SLS 2CB14 | 105% | 69% | 9% | 22% |
| Summer Rating | | | | 427.5 MVA | 427.5 MVA | 424.7 MVA | 424.7 MVA |
| 32HS | 150 MW | P0 | System Normal | 63% | 30% | 54% | 87% |
| | | P1 | 2L308 | N/A | 34% | 116% | 149% |
| | | P1 | 2L309 | 33% | N/A | 83% | 116% |
| | | P1 | 2L312 | 113% | 82% | N/A | N/A |
| | | P2 | SLS 2CB11/12 | 113% | 82% | N/A | N/A |
| | | P2 | SNK 2CB12 | 106% | 75% | N/A | N/A |
| | | P2 | SGB 2CB6, 2CB7, or SLS 2CB14 | 120% | 89% | 12% | 27% |
| 32LS | 150 MW | P0 | System Normal | 65% | 33% | 51% | 84% |
| | | P1 | 2L308 | N/A | 34% | 115% | 149% |
| | | P1 | 2L309 | 33% | N/A | 83% | 117% |
| | | P1 | 2L312 | 113% | 82% | N/A | N/A |
| | | P2 | SLS 2CB11/12 | 113% | 82% | N/A | N/A |
| | | P2 | SNK 2CB12 | 106% | 75% | N/A | N/A |
| | | P2 | SGB 2CB6, 2CB7, or SLS 2CB14 | 121% | 90% | 13% | 27% |

[redacted]

### 5.1.2 Steady-State Voltage Analysis

For all the studied load conditions (32ls, 32hs, 31hw), the voltage performance under system normal condition (P0) is acceptable.

There are no voltage deviation violations for P1 or P2 contingencies. The summary below for 31HW case demonstrates the voltages in the surrounding 230 kV buses are within acceptable ranges for representative contingencies.

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

| Case | IC's Plant Output | Contingency | | Bus Voltage (PU) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cat. | Description | MKT 230 | SNK 230 | SLS 230 | DKT 230 | GMS 230 | SGB 230 |
| 29HW | Max | P0 | System Normal | 1.032 | 1.032 | 1.033 | 1.02 | 1.012 | 1.033 |
| | | P1 | 2L308 | 1.029 | 1.029 | 1.025 | 1.02 | 1.012 | 1.025 |
| | | P1 | 2L312 | 1.029 | 1.029 | 1.034 | 1.015 | 1.005 | 1.034 |
| | | P2 | SLS 2CB11/12 | 1.029 | 1.029 | 1.034 | 1.015 | 1.005 | 1.034 |
| | | P2 | SNK 2CB12 | 1.028 | 1.028 | 1.034 | 1.018 | 1.007 | 1.034 |

### 5.1.3 Reactive Power Capability Evaluation

The BC Hydro TIR requires IBR power plant to have the dynamic reactive power capability at a minimum of +/- 33% of its MPO at the high voltage side of the IC's switchyard over the full MW operating range.

Based on the PSS/E power flow data submitted by the IC and the power flow study, the proposed generating project would be capable of meeting the BC Hydro's reactive capability requirement at the plant's maximum MW output, which is subjected to further verification in the next stage of interconnection study.

Furthermore, the BCH TIR requires the IC's project to provide sufficient reactive power capability over full MW operating range including at zero MW output level. According to the IC-provided reactive capability curve, the proposed WTG has +/- 3.78 Mvar reactive capability at minimum MW output, which needs to be re-confirmed adequate in subsequent detailed studies if the IC's project proceeds further.

### 5.1.4 Anti-Islanding Requirements

Cowie Creek Wind may be islanded with other generations and BC Hydro loads for the following contingencies, resulting in potential over-voltages and possible equipment damage which is not allowed.

1. Loss of (2L340 and 2L342) with (3L308 or 3L309 OOS) and (1L361 or 1L349 OOS).
2. Loss of 1L361 or 1L349 with (3L308 or 3L309 OOS) and (2L340 and 2L342 OOS).
3. Loss of 2L308 or 2L309 with (1L361 or 1L349 OOS) and (2L340 and 2L342 OOS)

Cowie Creek Wind is required to participate in the existing Peace region anti-islanding direct transfer trip (DTT) scheme.

In addition, as a back up the IC is required to install anti-islanding protection within its facility to disconnect the IC’s wind farm 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

The POI of the Cowie Creek Wind Project is a tap connection on 230 kV 2L312 line. 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 one switch structure. A 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 IPP, the line protection relays at BC Hydro's SNK and SLS substations for 2L312 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 Cowie Creek wind 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) at the entrance of Cowie Creek project to provide protection coverage for 2L312. BC Hydro P&C Planning will provide protection 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 PPIS equipment by BCH servers.
- Provide anti-islanding protection as stated in Section 5.1.
- The project is required to participate in the existing Peace Region Windfarm RAS.
- The project is required to participate in the existing Peace Region anti-islanding direct transfer trip (DTT) scheme.

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.

## 5.6 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, SNK – SLS, with C37.94 interfaces.
- WECC Level 3 PY & SY, SNK – CWWx, with C37.94 interfaces.
- WECC Level 3 PY & SY, SLS – CWWx, with C37.94 interfaces.

**Telecontrol Requirements for Telecom**

- One CWWx SCADA circuits off FVO & SIO.

**Other Requirements for Telecom**

- 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.

[redacted]

# 7 Conclusions

To interconnect the XYZ Wind Project and its facilities to the BCH Transmission System at the POI, this Feasibility Study has identified the following conclusions and requirements:

1. The T-tap connection on the BCH's existing circuit 2L312 is acceptable for interconnecting the IC's generating project to the BCH system.
2. The connection of Cowie Creek Wind Project does not cause any performance violation (i.e. thermal overload, voltage performance violation or voltage stability concern) under system normal conditions.
3. The connection of Cowie Creek Wind aggravates the pre-existing thermal overload on the BC Hydro lines 2L308 and 2L312 under single contingencies or breaker contingencies (i.e., 2L308, 2L312, SLS 2CB11, SLS 2CB12). These overloads are presently addressed by the Peace Region generation shedding remedial action scheme (RAS). The new Cowie Creek wind project is required to participate in the existing Peace Region generation shedding RAS.
4. With the addition of Cowie Creek Wind generation in the area, it is noted SNK 2CB12, SLS 2CB14, SGB 2CB6, or SGB 2CB7 breaker faults, also overloads 2L308 in light / heavy summer and heavy winter loading conditions. Also, it is noted that a contingency on 2L309, overloads 2L312-2 (P58 POI-SLS 230) in light / heavy summer loading conditions and 2L308 in heavy winter loading condition. These issues can be addressed by requiring the Cowie Creek Wind project to participate in the existing Peace Region generation shedding RAS and by adding these contingencies as input signals to trigger generation shedding. The exact requirements will be determined in subsequent studies if the project proceeds.
5. Cowie Creek Wind may be islanded with other generations and BC Hydro loads after certain critical contingencies, which may result in unacceptable over-voltages. The IC's project is required to participate in the existing peace region anti-islanding direct transfer trip (DTT) scheme. A list of contingencies is provided in Section [redacted]. I n addition to entrance protection and 2L312 protection, as a back up the IC is required to install anti-islanding protection within their facility to

disconnect the wind farm when an inadvertent island with the local load forms.

6. 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 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.

7. BC hydro will provide 2L312 line protection relay replacmenet at SLS and SNK. As part of the line protection replacements for each of the three substations, telecommunication facilities will be required. The IC shall provide required relays, telecom facility, and associated equipment at its facilities to accommodate the protection requirement.

# Appendix A

# Plant Single Line Diagram Used for Power Flow Study

Figure A-1 shows Cowie Creek Wind Project single line diagram used for power flow study.

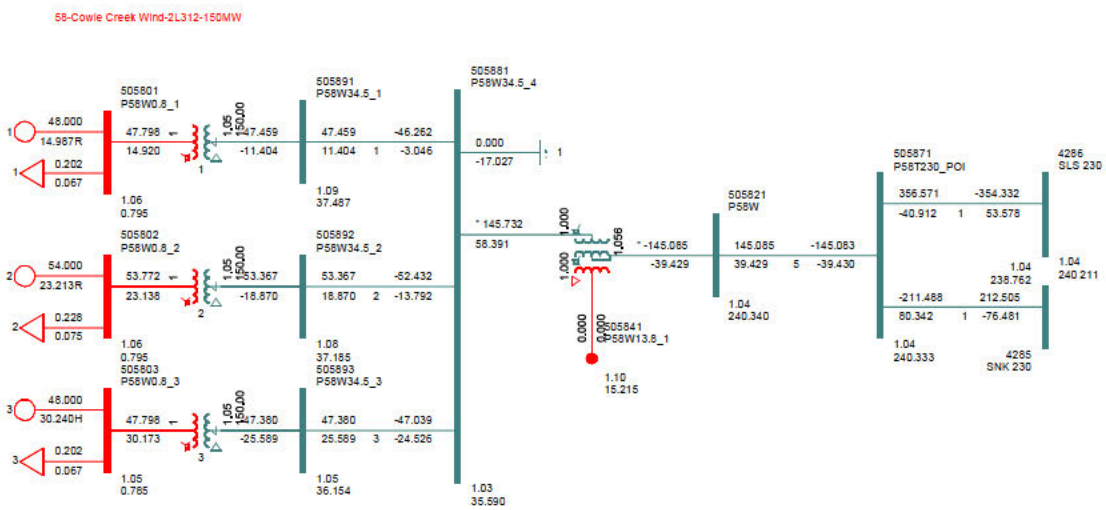


Figure A-1: Cowie Creek Wind Project Single Line Diagram for Power Flow Study.

As seen in the diagram, Cowie Creek Wind Project has one main power transformer and the plant is divided into three parts. Each part consist of one feeder connecting eight wind turbines to the collector station, except for feeder2 which connects 9 turbines for a total of 25 turbines.