# Facilities Study Report

## IR-668

**94.4 MW Weaver's Mountain Wind**
**Antigonish County, NS**

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## EXECUTIVE SUMMARY

This project (IR#668 – Weaver's Mountain Wind) provides for the establishment of a 230 kV system interconnection to Nova Scotia Power Inc (NSPI) transmission line L-7003 for a 94.4MW Wind Generation Facility in Guysborough County, Nova Scotia.

The Point of Interconnection (POI) is at the 230kV bus node of the new 230kV three-breaker ring substation (127C-Weaver's Mountain) located approximately 62 kms from 3C-Port Hastings substation (between existing line structures L7003-469 and L7003-470). The Point of Change of Ownership (PCO) is at the line side of disconnect 127C-771 located at the Weaver's Mountain substation 127C. The POI and PCO are further clarified in the Interconnection Overview Drawing provided in Appendix B.

The new 230kV system interconnection substation has been assigned NSPI system number 127C – Weaver's Mountain. The Interconnection Customer's substation for Weaver's Mountain Wind facility will be directly adjacent to the Interconnection Substation and will be included in the overall fenced area with a security fence separating the Interconnection Customer's facilities from the interconnection substation facilities. The section of line L-7003 between the Interconnection Substation 127C-Weaver's Mountain and the new Grosvenor Substation 125C will be renamed to L-7026.

The scope of work associated with this interconnection will consist of a line tap arrangement to NSPI transmission line L-7003, a three-breaker ring interconnection substation at 127C-Weaver's Mountain, modifications to existing remote protection and remedial action schemes (RAS), and the provision of redundant telecommunications systems.

All interconnection facilities must meet NSPI's Transmission System Interconnection Requirements (TSIR), version 1.1 dated February 25, 2021, as published on the NSPI OASIS site.

The interconnection substation and the Interconnection Customer's Facility substation both meet the Bulk Power System criteria and shall be designed with redundant and physically separated protection, control, and communications.

The following scope of work has been identified as meeting the defined criteria for 'Stand Alone' upgrades as per section 2.10:

- The interconnection substation (127C-Weaver's Mountain) including land acquisition, site preparation, access road, foundations, site grounding, primary equipment, control building, protection and control panels, and all associated devices except for the telecommunications equipment and the microwave radio tower.

Non-stand-alone upgrades include all other elements of the scope of work not identified as stand-alone upgrades including:

- The 230kV transmission line tap from 127C-Weaver's Mountain to L-7003
- The remote protection modifications at 67N-Onslow
- The modifications to existing Remedial Actions Schemes (RAS).
- Telecommunications equipment supply and installation at 127C-Weaver's Mountain Substation.

L-7003 shares a transmission line corridor with transmission line L-7004. Outages to these lines impose limitations on Cape Breton export energy flows. These constraints will require NSPI System Operator actions to minimize risks and maintain system stability. All system outages required to complete the interconnection work shall require advanced planning and coordination with the NS System Operator.

The total estimated cost to construct the required Network Upgrades and Transmission Provider's Interconnection Facilities is **$11,222,245**. Of this amount, the estimated cost to construct the Stand-Alone Network Upgrades is $8,545,097 and the estimated cost to construct the Non-Stand-Alone Network Upgrades is $2,677,148 (There are no TPIF costs associated with this interconnection). The detailed cost estimates are provided in Appendix F. All cost estimates exclude allowance for funds used during construction (AFUDC) or any escalations due to timing of project execution. The customer will be responsible for paying NSPI for the actual costs associated with this project, be they higher or lower than the estimate provided herein, unless otherwise specified in the Generation Interconnection Agreement (GIA).

The Interconnection Customer's targeted commercial operation date is December 31, 2025, with first-power available August 1, 2025. Based on the current supply chain issues and quoted delivery timelines for high voltage primary equipment, the Interconnection Customer's targeted in-service date is not able to be met. An estimated in-service date of Q2, 2026 has been provided based on an executed GIA in Q4, 2023. An overall preliminary project schedule is provided in Appendix G.

Part 2 of the SIS is still in progress and if any additional requirements are identified in the Part 2 Study, the FAC will be updated to reflect those additions as required.

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# Facilities Study Report

IR-668 – Weaver's Mountain Wind

## 1.0 INTRODUCTION

This Facilities Study Report is based on the System Impact Study Report (SIS) as identified below:

System Impact Study Report (Part 1)
Report GIP-IR668-SIS-Part1-R1
By Hung Huynh, P.Eng.
Dated June 14, 2023

The SIS describes the facilities and modifications required to the Nova Scotia transmission system to add a 94.4 MW Wind Generating Facility at Weaver's Mountain interconnected to NSPI's 230kV transmission line L-7003. It also addresses short circuit, steady state, stability, power flow, and motor start analysis. It provides an overview of the scope of work to be completed and directions to this Facilities Study (FAC).

Part 2 of the SIS is still in progress and if any additional requirements are identified in the Part 2 Study, the FAC will be updated to reflect those additions as required.

The scope of work identified in the Facilities Study outlines the anticipated work requirements for a conceptual level of engineering and design. Detailed design may identify additional requirements or modifications that were not anticipated or captured during the preliminary design phase.

### 1.1 Project Ownership and Responsibilities

Ownership, maintenance, and other commercial operation arrangements will be covered separately in a Generation Interconnection Agreement (GIA) between NSPI and the Interconnection Customer.

Following NSPI system naming standards, the new interconnection substation will be labeled 127C-Weaver's Mountain. As the Interconnection Customer's facility substation is at the same location it will also be labeled 127C-Weaver's Mountain but with distinct device numbering.

Ownership of the infrastructure associated with 127C-Weaver's Mountain Wind substation is based on the Point of Change of Ownership at the line side terminals of disconnect 127C-771 (refer to the Interconnection Overview Diagram in Appendix B). NSPI, as the transmission provider, will own the new 230kV, 3-breaker ring interconnection substation (127C-Weaver's Mountain) up to the point of change of ownership.

All communication systems infrastructure between NSPI Facilities and the Interconnection Customer Facilities required for the control and monitoring of the Interconnection Facilities will be owned by NSPI.

NSPI will also own the revenue metering equipment located at the interconnection substation.

All interconnection facilities must meet NSPI's Transmission System Interconnection Requirements (TSIR), version 1.1 dated February 25, 2021, as published on the NSPI OASIS site.

## 1.2 Estimated Cost

The total estimated cost to construct the required Network Upgrades and Transmission Provider's Interconnection Facilities is **$11,222,245**. Of this amount, the estimated cost to construct the Stand-Alone Network Upgrades is $8,545,097 and the estimated cost to construct the Non-Stand-Alone Network Upgrades is $2,677,148 (There are no TPIF costs associated with this interconnection). The detailed cost estimates are provided in Appendix F. *All cost estimates exclude allowance for funds used during construction (AFUDC) or any escalations due to timing of project execution.*

The cost estimates are based on the scope of work outlined in Section 2.0 of this Facilities Study Report. The cost estimate provided in Appendix F are estimates only based on 2023 budgetary dollars. The customer will be responsible to pay NSPI for the actual costs associated with this project, be it higher or lower than the estimate provided herein, unless otherwise specified in the Generation Interconnection Agreement (GIA).

The cost estimate in this report is valid for one hundred eighty (180) days.

The project cannot commence until the customer delivers to NSPI the balance of the cost estimate for the project in a form acceptable to NSPI, or as per the terms of the GIA. As per Item 11.4 of the GIA, Network Upgrade costs are refundable to the Interconnection Customer pending Nova Scotia Utility and Review Board (NSUARB) approval.

## 1.3 Project Schedule

The estimated project duration includes all scope of work required for the transmission interconnection as outlined in Section 2.0.

The Interconnection Customer's targeted commercial operation date is December 31, 2025, with first-power available August 1, 2025.

An outline of major project milestones is provided in Section 5.0 and a preliminary project schedule outlining the major components of this project is provided in Appendix G.

Based on the current supply chain issues and quoted delivery timelines for high voltage primary equipment, the Interconnection Customer's targeted in-service date is not able to be met. An estimated in-service date of Q2, 2026 has been provided based on an executed GIA in Q4, 2023.

# 2.0 SCOPE OF WORK

## 2.1 Interconnection Overview

An interconnection overview diagram of the 94.4MW Weaver's Mountain Wind interconnection is provided in Appendix B. The Point of Interconnection (POI) is at the 230kV bus node of the new 230kV three-breaker ring substation (127C-Weaver's Mountain) located approximately 62 kms from 3C-Port Hastings substation (between existing line structures L7003-469 and L7003-470). The Point of Change of Ownership (PCO) is at the line side of disconnect 127C-771 located at the Weaver's Mountain substation 127C.

## 2.2 Substation Interconnection to Transmission Line L-7003

A conceptual design plan for the line tap to L-7003 has been provided in Appendix E. Modifications may be required as detailed design is finalized. The overall design concept entails replacing structure 469 with a three pole deadend structure with open taps, installing new tangent structures 468A and 469A on each side of the line tap and extending line taps under line L-7003 into substation 127C. A new angle structure is anticipated on the L-7026 side of the tap point on the line tap into the substation.

Tower heights will need to be closely considered in detailed design to avoid any potential clearance issues associated with moving large equipment over the site access road.

An outage will be required on L-7003 to facilitate installation of the line taps to the 127C Substation. Outages to L-7003 will need to be approved by the System Operator and coordinated with any planned outages to minimize any system impacts.

Estimated costs associated with the line tap on L-7003 including termination at the 127C Substation are included in the Non-Stand-Alone Network Upgrade cost estimate.

## 2.3 Transmission Interconnection Substation: 127C-Weaver's Mountain

The developmental one line for 127C-Weaver's Mountain substation is provided in Appendix C. The developmental plan view for 127C-Weaver's Mountain substation is provided in Appendix D. In summary, the interconnection to the Weaver's Mountain Wind facility will consist of a 230kV 3-breaker ring substation designed and constructed by NSPI and a 34.5kV to 230kV substation designed and constructed by the Interconnection Customer (IC). A security fence will separate the NSPI switchyard from the IC switchyard. NSPI will extend the 230kV bus to the security fence where the IC and NSPI will mutually agree to a configuration that will allow the bus to be connected to the customer's 230kV disconnect switch on the high voltage side of their transformer.

The IC shall provide NSPI with deeded ownership and developed access to the land associated with the substation site.

The interconnection substation meets the NPCC Bulk Power System criteria and shall be designed with redundant and physically separated protection, control, and communications.

### 2.3.1 Substation Site Development / Civil Works / Structures / Site Access

#### 2.3.1.1 General Requirements

The following are the general requirements for NSPI substation civil design and construction:

- Topological survey is to be performed prior to design.
- Geotechnical investigation and soil resistivity testing is to be performed prior to design.
- Site Access
  - Access driveways must be designed with adequate width such that all equipment, deliveries, and general maintenance vehicles are able to access substation site.
  - Ditching along access roads are to be provided to ensure access is dry and stable.
  - Culverts are to be used where any drainage cuts across access route.
- Erosion/Sediment Control
  - Check dams/silt fences shall be installed to intercept runoff from any ditches and dewatering activities.
  - Substation finished grade shall be chosen such that surface water drains away from the site.
  - All exposed banks and/or erodible soil shall be temporarily stabilized by suitable means (hydroseed, straw, hay, or sodding).
- Environmental
  - A 30m wide buffer zone shall bracket all watercourses (if applicable).
  - Work inside this zone requires approval through the Dept. of Environment.
- Clearing/Stripping
  - Seasonal clearing must ensure nesting season is avoided and no habitat is destroyed.
  - Stripping shall consist of the removal and disposal of all surface vegetation, chipped or mulched brush, topsoil, trees, brush, tree stumps, roots, and any deleterious other material.
  - All greenfield sites are to be stripped at a minimum depth of 300mm.
- Excavation
  - All excavation practices must adhere to NSPI specification SS –10.7 - Earthworks.
  - Slopes resulting from rock cuts shall normally be 1 horizontal to 1 vertical. Slopes shall be cleaned and trimmed of all disturbed and loose material and left in a neat condition.
  - Following excavation on the site, the ground surface shall be graded and compacted to 95% Standard Proctor Density where it is 900 mm or more from subgrade and to the 100% Standard Proctor Density within the top 900 mm from subgrade.
- Backfill
  - All backfill practices must adhere to NSPI spec SS –10.7 - Earthworks
  - No native material shall be used as fill unless specified by design engineer.
  - Standard Type 1, and 2 gravels used for backfill shall conform to the Nova Scotia Department of Transportation and Public Works Standard Specification.
- Foundations
  - Bearing capacity design shall use maximum allowable bearing pressure of 75 kPa for support structures and 120 kPa for dead end structures.
  - Foundation design shall assume unsubmerged conditions.
  - Concrete must adhere to NSPI concrete spec SS –10.7 - Concrete Cast-in-Place with minimum 28-day compressive strength of 30 MPa.

- Fencing
  - Chain link fencing must adhere to NSPI concrete spec SS –10 - Chain-link Fencing – Supply and Install.
- Structural Steel – Design, Fabrication and Welding
  - Steel design and fabrication shall follow SE-12 Steel Substation Structures – Fabricate & Supply.
  - Materials shall be new and of high commercial quality conforming to the requirements of CSA G40.20 and G40.21, unless noted otherwise.
- Land and access allocated for the interconnection substation shall have deeded ownership provided to NSPI.

#### 2.3.1.2 127C-Weaver's Mountain Site Specific

All cable trenches and conduits shall be installed with full separation of the 'A' and 'B' protection and control systems.

Concrete foundations and steel support structures will be installed for:

- 2 – 230kV tubular dead-ends
- 7 – 230kV high rigid bus supports
- 5 – 230kV low rigid bus supports
- 6 – 230kV disconnect supports
- 3 – 230kV three phase potential transformer supports
- 1 – 230kV three phase current transformer support
- 2 – 132kV-120/240V single phase station service voltage transformer support
- 2 – 230kV three phase surge arrester supports

Concrete foundations only will be installed for:

- 3 – 230kV dead tank circuit breaker
- 1 – control building foundation
- 1 – self-supporting microwave radio tower foundation for 61m tower

### 2.3.2 Substation Grounding

A grounding grid system shall be installed for a design 3-phase fault level of 10,000MVA and meet NSPI's substation grounding specification SD-2. A ground grid design to any fault level lower than 10,000MVA shall require NSPI approval.

The minimum acceptable size of conductor shall be 2/0 stranded copper. Equivalent copper-weld conductor should be used for above ground applications. The ground grids for the NSPI substation and the IC's substation shall be designed to be fully integrated and interconnected to provide one common ground system for the overall station.

All structures, fencing, and equipment shall be grounded as per NSPI standards.

## 2.3.3 Primary Equipment and Layout

A developmental substation layout for 127C is provided in Appendix D. All equipment shall conform with Nova Scotia Power standard equipment specifications.

2.3.3.1 Circuit Breakers 127C-701, 127C-702, and 127C-703

- 230kV, 2000A, 900kV BIL, 2 cycle, 31.5kA mom., SF6 dead-tank circuit breaker with independent pole operation.
- Complete with two sets (each side) of 2000/16/8/6-5A multi-ratio bushing current transformers.
- As per NSPI Standard Circuit Breaker Specification SE-14.

2.3.3.2 230kV Disconnects (127C-701A, 701B, 702A, 702B, 703A, and 704B)

- 230kV, 2000A, 900kV BIL, 63kA mom., complete with 125Vdc motor operator.
  - Line disconnects 127C-702B and 127C-703A will also include an integral key interlocking ground switch.
- As per NSPI Standard Specification SE-8 (Outdoor Air Switches) and SE-10 (Air Switch Motor Operators).

2.3.3.3 230kV Voltage Transformers (P7003 and P7026)

- 2000/1200:1:1 with two 115/69V secondaries, 3000VA, 0.3 WXYZ, 900kV BIL
- As per NSPI Standard Specification SE-4

2.3.3.4 230kV Station Service Voltage Transformer (ST71 and ST72)

- 138kV – 120/240V single phase voltage transformer with KVA rating sized for full AC station service load

2.3.3.5 230kV Line Terminal Surge Arresters

- Station Type, Metal Oxide, 192kV rated, 152kV MCOV
- As per NSPI Standard Specification SE-20.

2.2.3.6 Revenue Metering

The required revenue metering potential and current transformers shall be:

- Potential Transformer (Qty 3)
  - 230kV Rated, Revenue Class Certified, 138kV-115V/69V
  - As per NSPI Standard Specification SE-4 (Instrument Voltage Transformers)
- Current Transformer (Qty 3)
  - 230kV Rated, Revenue Class Certified, 2 Core, ratios as specified in detailed design.
  - As per NSPI Standard Specification SE-6 (Instrument Current Transformers)

## 2.3.4 Protection and Control

At 127C, line protection on all three terminals will consist of redundant "A" and "B" protection schemes, with physical separation of panels and cabling between protection schemes, per Northeast Power Coordinating Council's (NPCC) Directory 4 criteria. The design shall be presented to NPCC Task Force on System Protection (TFSP) for approval and comment, prior to construction.

2.3.4.1 Line Protection

- The A scheme line protection relays shall be SEL-411L, with L-7003 and L-7026 relays using the 87L line current differential element for high-speed tripping and step distance elements for backup tripping.
- The B scheme line protection relays shall be GE L90, with L-7003 and L-7026 relays using the 87L line current differential element for high-speed tripping and step distance elements for backup tripping.
- The line protection shall accommodate single pole tripping and reclosing.

2.3.4.2 Bus Protection

- Redundant A and B bus protection shall be provided for bus B71.
- The A scheme bus protection relay shall be SEL-487B.
- The B scheme bus protection relay shall be GE B30.
- Two CT cores on the HV bushings of the interconnection transformer 127C-T71 shall be made available to supply current contributions to the A and B bus protection.

2.3.4.3 Breaker Failure

- Redundant A and B breaker failure protection shall be provided.
- The A scheme breaker failure protection shall be provided by an SEL-451 bay control relay for each breaker, which shall also provide reclosing and synchronizing for the breaker.
- The B scheme breaker failure protection may be provided by the GE L90 line relays.
- Breaker Failure Initiate (BFI) must not be latched in the design. Breaker failure timer shall only run for (Trip active) AND (Breaker current above minimum pickup). The trip input to the BFI logic shall not be subject to a minimum trip duration.
- Transfer tripping via high-speed tele-protection channels to the remote ends of line L-7003 and L-7026 shall be required for associated line breaker failures.
- Note: Breaker Failure protection is referred to as Breaker Backup (BBU) in NSPI documentation. A Re-trip is referred to as "Early Trip."

2.3.4.4 Reclosing and Synchronizing

- Reclosing may be initiated in the SEL-451 relays by either the A or B protection schemes.
- The reclosing mode shall be Single Pole Auto Reclose (SPAR), Delayed 3 phase Auto Reclose (DAR) or both SPAR/DAR.
- The reclosing function shall have a single OFF/ON control for each breaker, regardless of the reclosing mode selected.
- Automatic synchronizing/sync check shall be provided by the SEL-451 bay control relays.
- Manual synchronizing shall also be provided.

2.3.4.5 DC Supply for Protection

Two redundant 125V DC battery banks along with battery chargers shall supply the DC protection and control systems. The batteries and chargers will be sized as part of the detailed design to fully accommodate all DC loads under simultaneous operation.

- Both A and B 125 Vdc batteries shall have the capacity to supply the entire substation. These will be designated 127C-D41 for the A battery and disconnect switch, and 127C-D42 for the B battery and disconnect switch.
- The two batteries shall be physically separated, preferably in separate battery rooms.
- DC distribution panels for the A and B systems shall not be located beside each other.
- Manual transfer capability shall be provided between the A and B dc systems to permit offline battery maintenance, however there shall be two normally open switches or breakers in this transfer path.

2.3.4.6 Station Control and Communications

- Station control, Remote Terminal Unit (RTU), and Sequence of Events Recording (SER) functions to be provided by a non-redundant SEL Axion system, including SEL-RTAC and SEL-3350 HMI computer, keyboard/trackpad tray and touch screen.
- Communication to Supervisory Control and Data Acquisition (SCADA) master will use DNP3 protocol over a serial channel.
- Network connections between different panels shall be via fiber optic cable. Network connections within a panel may be copper cabling (Cat 5e or Cat 6).
- A non-redundant SEL-2488 satellite clock shall be provided.
- A time signal shall be distributed to each measuring relay using either PTP (IEEE 1588-2008 or later) or IRIG-B timecode over 50 ohm coaxial cable, taking care to maintain galvanic isolation between A and B side equipment.
- Each protective relay shall assert an alarm to the SAS in the event of a loss of satellite clock signal.
- Ethernet switches shall be capable of supporting PTP with the C37.238-2017 power system profile.
- Local substation operation, including tagging functions, shall normally be from the HMI computer/Substation Automation System (SAS).
- In the event of a failure of the SAS, local manual operation of the breakers shall be available from inside the control building.
- Redundant communications paths shall be provided for 127C.

2.3.4.7 Station Alarms

The following substation alarms will be provided to the local Sequence of Events Recorder (SER) and SCADA (unless otherwise noted):

1. Urgent (SCADA) time delayed & initiated by following SER points:
   - Station Service Failed
   - A Battery(s) Volts Low
   - B Battery(s) Volts Low
   - A Battery Charger(s) Failed
   - B Battery Charger(s) Failed
   - A Protection and Control Relay/DC Failed
   - B Protection and Control Relay/DC Failed
   - A Protection AC Potential Failed
   - B Protection AC Potential Failed
   - Breaker Trip Circuit #1 Failed
   - Breaker Trip Circuit #2 Failed

- Line L-7003 A Tele-protection Channels Failed
- Line L-7003 B Tele-protection Channels Failed
- Line L-7026 A Tele-protection Channels Failed
- Line L-7026 B Tele-protection Channels Failed
- Fire Alarm Operated
- Building High Temperature
- Building Low Temperature

2. Non-Urgent (Scada) time delayed & initiated by following SER points:
   - Alternate Station Service Failed
   - Station Service Auto Transfer Operated
   - A DC Supply(s) Grounded
   - B DC Supply(s) Grounded
   - Breaker 701 Monitor Trouble
   - Breaker 702 Monitor Trouble
   - Breaker 703 Monitor Trouble
3. A Transfer Trip Received (Scada) initiated by following SER points:
   - Line L-7003 #1 Transfer Trip From 67N Received
   - Line L-7026 #1 Transfer Trip From 125C Received
4. B Transfer Trip Received (Scada) initiated by following SER points:
   - Line L-7003 #2 Transfer Trip From 67N Received
   - Line L-7026 #2 Transfer Trip From 125C Received
5. Line L-7003 A Protection Operated (SER only)
6. Line L-7003 B Protection Operated (SER only)
7. Line L-7026 A Protection Operated (SER only)
8. Line L-7026 B Protection Operated (SER only)
9. Sync Freq Limit Exceeded (Scada) initiated by following SER point:
   - Synchronizing Frequency Limit Exceeded
12. Sync Volt Limit Exceeded (Scada) initiated by following SER point:
   - Synchronizing Voltage Limit Exceeded
13. Sync Phase Angle Limit Exceeded (Scada) initiated by following SER point:
   - Synchronizing Phase Angle Limit Exceeded
14. Local Control (Scada) initiated by following SER point:
   - Station Control Local
15. Breaker 701 Closed
16. Breaker 702 Closed
17. Breaker 703 Closed
18. Breaker 701 Urgent (Scada) initiated by following SER points:
   - Breaker 701 SF6 Density Low
   - Breaker 701 Motor Overload*
19. Breaker 702 Urgent (Scada) initiated by following SER points:
   - Breaker 702 SF6 Density Low
   - Breaker 702 Motor Overload*
20. Breaker 703 Urgent (Scada) initiated by following SER points:
   - Breaker 703 SF6 Density Low
   - Breaker 703 Motor Overload*
21. Breaker 701 Control Lockout (Scada) initiated by following SER point:
   - Breaker 701 SF6 Control Blocked
22. Breaker 702 Control Lockout (Scada) initiated by following SER point:
   - Breaker 702 SF6 Control Blocked
23. Breaker 703 Control Lockout (Scada) initiated by following SER point:
   - Breaker 703 SF6 Control Blocked

24. Breaker 701 Auto-reclose Off (Scada) initiated by following SER point:
    - Breaker 701 Auto-reclose Off
25. Breaker 702 Auto-reclose Off (Scada) initiated by following SER point:
    - Breaker 702 Auto-reclose Off
26. Breaker 703 Auto-reclose Off (Scada) initiated by following SER point:
    - Breaker 703 Auto-reclose Off
27. Breaker Backup Lockout (Scada) initiated by following SER point:
    - Breaker Backup Lockout Operated
28. Breaker 701 BBU Initiated & Early Trip Operated (SER) only
29. Breaker 702 BBU Initiated & Early Trip Operated (SER) only
30. Breaker 703 BBU Initiated & Early Trip Operated (SER) only
31. Substation Entry
32. Bus B71 Lockout
33. Motor Operated Disconnect (MOD) 771 Closed
34. MOD 701A Closed
35. MOD 701B Closed
36. MOD 702A Closed
37. MOD 702B Closed
38. MOD 703A Closed
39. MOD 703B Closed

*Note: These alarms may differ depending on the manufacturer of the breakers purchased.

#### 2.3.4.8 General

- Specific part numbers for IEDs and equipment remain to be determined.
- A single line protection panel may include two relays for two lines, or a line relay and a bay control relay if this makes economic use of panel space.
- If IEC 61850 is used for protection functions, the network design shall meet NPCC Directory 4 criteria.
- If serial connections are used for communication between relays and/or the SAS, serial fiber shall be used between A and B systems. ie. If the SAS is supplied from the A battery, serial connection to B IEDs shall be over fiber.
- If the physical design of the 127C substation permits the addition of a fourth breaker to accommodate a fourth line terminal, then the protection panel layout shall also accommodate additional relaying.
- Remote engineering access shall be provided via an NSPI-supplied firewall.

### 2.3.5 Control Building

A control building to house the redundant and physically separated protection and control panels, physically separated dual path tele-communications equipment, redundant and physically separated batteries and chargers, and physically separated primary and back-up station service supplies is required. The final size of the control building shall be determined during detailed design. A marshalling box shall be provided in the control building to interface all control cabling from external equipment.

## 2.4 Customer's Terminal Station at 127C-Weaver's Mountain

The Weaver's Mountain Wind terminal substation meets the NPCC Bulk Power System criteria and shall be designed with redundant and physically separated protection, control, and communications. The Interconnection Customer Terminal Substation will be constructed at the same site as the Interconnection Substation separated by a chain link security fence.

### 2.4.1 Terminal Station One-Line

A Basic One Line diagram of the Interconnection Customer's substation at 127C-Weaver's Mountain Wind substation, as provided by the Interconnection Customer, is included in Appendix I. The Interconnection Customer's substation is configured with a single 230kV-34.5kV transformer tapped to a node on the 230kV three-ring breaker interconnection substation. Three 34.5kV collector circuits will be utilized to connect the 94.4MW Wind Farm.

### 2.4.2 Layout, Civil Work, and Structures

The Interconnection Customer's substation will be constructed on the same site as NSPI's Interconnection Substation. The General Requirements as outlined in section 2.3.1 shall apply to Interconnection Customer's substation area.

The substation layout shall be designed by the Interconnection Customer and configured as per the one line provided in Appendix I. The physical 230kV interface with NSPI's Interconnection Substation will be as shown in Appendix D with the PCO at the line side terminals of disconnect 127C-771.

All equipment on the IC's side of the PCO shall be the responsibility of the IC including the 230kV-34.5 kV transformer and 34.5kV collector system. Cable trenches with physical separation for A and B protection cabling shall extend between the two substation areas to interface all control cable and wiring.

### 2.4.3 Interconnection Customer Protection and Control at 127C–Weaver's Mountain

At 127C, 230 kV protection will consist of redundant "A" and "B" transformer protection schemes, with physical separation of panels and cabling between protection schemes, per Northeast Power Coordinating Council's (NPCC) Directory 4 criteria. The design shall be presented to NPCC Task Force on System Protection (TFSP) for approval and comment, prior to construction.

The IC shall provide the following protection and control schemes as a minimum:

- Interconnection Protection
- Redundant A and B Transformer Protection
- Inter-Tie Controls
- Voltage Control
- MW Ramp Rate Control
- Active Power Control
- SCADA control and indication inputs and outputs as specified

- Collector Circuit Protection
- Any additional requirements as specified in the Transmission System Interconnection Requirements (TSIR)

2.4.3.1 Interconnection Protection

The IC shall provide interconnection protection, which as a minimum, shall consist of the following functions and will trip the low voltage (LV) breakers:

- Under voltage (27)
- Over voltage (59)
- Voltage controlled phase overcurrent (51V)
- Over/under frequency (81O/81U)
- Ground overcurrent (51G)

2.4.3.2 Transformer Protection

The transformer protection on the intertie transformer, as a minimum, shall consist of the following functions and trip the 230kV breakers and the LV interrupting devices:

- A and B Transformer differential (87,87NG)
- Overcurrent (50/51, 51N, 51G)
- Over fluxing (24)
- Tertiary Burn Out (51T)
- Tertiary Ground (50TG)
- Gas (63P)
- Low Oil (71)
- High Winding Temperature (49)

2.4.3.3 Collector Circuit Protection

Each 34.5kV collector circuit shall be provided with a protective device, each complete with phase and ground over current protection functions to trigger tripping.

2.4.3.4 Controls and Alarms

NSP's Interconnection Substation will include a remote terminal unit (RTU) to interface with NSP's SCADA system which will receive the operating control signals, alarm and control signals, and analogue signals from the IC's substation.

The following are a list of the signals to be provided from the IC's substation:

2.4.3.5 Station Control and Communications

- Station control, Remote Terminal Unit (RTU), Fault Recording (FR) and Sequence of Events Recording (SER) functions to be provided.
- Communication to Supervisory Control and Data Acquisition (SCADA) master will use DNP3 protocol over a serial channel.
- A satellite clock shall be provided.
- A time signal shall be distributed to each measuring relay using either PTP (IEEE 1588-2008 or later) or IRIG-B timecode over 50 ohm coaxial cable, taking care to maintain galvanic isolation between A and B side equipment.

- IED clock synchronization shall be +/- 100 microseconds.
- Each protective relay shall assert an alarm to the SAS in the event of a loss of satellite clock signal.
- Ethernet switches shall be capable of supporting PTP with the C37.238-2017 power system profile.

### 2.4.4 Station Service

The Interconnection Customer shall provide AC and DC station service supplies of adequate capacity to provide all the electrical power needs of the primary and secondary equipment.

### 2.4.5 Canadian Electrical Code

The customer owned interconnection substation at 127C-Weaver's Mountain shall be designed and constructed to comply with Canadian Electrical Code requirements.

## 2.5 Remedial Action Scheme (RAS) Modifications

NSPI utilize special protection schemes or Remedial Action Schemes (RAS) to manage system power flow conditions.

- Modifications will be required to the Group 3 and possibly Group 4 RAS logic at the 67N-Onslow substation and the 3C-Port Hastings substation (to be determined during detailed design).
- At a minimum, breaker statuses and protection trips from 127C-Weaver's Mountain will be sent via high-speed tele-protection channels to the RAS panel at 67N-Onslow, to be incorporated into the RAS panel logic there.
- The full extent of Remedial Action Scheme (RAS) modifications will not be determined until detailed design. Additional space shall be available in the control building at 127C-Weaver's Mountain to accommodate a single non-redundant RAS panel in case one is determined to be required.
- All additions and/or modifications to RAS are subject to Northeast Power Coordinating Council (NPCC) approval.

Estimated costs associated with the RAS modifications are included in the Non-Stand-Alone Network Upgrade cost estimate.

## 2.6 Remote Terminal Protection Modifications

The A and B line protection relays for L-7003 at 67N-Onslow will be replaced to match the relays to be installed at 127C-Weaver's Mountain. Estimated costs associated with these protection modifications are included in the Non-Stand-Alone Network Upgrade cost estimate.

## 2.7 Revenue Metering

A 230kV revenue metering system, owned by NSPI, shall be installed at the Weaver's Mountain Interconnection Substation (127C).

230kV revenue class current and voltage transformers, complete with supporting structures, test switch, and meter base as per Nova Scotia Power metering standard STD 5.12 (attached as Appendix H: Revenue Metering) will be supplied and installed by Nova Scotia Power on the Nova Scotia Power side of the PCO.

The revenue metering class potential and current transformers shall not be embedded in any other piece of equipment and shall be certified by Measurement Canada for three element metering. Nova Scotia Power shall provide the technical specifications for the required current and voltage transformers to the Interconnection Customer.

Nova Scotia Power will install the revenue meter at the Interconnection Customer's substation once the commissioning is complete and the system is ready for energization.

## 2.8 Tele-Communications

The 127C-Weaver's Mountain substation is classified as bulk power and requires fully redundant communication paths.

The redundant telecommunications paths for the 127C-Weaver's Mountain substation will be installed as per the following:

<u>Dual Communications Paths to 127C-Weaver's Mountain</u>
Path A: Microwave radio: Weaver's Mountain to NSPI existing Maple Ridge radio
Path B: Microwave radio: Weaver's Mountain to NSPI existing McLellan Mountain Radio

A 61m self-supporting tower will be required at 127C-Weaver's Mountain Substation. This tower will accommodate the microwave radio antennae for the Path A system from Weaver's Mountain to Maple Ridge and the Path B system from Weaver's Mountain to McLellan Mountain. Modification to the existing radio systems at Maple Ridge and McLellan Mountain will be made to accommodate the additional paths. The new radio tower at 127C-Weaver's Mountain will be enclosed in its own fenced area near the 127C substation.

All costs associated with these telecommunication assets are included in the Non-Stand-Alone Upgrade cost estimate.

## 2.9 Stand Alone Upgrades Categorization

In the event NSPI cannot meet the Interconnection Customer's schedule expectation or as agreed in the terms of the Generation Interconnection Agreement (GIA), the Interconnection Customer may take responsibility for design, procurement, and construction activities associated with NSPI owned assets.

These design, procurement, and construction activities are limited to upgrades deemed to be 'Transmission Providers Interconnection Facilities (TPIF)' or 'Stand Alone Network Upgrades', defined as:

> *Transmission Provider's Interconnection Facilities shall mean all facilities and equipment owned, controlled, or operated by the Transmission Provider from the Point of Change of Ownership to the Point of Interconnection as identified in Appendix A to the Standard Generator Interconnection and Operating Agreement, including any modifications, additions or upgrades to such facilities and equipment.*
>
> *Stand Alone Network Upgrades shall be defined as Network Upgrades that the Interconnection Customer may construct without affecting day-to-day operations of the Transmission System during their construction.*

The Weaver's Mountain Wind transmission interconnection includes both Network Upgrades and Transmission Provider Interconnection Facilities. Should the Interconnection Customer decide to exercise their 'Option to Build', NSPI have defined the upgrades in terms of what would be considered stand-alone facilities and may be constructed without affecting day-to-day operations of the Transmission System. If the Interconnection Customer exercises their option to build, all facilities must be designed to NSPI Standards and are subject to NSPI review and approval.

### 2.9.1 'Stand-Alone' Network Upgrades and 'Stand-Alone' TPIF

The following scope of work meets the defined criteria for 'Stand Alone' Network Upgrades or Stand-Alone TPIF:

- Stand-Alone Network Upgrade:
  - The interconnection substation (127C-Weaver's Mountain) including land acquisition, site preparation, access road, foundations, site grounding, primary equipment, control building, protection and control panels, and all associated devices except for the telecommunications equipment and the microwave radio tower. Note: the land acquisition and access road costs are the responsibility of the IC and not included in the cost estimates.
- Stand-Alone TPIF
  - There are no Stand-Alone TPIF's for this project.

The cost estimate for the 'Stand-Alone' Network is provided for 127C-Weaver's Mountain substation (see Appendix F).

### 2.9.2 Non-Stand-Alone Network Upgrades and Non-Stand-Alone TPIF

Non-stand-alone network upgrades include all other elements of the scope of work not identified as stand-alone upgrades:

- Non-Stand-Alone Network Upgrades
  - The 230kV transmission line tap to existing L-7003 at 127C-Weaver's Mountain Substation
  - The remote protection modifications at 67N-Onlsow
  - The modifications to existing Remedial Actions Schemes (RAS).
  - Telecommunications equipment supply and installation at 127C-Weaver's Mountain Substation.

- Non-Stand-Alone TPIF
  - There are no 'Non-Stand-Alone' TPIF's for this project.

Interfaces and commissioning activities requiring joint collaboration shall be identified during the detailed design phase and prior to construction.

The cost estimate for the 'Non-Stand-Alone' Network Upgrades has been broken out as a separate cost estimate (see Appendix F).

## 3.0 PERMITS, APPROVALS, AND STANDARDS

The Interconnection Customer is responsible to obtain all permits and approvals required to construct the interconnection substation at 127C-Weaver's Mountain.

The Nova Scotia Electrical Inspection Act requires that electrical work be performed under permit. Contractors must take out permits for work at voltage levels below and above 750V – including work on customer owned substations. Plans must be submitted for review and all equipment must be approved by a recognized certification authority (CSA, ULC, etc.).

The customer facilities are subject to the minimum requirements of the latest edition of the Canadian Electrical Code, CSA C22.1, and other applicable CSA standards, for the purpose of electrical inspection. The cost associated with acquiring wiring permits and the associated electrical inspections are the responsibility of the customer. No equipment will be connected or energized without authorization of the electrical inspector.

Where applicable, all NPCC bulk power standards shall be met.

The interconnection substation installation will be subject to the review and approval by Nova Scotia Power to ensure coordination of the Nova Scotia Power and Interconnection Customer's scopes of work.

## 4.0 DESIGN AND CONSTRUCTION

NSPI will be responsible for the design and engineering drawing production for all aspects of the scope of work from the Point of Interconnection to the Point of Change of Ownership unless otherwise specified and agreed in the Generation Interconnection Agreement (GIA). NSPI will also be responsible for the design of any other associated network upgrades or modifications identified in the Study Impact Study.

NSPI will be responsible for the procurement and construction of all aspects of the scope of work from the Point of Interconnection to the Point of Change of Ownership and any associated network upgrades unless otherwise specified in the Generation Interconnection Agreement (GIA).

The Interconnection Customer shall be responsible for the design, procurement, and construction of all facilities on the Interconnection Customer side of the Point of Change of Ownership.

The construction work associated with this interconnection will require planned outages to existing system components. Planned system outages must be coordinated with NSPI System Operations and will be restricted to opportunities when system reliability risks are acceptable.

## 5.0 SCHEDULE MILESTONES

The Interconnection Customer's targeted commercial operation date is December 31, 2025, with first power on August 1, 2025.

A preliminary project schedule outlining major components is provided in Appendix G.

A series of milestone target dates (listed below) were assumed based on optimistic timelines for the purpose of drafting a preliminary schedule for this Facilities Study. Currently, deliveries on high voltage primary equipment are being quoted by vendors at 24 months. Based on achieving the milestones listed below and the equipment delivery timelines quoted, **the targeted in-service date requested by the Interconnection Customer of Dec. 31, 2025, is not able to be met**. The in-service dates provided in this schedule are based on achieving the progression milestones noted below. Missing any of these milestones increases the risk of not meeting the proposed commercial operation date.

| | |
|---|---|
| Facilities Study Complete | Q4, 2023 |
| Generation Interconnection Agreement Executed | Q4, 2023 |
| Detailed Design Start – L-7003 Line Tap | Q2, 2024 |
| Detailed Design Start – Substation 127C (Weaver's Mountain) | Q4, 2023 |
| Procurement of Long Lead Items Start | Q4, 2023 |
| 127C Site Prep Complete, Access Road Complete | Q3, 2024 |
| 127C Substation Construction Start | Q3, 2024 |
| Receipt of Long Lead Primary Equipment | **Q4, 2025** |
| 127C Substation Complete | Q2,2026 |
| L-7003 Line Tap Complete<br>(Actual timing to coordinate with earliest line outage available opportunity) | Q3, 2025 |
| Remote Terminal Protection and RAS Modifications Complete | Q3, 2025 |
| Targeted First Power Available (per Interconnection Customer) | August 1, 2025 |
| Projected Earliest First Power Available (per NSPI) | **Q2, 2026** |
| Targeted Commercial Operation (per Interconnection Customer) | December 31, 2025 |
| Projected Earliest Commercial Operation Date (per NSPI) | **Q2, 2026** |

# 6.0 COST ESTIMATE

The cost estimates have been produced using 2023 budgetary rates. They do not include allowance for funds during construction (AFUDC) or any escalations due to timing of project execution.

The cost estimates are based on the conceptual design outlined in this report and should be considered as a class 3 accuracy level (-20% / +30%).

The cost estimates include project overheads based on NSPI's typical internal capital administration overhead allocation process.

A contingency of 10% has been included in the estimates to account for any unforeseen scope changes or supply chain issues.

As per Item 11.4 of the GIA, Network Upgrade costs are refundable to the Interconnection Customer pending Nova Scotia Utility and Review Board (NSUARB) approval.

For this Facilities Study the cost estimates have been broken out into two blocks:

1. Network Upgrade: Stand-Alone Interconnection Substation 127C-Weaver's Mountain
2. Network Upgrades – Non-Stand-Alone

There are no Transmission Provider Interconnection Facilities associated with this interconnection.

Cost Estimate Summary:

| Upgrade Component | Cost Estimate |
|---|---|
| **Network Upgrades – Stand Alone** | |
| Three Breaker Ring 230kV Interconnection Substation – 127C Weaver's Mountain | $8,545,097 |
| **Network Upgrades – Non-Stand-Alone** | |
| - 230kV line tap to existing L-7003 at 127C-Weaver's Mountain Substation<br>- Remote protection modifications at 67N-Onslow<br>- Modifications to existing Remedial Actions Schemes (RAS);<br>- Telecommunications equipment supply and installation at 127C-Weaver's Mountain Substation and remote sites. | $2,677,148 |
| **Network Upgrade Total** | **$11,222,245** |

A more detailed breakdown of each cost estimate is provided in Appendix F.

## 7.0 COMMISSIONING / OPERATIONS

NS Power reserves the right to inspect all Interconnection Facilities identified in this study prior to connection to the NS Power Transmission System to ensure the facility design and construction will not adversely affect the reliability of the Transmission System. All Interconnection Facilities are subject to NS Power's review and acceptance of all testing and commissioning requirements and results. Construction, switching, testing, and commissioning schedules that affect the reliable and stable operation of the Transmission System shall be coordinated with the Nova Scotia Power System Operator.

L-7003 shares a transmission line corridor with transmission line L-7004. Outages to either of these lines impose limitations on Cape Breton export energy flows. These constraints will require NSPI System Operator actions to minimize risks and maintain system stability. All system outages required to complete the interconnection work shall require advanced planning and coordination with the NS System Operator.

All interconnection facilities must meet NSPI's Transmission System Interconnection Requirements (TSIR), version 1.1 dated February 25, 2021, as published on the NSPI OASIS site.

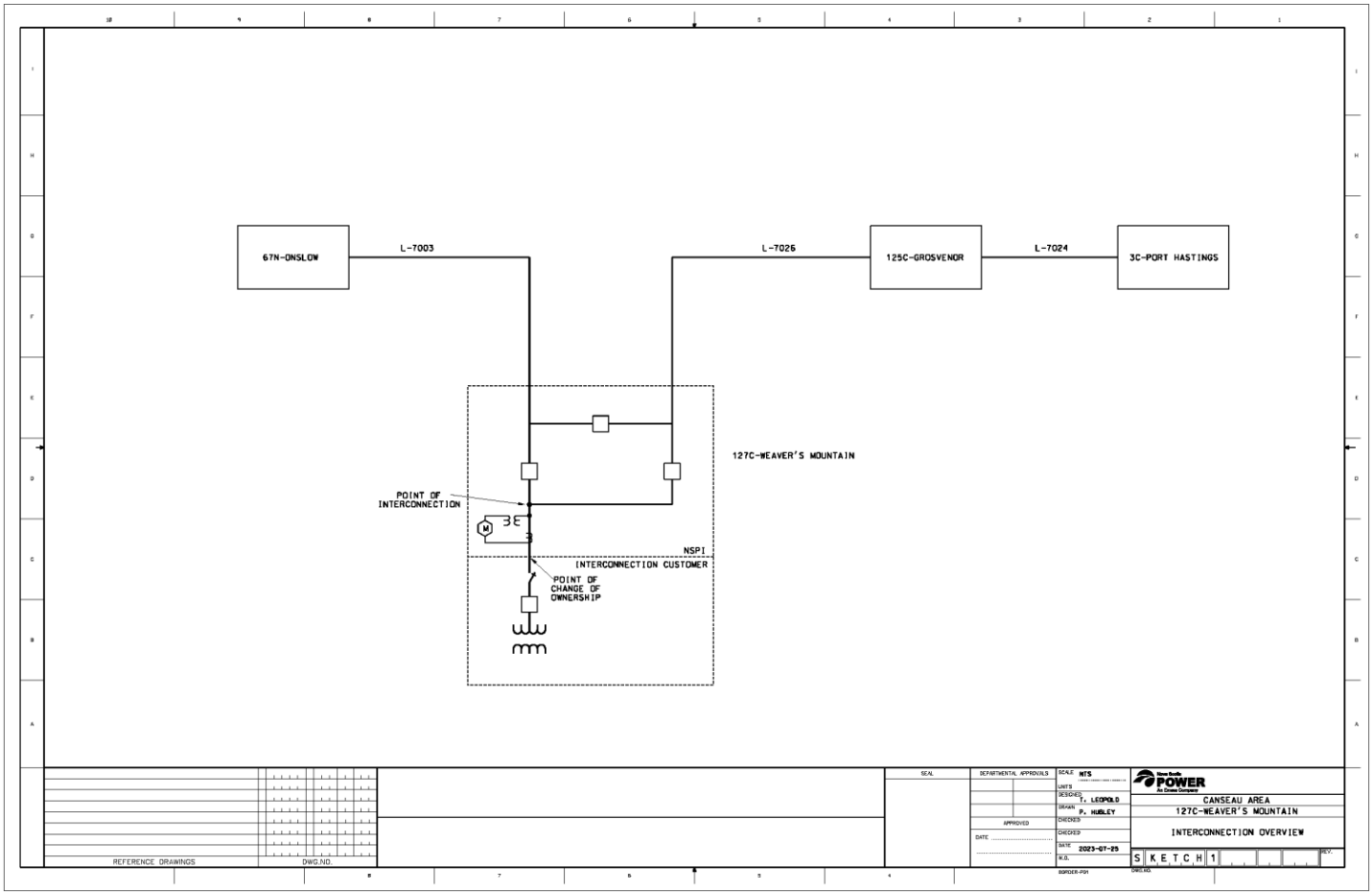
## Appendices

**APPENDIX A – INTERCONNECTION FACILITIES STUDY AGREEMENT**
**APPENDIX B – INTERCONNECTION OVERVIEW**
**APPENDIX C – INTERCONNECTION SUBSTATION DEVELOPMENTAL ONE LINE**
**APPENDIX D – INTERCONNECTION SUBSTATION DEVELOPMENTAL PLAN VIEW**
**APPENDIX E – INTERCONNECTION SUBSTATION DEVELOPMENTAL OVERALL PLAN**
**APPENDIX F – COST ESTIMATE DETAILS**
**APPENDIX G – PRELIMINARY PROJECT SCHEDULE**
**APPENDIX H – REVENUE METERING**
**APPENDIX I – 127C-WEAVER'S MOUNTAIN CUSTOMER STATION ONE LINE**
**APPENDIX J – MINUTES OF FACILITIES STUDY REVIEW MEETING**

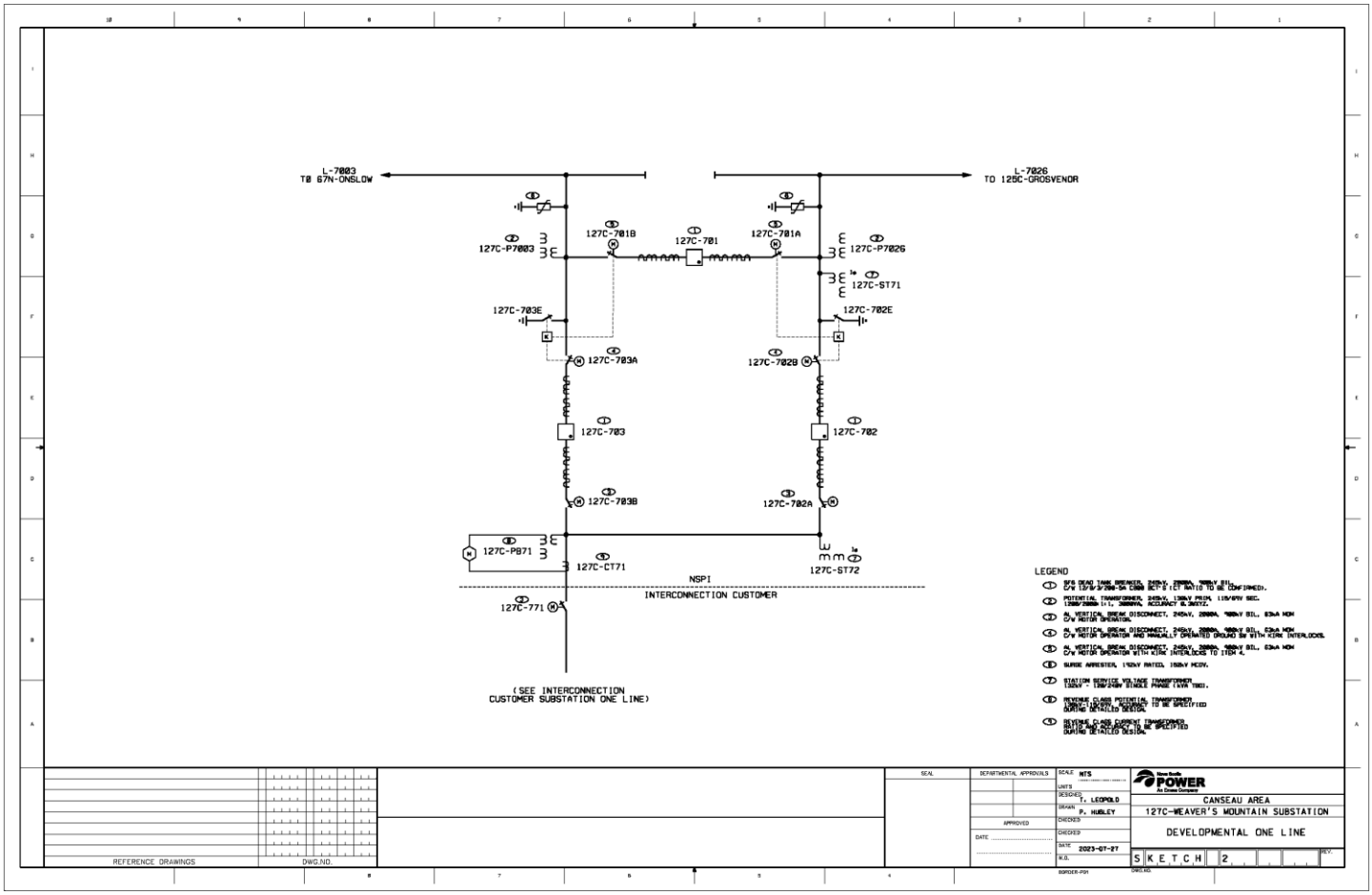
**Appendix A – Interconnection Facilities Study Agreement**

(Attachment 1)

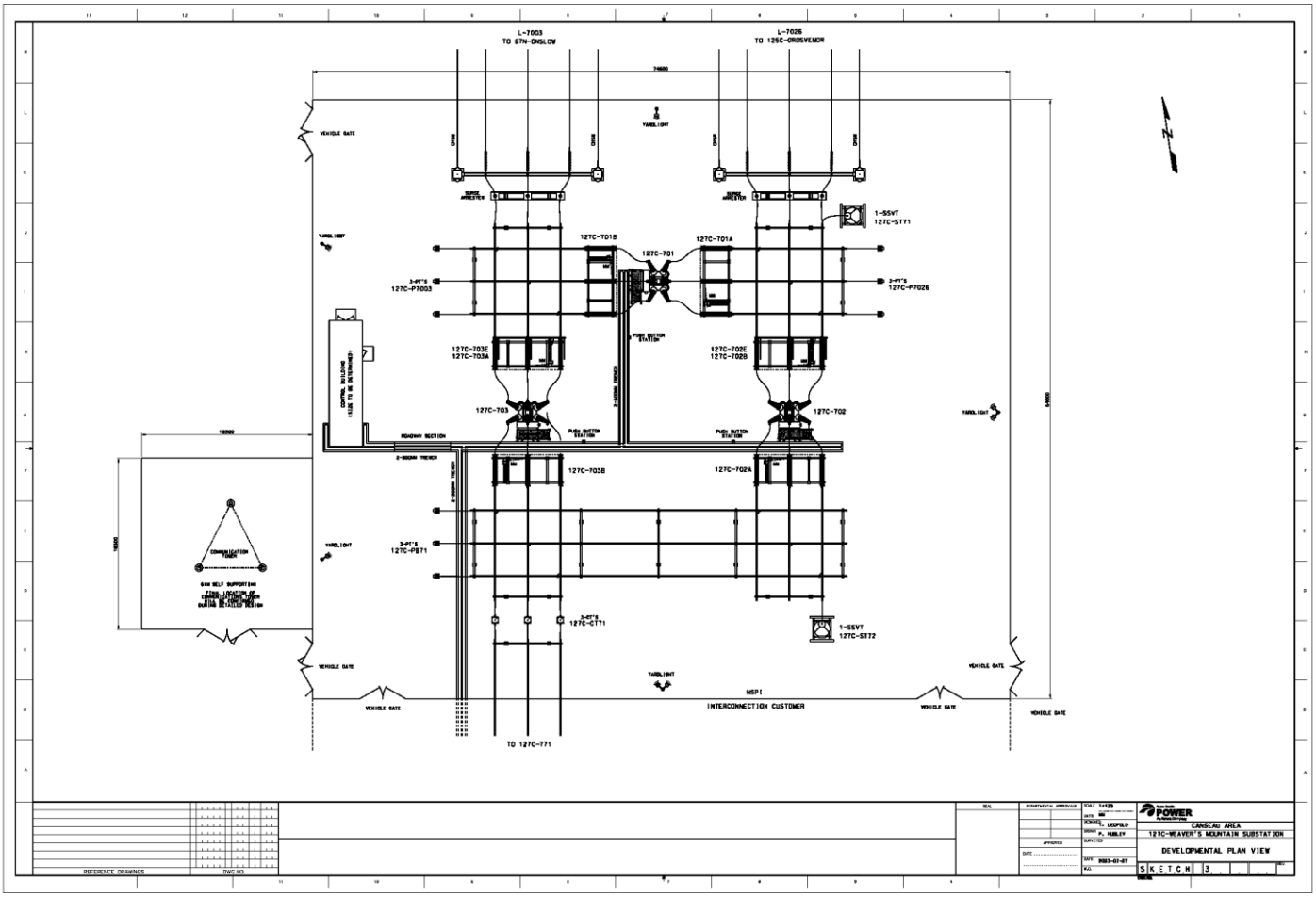
## Appendix B – Interconnection Overview



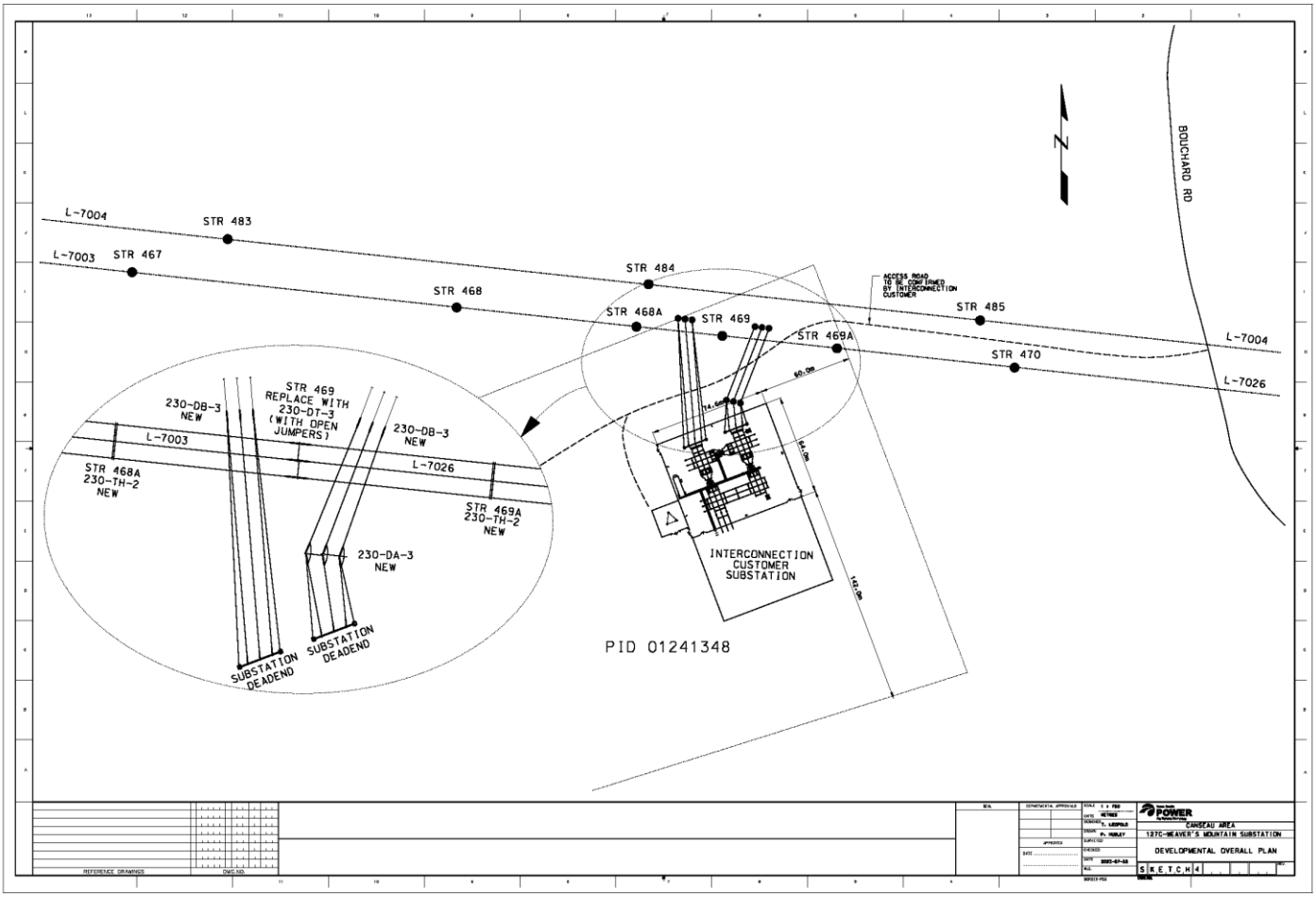
## Appendix C – Interconnection Substation Developmental One Line



## Appendix D – Interconnection Substation Developmental Plan View



## APPENDIX E – INTERCONNECTION SUBSTATION DEVELOPMENTAL OVERALL PLAN



## Appendix F – Cost Estimate Details

### New Substation – 127C Weaver's Mountain

| IR 668 Weaver's Mountain Interconnection Substation - 127C | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Project Number:** | | | | | | | | |
| | | **Cost Centre:** | | **900** | | | | | | |
| | | Labour | | Material | Expenses | | | Contracts | Consulting | Totals |
| Activity | Accounts --> | 535050 | 535200 | 531400 | 530950 | 533410 | 533400 | 531550 | 532500 | |
| 003 | Buildings, Structures and Grounds | 0 | 0 | 415,000 | 0 | 0 | 0 | 2,554,600 | | 2,969,600 |
| 022 | Electrical Control Equipment | 61,880 | 0 | 1,067,200 | 0 | 0 | 0 | 120,000 | | 1,249,080 |
| 043 | Substation Devices | 146,964 | 0 | 1,589,400 | 0 | 0 | 0 | 38,000 | | 1,774,364 |
| 061 | Telephone Equipment ( / Comm Equip.) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| 085 | Design (i.e. Engineering) | 224,871 | | 10,000 | 2,220 | | 2,500 | 0 | 108,000 | 347,591 |
| 086 | Commissioning | 83,331 | 10,313 | 0 | 0 | 1,500 | 0 | 0 | | 95,144 |
| 087 | Field Supervision and Operations | 16,390 | 0 | 0 | 29,850 | | 5,000 | 180,000 | | 231,240 |
| | **Sub-Total** | **533,436** | **10,313** | **3,081,600** | **32,070** | **1,500** | **7,500** | **2,892,600** | **108,000** | **6,667,019** |
| 085 | Contingency | 53,344 | 1,031 | 308,160 | 3,207 | 150 | 750 | 289,260 | 10,800 | 666,702 |
| | **Sub-Total** | **586,779** | **11,345** | **3,389,760** | **35,277** | **1,650** | **8,250** | **3,181,860** | **118,800** | **7,333,721** |
| 005 | Vehicle Allocation (Labour & Eng'g) | | | | 220,866 | | | | | 220,866 |
| 005 | Construction Overhead (Labour) | | | | | | | 439,114 | | 439,114 |
| 005 | Construction Overhead (Contracts) | | | | | | | 551,397 | | 551,397 |
| | **Sub-Total** | | | | **220,866** | | | **990,510** | | 1,211,376 |
| | **Totals** | **586,779** | **11,345** | **3,389,760** | **256,143** | **1,650** | **8,250** | **4,172,370** | **118,800** | **8,545,097** |

## Non-Stand-Alone Upgrades:

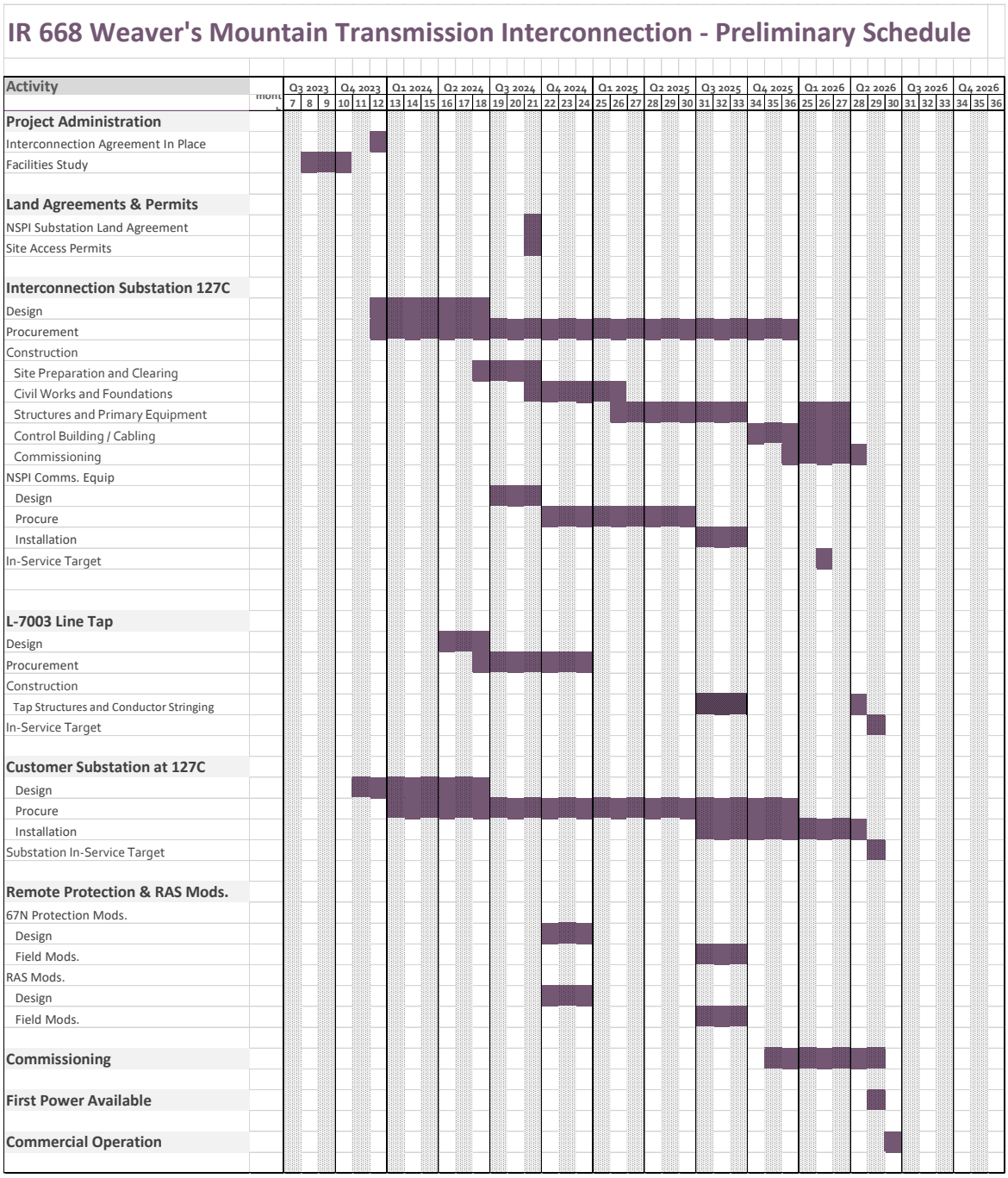
- 230kV line tap to existing L-7003 at 127C-Weaver's Mountain Substation
- Remote protection modifications at 67N-Onslow
- Modifications to existing Remedial Actions Schemes (RAS);
- Telecommunications equipment supply and installation at 127C-Weaver's Mountain Substation and remote sites.

**IR 668 Weaver's Mtn Facilities Study**
**- Non-Stand-Alone Upgrades:**
**L-7003 Line Tap, RAS Mods.,Telecomm, Remote Prot. Mods.**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Project Number:** | | | | | | | | |
| | | **Cost Centre:** | | **900** | | | | | | |
| | | Labour | | Material | Expenses | | | Contracts | Consulting | Totals |
| Activity | Accounts --> | 535050 | 535200 | 531400 | 530950 | 533410 | 533400 | 531550 | 532500 | |
| 022 | Electrical Control Equipment | 28,361 | 5,157 | 80,000 | 0 | 0 | 0 | 0 | | 113,518 |
| 035 | Wood Poles | 5,018 | 0 | 150,000 | 0 | 0 | 0 | 350,000 | | 505,018 |
| 061 | Telephone Equipment ( / Comm Equip.) | 30,940 | 20,627 | 501,000 | 0 | 0 | 0 | 500,000 | | 1,052,566 |
| 085 | Design (i.e. Engineering) | 173,213 | | 5,000 | 1,110 | | 500 | 0 | 20,000 | 199,823 |
| 086 | Commissioning | 15,470 | 3,094 | 0 | 3,000 | 0 | 0 | 0 | | 21,564 |
| 087 | Field Supervision and Operations | 13,658 | 0 | 0 | 2,220 | | 1,500 | 60,000 | | 77,378 |
| 088 | Survey and Mapping | 0 | | 0 | 0 | | 0 | 0 | 10,000 | 10,000 |
| | **Sub-Total** | **266,660** | **28,877** | **736,000** | **4,110** | **0** | **500** | **910,000** | **30,000** | **1,976,148** |
| 085 | Contingency | 26,666 | 2,888 | 73,600 | 411 | 0 | 50 | 91,000 | 3,000 | 197,615 |
| | **Sub-Total** | **293,326** | **31,765** | **809,600** | **4,521** | **0** | **550** | **1,001,000** | **33,000** | **2,173,762** |
| 005 | Vehicle Allocation (Labour & Eng'g) | | | | 110,409 | | | | | 110,409 |
| 005 | Construction Overhead (Labour) | | | | | | | 219,510 | | 219,510 |
| 005 | Construction Overhead (Contracts) | | | | | | | 173,467 | | 173,467 |
| | **Sub-Total** | | | | **110,409** | | | **392,977** | | **503,386** |
| | **Grand Total** | **293,326** | **31,765** | **809,600** | **114,930** | **0** | **550** | **1,393,977** | **33,000** | **2,677,148** |

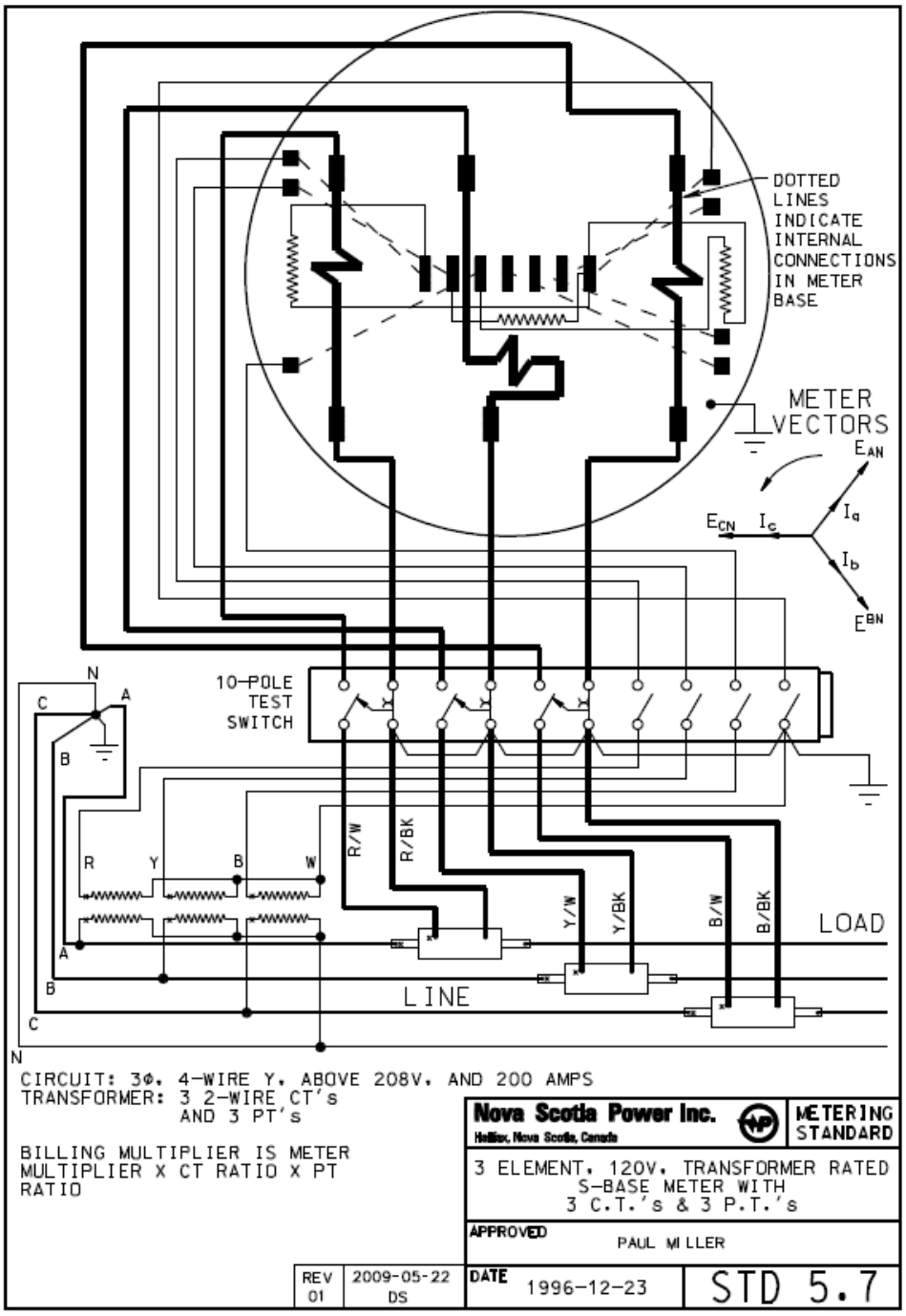
## Appendix G – Preliminary Project Schedule

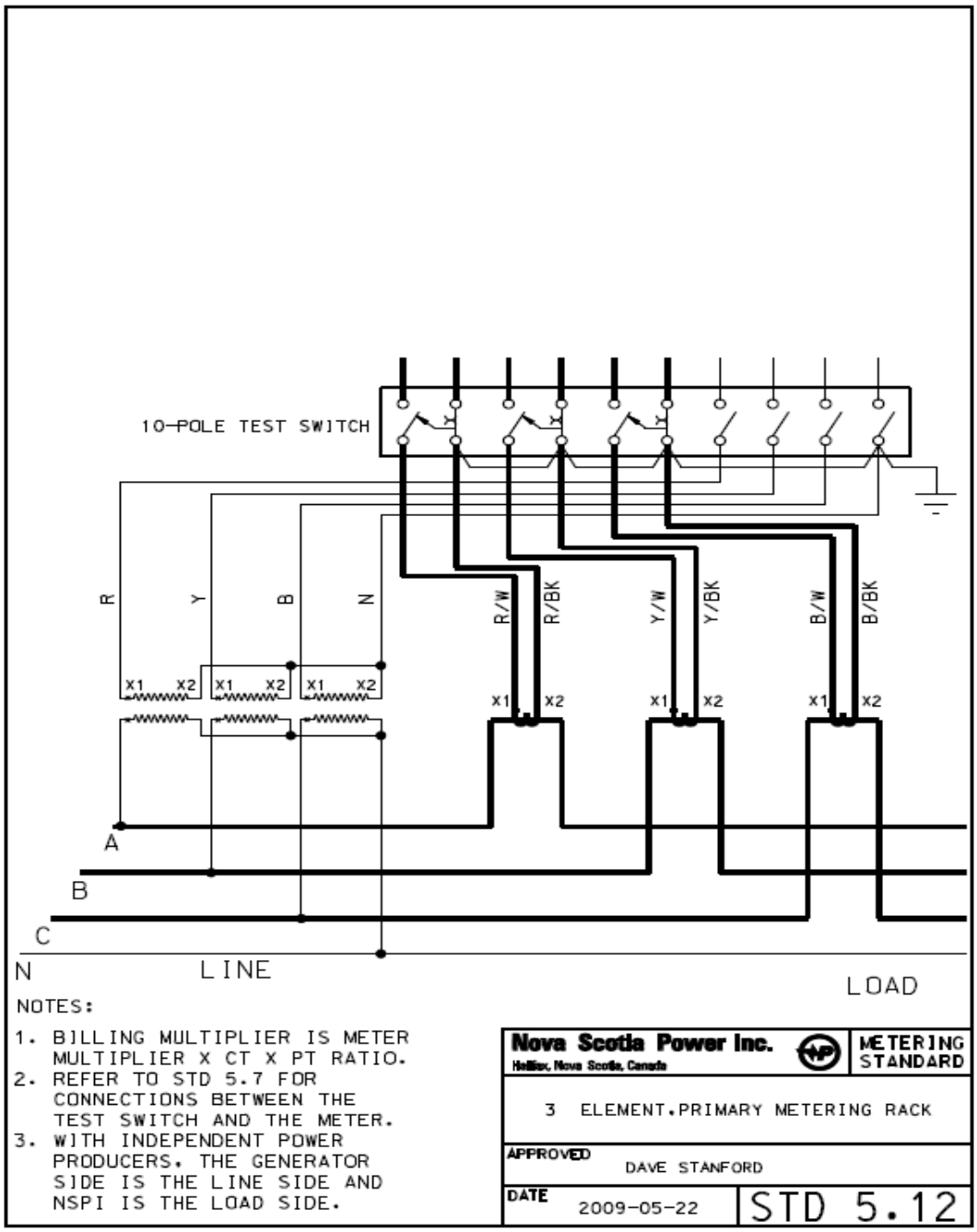
*Note: Primary Equipment supply chain volatility may introduce significant and unpredictable procurement timelines to the overall project schedule.*



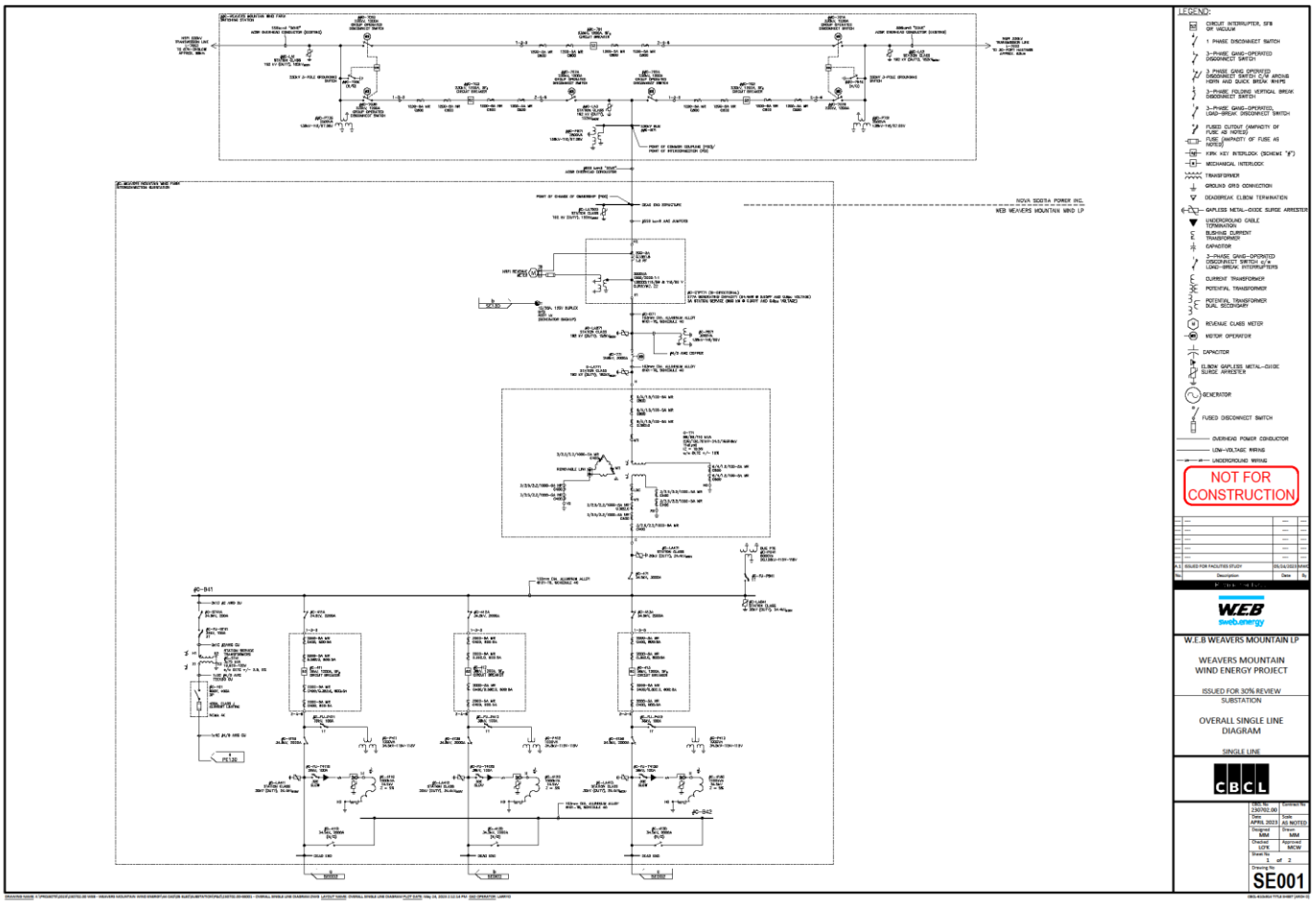
## Appendix H – Revenue Metering

NSPI Standards 5.7 and 5.12




10-POLE TEST SWITCH
R
Y
B
N
R/W
R/BK
Y/W
Y/BK
B/W
B/BK
X1
X2
A
B
C
N
LINE
LOAD
NOTES:
1. BILLING MULTIPLIER IS METER MULTIPLIER X CT X PT RATIO.
2. REFER TO STD 5.7 FOR CONNECTIONS BETWEEN THE TEST SWITCH AND THE METER.
3. WITH INDEPENDENT POWER PRODUCERS, THE GENERATOR SIDE IS THE LINE SIDE AND NSPI IS THE LOAD SIDE.
Nova Scotia Power Inc.
Halifax, Nova Scotia, Canada
METERING STANDARD
3 ELEMENT.PRIMARY METERING RACK
APPROVED
DAVE STANFORD
DATE
2009-05-22
STD 5.12

## Appendix I – 127C-Weaver's Mountain Wind Customer Station One Line



## Appendix J – Minutes of Facilities Study Review Meeting

Notes:

- Attendees:
- Introductions
- Review of questions provided by the Interconnection Customer (IC) on the draft Facilities Study (FAC):
  - 
  - 
- Next steps:
  - 
  - 