CI C0083589

IR751 Brooklyn Community Solar

REDACTED

May 4, 2026

Nova Scotia POWER
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NSEB APPROVAL SHEET

Project Title: IR751 Brooklyn Community Solar

CI Number: C0083589 **Date:** May 4, 2026

Expenditure Profile

Year	Budget Amount	Project Estimate
2026		792,788
2026		(792,788)
2027		2,153,774
2027		(2,153,774)
Total	$0	$0

Type of Filing

- [ ] Capital Project Authorization
- [X] Unforeseen and Unbudgeted (U&U)
- [ ] Planned & Advanced (P&A)
- [ ] Subsequent Approval Item
- [ ] Authorization to Overspend (ATO)
- [ ] Scope Change
- [ ] Final Cost (FIN)

COMMENTS

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

Authorized Signatory
Dave Pickles
Chief Operating Officer

DATE
May 4, 2026

Approved on behalf of NOVA SCOTIA ENERGY BOARD

DATE

CI Number: C0083589

Title: IR751 Brooklyn Community Solar

Start Date: 2026/02
In-Service Date: 2027/06
Final Cost Date: 2027/12
Function: Distribution
Forecast Amount: $0

DESCRIPTION:

In order to accommodate the new Brooklyn Community Solar generation project, NS Power must undertake upgrades to and expansion of existing distribution facilities (at the Interconnection Customer's expense). The required work includes the following:

The Interconnection Customer will pay the actual costs incurred by NS Power. All work will be performed in accordance with NS Power standard practices.

The above project work is based on the Final Distribution System Impact Study (DSIS) for IR751 Brooklyn Community Solar (please refer to Partially Confidential Attachment 1).

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for distribution projects include "work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."

- 2026 C0083811 IR769 Sydney Community Solar $0
- 2026 C0083591 IR746 Petpeswick Solar Farm $0

Depreciation Class: Distribution Plant – Overhead Conductors and Devices

Estimated Life of the Asset: 30 years

JUSTIFICATION:

Justification Criteria: Distribution System

Sub Criteria: Requirement to Serve

Why do this project?

NS Power has a requirement to serve interconnection customers participating in the Government of Nova Scotia's Community Solar Program. The Minister has issued a Power Purchase Agreement for this project, in accordance with s.11(5) of the Electricity Act.. This project will add 4.8 MW of solar energy to the grid.

Why do this project now?

NS Power has received direction from the Government of Nova Scotia to proceed with the interconnection based on the Power Purchase Agreement (PPA) with the Interconnection Customer. This timing aligns with the expected operation date of the solar garden facility.

Why do this project this way?

The Minister has issued a Power Purchase Agreement for this project, in accordance with s. 11(5) of the Electricity Act. The project will be completed as per standard working procedures including the required work orders, work permits, inspection testing and commissioning and in accordance with the regulated rules of the Distribution Generation Interconnection Procedure (DGIP)

Capital Project Detailed Estimate

Location: Steam
CI# : C0083589
Title: IR751 Brooklyn Community Solar
Execution Year: 2026-2027

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
Electrician	PD	1550	$ 403	$ 625,085		
Engineering	PD	202	$ 452	$ 91,374		
			Sub-Total	$ 716,460		
Travel Expense						
Travel Expense	Lot	1	$ 22,500	$ 22,500		
			Sub-Total	$ 22,500		
Materials						
Primary Metering Rack	Lot	1	$ 41,000	$ 41,000		
Electronic Recloser	Lot	1	$ 111,800	$ 111,800		
Recloser Transformer	Lot	1	$ 2,500	$ 2,500		
SCADA Communication Modems	Lot	1	$ 15,000	$ 15,000		
Extension 1.2 km of 2/0 AASC	Lot	1	$ 320,000	$ 320,000		
Reconcoducting of 3.6km	Lot	1	$ 1,100,000	$ 1,100,000		
			Sub-Total	$ 1,590,300		
Vehicle Overhead						
Vehicle Labour AO				$ 230,542		
			Sub-Total	$ 230,542		
Administrative Overhead						
Labour AO				$ 386,759		
			Sub-Total	$ 386,759		
			SUB-TOTAL (no AO, AFUDC)	$ 2,329,260		
			Capital Contributions	$ (2,946,562)		
			TOTAL (AO, AFUDC included)	$ (0)		
Original Cost				N/A		

Note 1: The labour figures noted above are an average of salaries across a variety of jobs within similar classifications including fringe, and are used solely for budgeting purposes.
Note 2: Small differences in totals are attributable to rounding.

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Instructions: Select option in Column B. Columns C through G will auto-populate.

Document No: XXX-XX-XXXX-XXXX

Project Cost Estimate Input Checklist and Maturity Matrix

Transmission Line Infrastructure	Required fields:	Estimate Classification				
Project Name: IR751 Brooklyn Community Solar	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete					
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)	P	P	D	D	D
Site Infrastructure (Access, Construction Power, Camp, etc.)	Defined (D)	NR	P	D	D	D
B. Capacity						
Voltage (kV) and Circuits	Defined (D)	P	P	D	D	D
C. Project Location						
Not Applicable						
D. Requirements						
Codes and/or Standards	Defined (D)	NR	P	D	D	D
Environmental Monitoring	Not Applicable (NA)	NR	NR			
E. Technology Selection						
Not Applicable						
F. Strategy						
Right-of-Way (ROW)	Defined (D)	P	P	D	D	D
Contracting/Sourcing	Defined (D)	NR	P	D	D	D
Escalation	Defined (D)	NR	P	D	D	D
G. Planning						
System/Grid Planning (including substation and interconnect locations)	Defined (D)	P	P	D	D	D
Logistics Plan	Preliminary (P)	P	P	P		
Integrated Project Plan	Defined (D)	NR	P	D	D	D
Project Code of Accounts	Defined (D)	NR	P	D	D	D
Project Schedule	Defined (D)	NR	P	D	D	D
Regulatory Approval & Permitting	Defined (D)	NR	P	D	D	D
Risk Register	Preliminary (P)	NR	P			
Stakeholder Consultation/Engagement/Management Plan	Defined (D)	NR	P	D	D	D
Work Breakdown Structure (WBS)	Defined (D)	NR	P	D	D	D
Start-up & Commissioning Plan	Preliminary (P)	NR	P	P/D		
H. Studies						
Routing Options	Defined (D)	P	P	D	D	D
Topography & Bathymetry	Not Applicable (NA)					
Environmental Impact/Sustainability Assessment	Not Applicable (NA)	NR				
Environment/Existing Conditions	Not Applicable (NA)	NR				
Meteorology and/or Oceanographic/Subsea	Not Applicable (NA)	NR				
Soils & Hydrology	Not Applicable (NA)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Conductor, Insulator, Grounding, Joint Design (including protection for buried or subsea)	Complete (C)	S	P	C	C	C
Foundation/Structure (Tower) Design	Not Applicable (NA)					
Route Mapping/Survey	Complete (C)	S/P	P/C	C	C	C
Design Specifications	Complete (C)	NR	S/P	C	C	C
Instrument List	Complete (C)	NR	S/P	C	C	C
Construction Permits	Not Applicable (NA)	NR				
Geometric Layout, Alignment, Profile, Cross Section	Not Applicable (NA)	NR				
Land/ROW Title Negotiation	Complete (C)	NR	S/P	P/C	C	C
Civil/ Site/Structural/Architectural Discipline Drawings	Not Applicable (NA)	NR				
Crossings and Borings Designs and Drawings	Not Applicable (NA)	NR				
Demolition Plans and Drawings	Not Applicable (NA)	NR				
Erosion Control Plan & Drawings	Not Applicable (NA)	NR				
Foundation/Structure (Tower) Discipline Drawings	Not Applicable (NA)	NR				
Tower/Structure Location/Spotting	Not Applicable (NA)	NR				
Instrument Datasheets	Complete (C)	NR	NR/S	P	P/C	C
Electrical Discipline Drawings	Complete (C)	NR	NR	S/P	P/C	C
Instrumentation/Control System Discipline Drawings	Preliminary (P)	NR	NR	S/P	P/C	
	Total # Deliverables for this Project	8	23	25	23	22
	% Defined/Complete towards Class Estimate	100%	100%	96%	88%	85%

Comments:

This project is being filed as a Class 3 estimate. The defined deliverables for this project indicate that 96% of Class 3 deliverables are completed. A contingency value of 0% was selected as this project is customer contributed and any potential additional costs will be fully recovered from the customer.

Legend:

The maturity level is an approximation of the completion status of the deliverable. The completion is indicated by the following descriptors:

General Project Data:

- **Not Required (NR):** May not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- **Preliminary (P):** Project definition has begun and progressed to at least an intermediate level of completion. Review and approvals for its current status has occurred.
- **Defined (D):** Project definition is advanced, and reviews have been conducted. Development may be near completion with the exception of final approvals.

Technical Deliverables:

- **Not Required (NR):** Deliverable may not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- **Started (S):** Work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- **Preliminary (P):** Work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- **Complete (C):** The deliverable has been reviewed and approved as appropriate.

Inclusions:

For the purposes of this document, the term *power transmission line infrastructure industries* is assumed to include greenfield or brownfield sites for overhead, buried and submarine transmission of electrical power in the infrastructure industries. High voltage is typically >100kV but may be less (e.g., 33 or 66kv) if long distance with light electrical loads. This excludes power supply and distribution scope within a process plant, mining facility, building complex or other facility site. It also excludes power generation facilities and substations. The defining deliverables of those excluded project scopes are covered in other RPs (e.g., 18R-97 for process plants [2]).

Power transmission is considered an element of the infrastructure industry. The Construction Industry Institute has provided a good definition of infrastructure in its Project Definition Rating Index for Infrastructure Projects as follows [3]:

"A capital project that provides transportation, transmission, distribution, collection or other capabilities supporting commerce or interaction of goods, services, or people. Infrastructure projects generally impact multiple jurisdictions, stakeholder groups and/or a wide area. They are characterized as projects with a primary purpose that is integral to the effective operation of a system. These collective capabilities provide a service that is made up of nodes and vectors into a grid or system."

Using this definition, power transmission lines are a vector or linear scope element that connects substation or other facility nodes at its terminations. The substation nodes may be part of or associated with a generation, consuming or interconnection facility. As such, transmission projects are often executed as part of a program that also involves node project scope or facility operational changes (or at least considerations for integrated system commissioning and startup). As the definition states, a distinguishing feature of these projects is that they often traverse wide areas, cross country or subsea, which puts an emphasis on the definition of routing, land ownership and conditions, and establishing right-of-way (ROW). Associated scope definition challenges include defining stakeholder, permitting and regulatory requirements. Buried and submarine installations increase the focus on the protection philosophy and strategies affecting cable selection, armoring and joint considerations. While many distinguish power transmission (higher voltage, long distances) from power distribution (short distance, lower voltage connections to retail customers), the principles of estimating these elements are similar; i.e., the RP applies to both.

The main physical power transmission line scope elements are conductors and their support structures if installed overhead. Main installation elements include land clearing if over land (including forestry if applicable), foundation and structure erection and conductor stringing if overhead, or trenching, laying and horizontal boring if subsurface or subsea. Special scope elements are involved with crossings of water, road, rail and so on and at terminations. Because conductor (e.g., aluminum) and structure (e.g., steel) material costs are usually a significant cost element, these project estimates are particularly sensitive to escalation uncertainty. In general, the more developed the route, the more complex the installation will be. In urban areas, visual appeal and concern for safety and health can be major issues. Installation in remote location and/or difficult or environmentally sensitive terrain creates its own challenges. Subsea installation adds the need for bathymetry[1] and metocean[2] studies and specialized installation equipment and vessels. Before any installation work can begin in an area, stakeholder consultation must be advanced (sometimes requiring agreements with local populations with rights), and appropriate land and ROW must be acquired which creates unique scheduling as well as cost challenges.

For the purpose of estimate classification then, the main scope definition deliverables are associated with defining the power requirements (i.e., kV), the conductors and structure, and the routing. Conductors can vary widely in content (copper, aluminum, etc.) and insulation. Overhead structures may be wood, concrete, composite or steel in various configurations with various foundation designs including pilings, concrete and so on. The route's land or subsea characteristics and the nature of developments drive the need for special design features and execution strategies. Operability and maintainability considerations may also affect ROW and access design. Brownfield and revamp projects add their own concerns for interface with existing elements, crowded working conditions, etc. For each scope definition decision, stakeholder requirements need to be considered.

Power substation projects are usually associated with transmission projects. However, substations being equipment-centric and located on a facility site have physical and defining characteristics similar to process plant projects (e.g., reliance on one-line diagrams, plot plans, etc.).

INTERCONNECTION REQUEST #751
SYSTEM IMPACT STUDY

Community Solar program: Total 4.8 MW Capacity
Site Address: Brooklyn Road, Annapolis County, NS

Report Number:
W-DSIS-2025-011

Prepared By: NSPI
Date: November 17th, 2025

Rev	Description	Date	Prepared	Reviewed	Approved
0	Issued for Release	November 17, 2025	MA	JH, BH, RD	BH

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SUMMARY

This study was initiated to determine the requirements and conditions for the proposed interconnection of 4.8 MW of solar generation with inverters by the Interconnection Customer (IC) at the Brooklyn Road, Annapolis County, Nova Scotia. The Brooklyn Solar Farm facility is supplied via the 12 kV distribution feeder [redacted] from the [redacted].

The key findings of this report with respect to the impact of this development on the local distribution system are as follows:

- A gang operated, NSPI accessible, and lockable switch, capable of providing a visible break, is required between the Generating Facility and its connection point behind the meter
- Nova Scotia Power Inc. (NSPI) must add onto existing distribution facilities (at the Interconnection Customer's expense) in order to accommodate the Brooklyn Solar Farm Site.
  - The required work includes:
    - [redacted]

  The Interconnection Customer shall pay a capital contribution for any required line extensions, upgrades, and right-of-way acquisition necessary to extend the Distribution System to the Generating Facility. The line between POI and customer owned Gang operated switch is dedicated to serve the Interconnection Customer, all maintenance, repair and replacement costs are the responsibility of the Interconnection Customer. NS Power will perform and manage the maintenance of these facilities. Bell-Aliant owned equipment such as pole replacements, transfers, guy replacements, and customer owned equipment such as the gang operated switch is not included in these estimates.

- The cost estimate to complete the work as outlined in Section 7.0 of this report is $2,557,454 plus tax. The Interconnection Customer will pay any actual costs incurred by NSPI. All costing will be performed in accordance with NSPI standard practices. The Interconnection Customer must comply with the Generating Facility requirements listed in

Section 4 of this report. The Interconnection Customer must comply with the Interconnection Facility requirements listed in Section 6 of this report.

- Flicker data was not available for the solar generators at the Brooklyn Solar Site. Should at any future time flicker emissions from the site be of concern to NSPI or to other connected customers, then the Interconnection Customer will be given a reasonable amount of time to find an acceptable solution to lower the flicker levels. If, after notice has been provided and a reasonable amount of time has elapsed, the Interconnection Customer fails to make corrections, NSPI may disconnect the generating facility per Article 4.4.4 of Standard Small Generator Interconnection and Operating Agreement (SSGIA).
- NSPI requires that the Interconnection Customer operate the solar generators with a power factor as specified in Section 4.6 of this report.
- Protection and control settings for the Brooklyn Solar generation recloser and upstream devices have been included in Appendix B – Protection, Current, and Time curves. These settings are subject to change prior to the facility in-service date.
- NSPI shall have sole operational control over all NSPI owned high voltage equipment at the Brooklyn Solar Site. Operational Control of the Interconnection Customer's high voltage and low voltage equipment shall be designated in the Standard Small Generator Interconnection and Operating Agreement, per Section 6.4 of this report.

In addition to the interconnection requirements described in this report, it is the Interconnection Customer's responsibility to ensure that their electrical installation meets all applicable national, provincial, and municipal electrical construction and safety codes including, without limitation, the Electrical Installation and Inspection Act. Except as expressly permitted by law, all electrical equipment (including batteries and inverters) must have CSA or equivalent approval. The regulations require that electrical and communication installations must be performed under permits and be inspected. Application for permits and inspections can be obtained from the NSPI Electrical Inspection Authority. The following are general requirements and not all inclusive as to other requirements mandated by the Inspection Authority:

- The customer must provide two sets of electrical drawings to the Inspection Department for review before the commencement of any electrical work at the site.
- The electrical installation must comply with the Canadian Electrical Code, Part 1, and applicable electrical inspections bulletins.
- The electrical contractor(s) must obtain all necessary Wiring Permits before the commencement of any electrical work.
- No electrical equipment is permitted to be energized until it has received an inspection and acceptance by the Inspector.
- No electrical installation is permitted to be covered up until the installation has received an electrical inspection and acceptance by the Inspector. (Examples: underground cables and raceways and grounding conductors).
- The electrical contractor must arrange and schedule all necessary inspections.
- Electrical Equipment must be certified by an acceptable certification agency acceptable to the Nova Scotia Department of Environment and Labour. High voltage equipment such as padmount transformers must be built to an applicable CAN/CSA standard. Where there is no applicable CAN/CSA standard, the Inspection Department would require a special inspection to be performed by a recognized agency.

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LIST OF TABLES AND FIGURES

1.0 INTRODUCTION

[redacted]

Figure 1: Proposed Solar Location

The proposed development is for the installation of 4.8 MW of solar generation with inverters. The installation has been approved for the Community Solar Program.

2.0 LOCAL SUPPLY

[redacted]

2.1 Substation

[redacted]

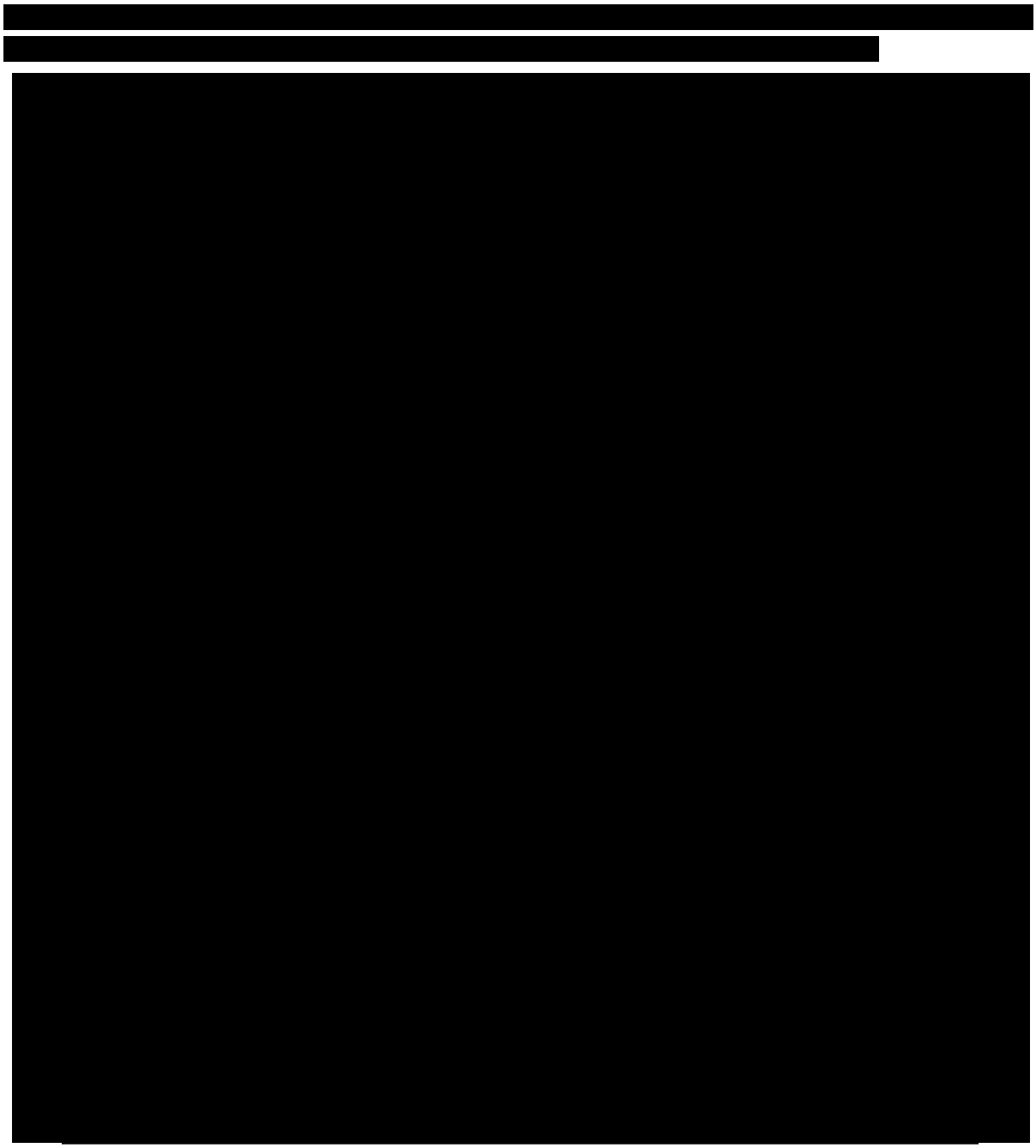
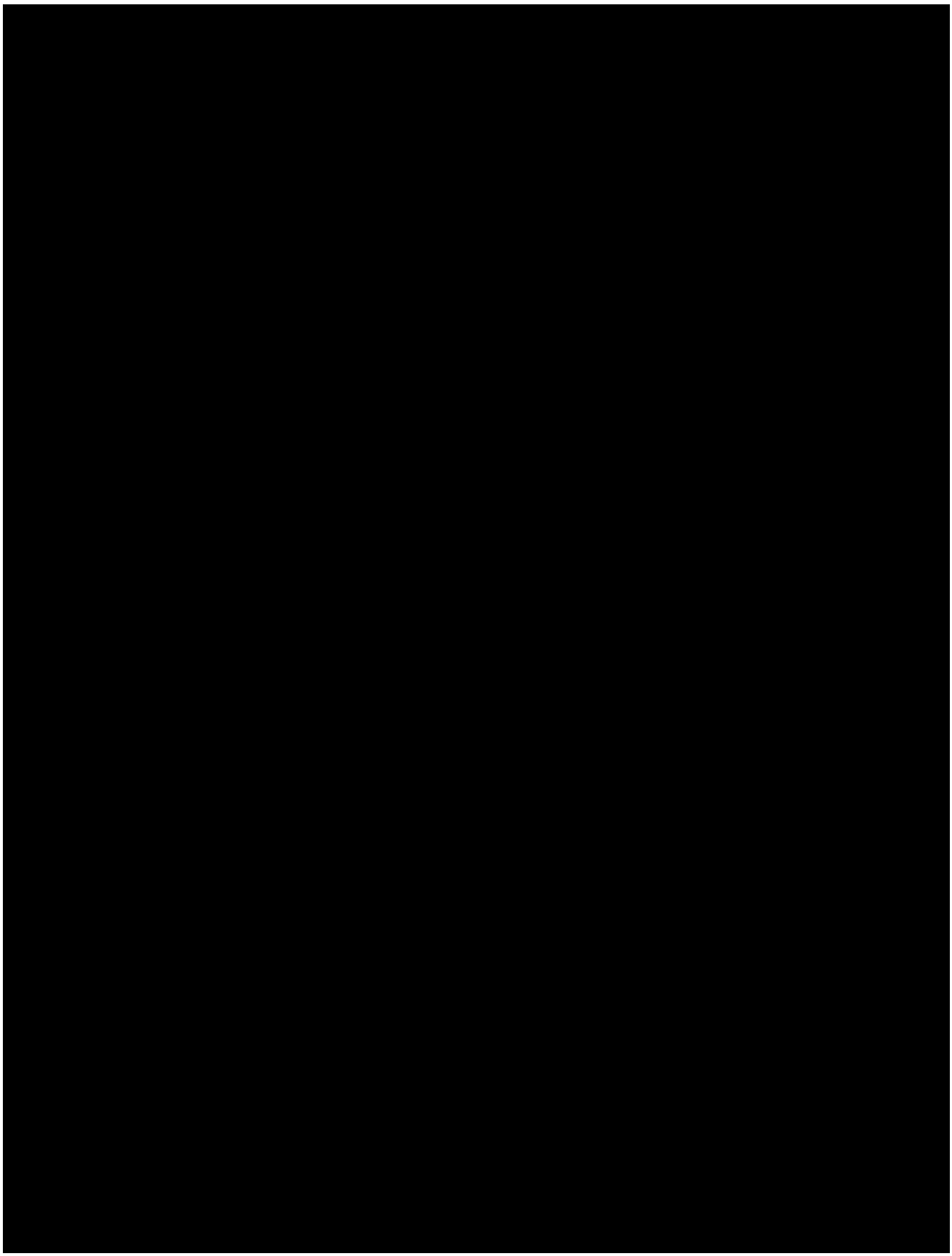


Figure 2: Substation System Operating Diagram



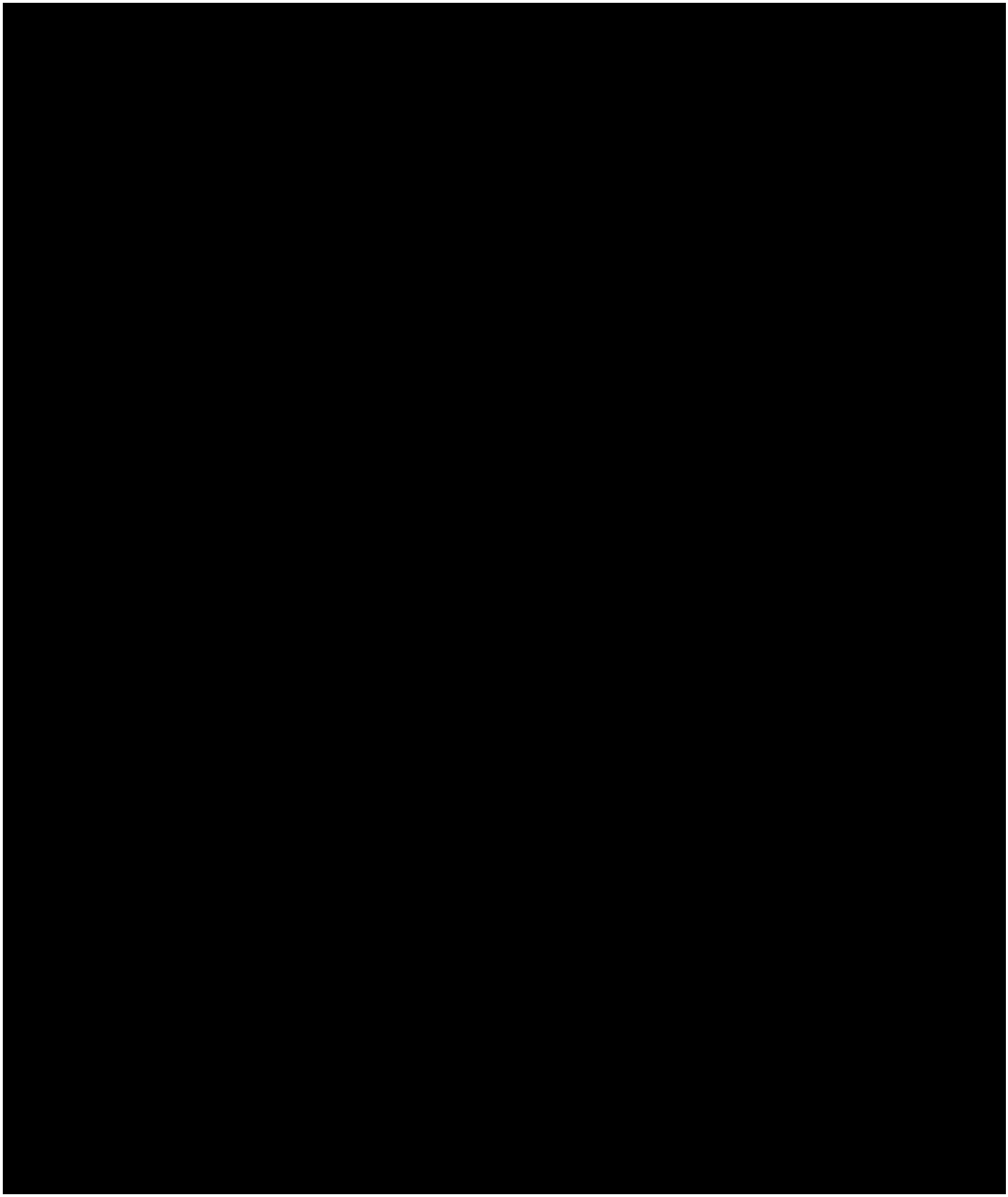


Figure 4: Required Circuit Modifications

4.0 SUMMARY OF GENERATING FACILITIES REQUIREMENTS

4.1 Adverse System Impacts

The Generating Facility must not adversely affect the Distribution System or service to any other connected customers or facilities.

4.2 Isolating Devices

A manual disconnecting device between the Generating Facility and its connection point behind the meter with a visible break for isolation purposes must be provided. The form of this device will vary with the service voltage and capacity but in all cases must be:

- accessible to NSPI,
- capable of providing a visible break, breaking load, opening all phases simultaneously (Gang-operated), and,
- capable of being locked in the open position.

The location and form of the device must be approved by NSPI. This isolating device is owned by the Interconnection Customer and is therefore subject to the requirements of the Canadian Electrical Code.

4.3 Grounding Requirements

Following the addition of any Interconnection Customer Interconnection Facilities and a Generating Facility to the Distribution System, the system must remain effectively grounded at all locations, in all sustained, temporary, and transient conditions. Operating temporarily ungrounded at any time is not permitted due to the risk of overstressing surge arrestors. See NSPI's Distribution Interconnection Requirements (DSIR) for Generating Facilities Greater than 100 kW for more information.

4.4 Interconnection Transformer Configuration

The Generating Facility interconnection transformer shall not cause voltage disturbances or disrupt coordination of Distribution System ground fault protection.

The interconnection transformers to be installed at the Interconnection Customer's facility are 2 x 2500 kVA, 12.47kV – 0.6kV, Yg-Y padmount transformer in accordance with their proposal. There is a ZigZag grounding transformer proposed at LV side of the Interconnection transformer to provide the ground source.

4.5 Synchronizing Facilities

Synchronous generators and self-commutated inverters connected to the Distribution System must be equipped with synchronizing facilities to permit connection only when both the frequency and voltage are within the limits shown in Table 3. The settings must be submitted to NSPI for approval prior to finalizing the SSGIA. The Interconnection Customer is responsible for synchronizing the generators to the Distribution System and ensuring that these synchronizing facilities are in good working order at all times.

Table 3: Synchronization Limits - from IEEE 1547-2018 - Table 5

Aggregate Ratings of Generation (kVA)	Frequency Difference (ΔHz)	Voltage Difference (ΔV, %)	Phase Angle Difference (degrees)
0 to 500	0.3	10	20
> 500 to 1,500	0.2	5	15
> 1,500	0.1	3	10

All Generating Facilities must have protection employed which prevents any generator from being started, and synchronizing attempted, until the Distribution System feeder has voltages and frequencies that have Stabilized within normal range for a period of time, as measured at the Point of Interconnection. The delay period must be settable in the range of 5-60 minutes. The actual setting is specified by NSPI in Section 4.12.

4.6 Voltage Regulation and Power Factor Control

Inverter-based generators interconnected to the distribution system must be capable of controlling voltage. The controller's voltage set-point shall be adjustable throughout the range of 95% - 105% of rated terminal voltage.

Refer to Section 6.17 of the DSIR document for additional voltage regulation and power factor control requirements specific to the interconnection of smart/advanced inverter-based generation.

4.7 Off-Nominal Frequency Operation

The transmission system in Nova Scotia is synchronously connected to the North American grid via three transmission ties to New Brunswick and the HVDC link to Newfoundland. As a result, frequency rarely varies more than 0.2 Hz from its 60 Hz nominal value. On occasion, Nova Scotia may become separated from the grid and operate independently as an electrical island. When this occurs, frequency may vary from 59.5 to 60.5 Hz during normal operation.

In conformance with the NPCC Standard PRC-006-NPCC-2 *"Automatic Underfrequency Load Shedding", October 19, 2021 (Figure #2)"*, NERC Standard "*PRC 024-2 Generator Frequency and Voltage Protective Relay Settings Version 1 (Attachment 1 – Off Nominal Frequency Capability Curve)*", IEEE 1547-2018 "*IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems (Table 18)*", and CSA C22.3 No. 9:20 "*Interconnection of distributed resources and electricity supply systems (Table 9)*" the settings in Table 4 are required for generator over and under frequency tripping:

Table 4: Required Over and Under Frequency Tripping Settings

Function	Frequency (Hz)	Clearing Time (sec)
OF2	> 62	0.16
OF1	> 61.2	300
UF1	< 58.5	300
UF2	< 56.5	0.16

Frequency ride-through performance requirements for inverter-based generation, as shown in Table 5, must also be respected. The generator must stay connected to the Distribution System while the system remains within the "Ride-Through Duration" frequency-time range and must function in the corresponding "Operating Mode" for each Frequency Condition listed in Table 5.

Table 5: Generating Facility Frequency Ride-Through Function Settings – from CSA C22.3

Frequency Condition	Distribution System Frequency	Ride-Through Duration (sec)	Inverter Operating Mode	Clearing Time: adjustable up to & including (sec)
Level 2 (OF2) Over Frequency	f > 62	No Ride Through	Cease to Energize	0.16
Level 1 (OF1) Over Frequency	62 ≥ f > 61.2	299	Mandatory Operation	300
Normal Frequency Range	61.2 ≥ f ≥ 58.8	Normal Range	Continuous Operation	Not Applicable
Level 1 (UF1) Under Frequency	58.8 > f ≥ 57	299	Mandatory Operation	300
Level 2 (UF2) Under Frequency	f < 57	No Ride Through	Cease to Energize	0.16

4.8 Off-Nominal Voltage Operation

The Generating Facility shall have protective devices installed to detect abnormal voltages and to disconnect the generators from the system. Over/Under Voltage relaying limits (from CSA C22.3) will be set to meet the following unless otherwise specified by NSPI:

Table 6: Voltage Limit Default Settings – from Table 10, CSA C22.3 No. 9

Function	Voltage (% of nominal voltage)	Clearing Time (sec)
OV3	>120	0.16
OV2	> 110	2
OV1	> 106	120
UV1	< 88	10
UV2	< 45	0.16

Voltage ride-through performance requirements for inverter-based generation, as shown in Table 7, must also be respected. The generator must stay connected to the Distribution System while the system remains within the "Ride-Through Duration" voltage-time range and must function in the corresponding "Operating Mode" for each Voltage Condition listed in Table 7.

Table 7: Voltage Ride-Through Settings – from CSA C22.3

Voltage Condition	Voltage at POI (% of Nominal)	Ride-Through Duration Default Setting (Sec)	Inverter Operating Mode	Clearing time: Adjustable up to & including (sec)	Post Ride-Through Start/Restart Conditions	
					Voltage Criteria (V) (% of Nominal)	Time Delay (min)
Level 3 (OV3) Over Voltage	V ≥ 120%	No Ride Through	Cease to Energize	0.16	110% ≥ V ≥ 88%	5 - 60
Level 2 (OV2) Over Voltage	110% < V < 120%	1	Mandatory Operation	12	110% ≥ V ≥ 88%	5 - 60
Level 1 (OV1) Over Voltage	106% < V ≤ 110%	10	Mandatory Operation	120	110% ≥ V ≥ 88%	5 - 60
Normal Voltage Range - High (NVH)	100% < V ≤ 106%	Indefinite	Continuous Operation	Not Applicable Within Normal Voltage Range		
Normal Voltage Range - Low (NVL)	88% ≤ V < 100%	Indefinite	Continuous Operation			
Level 1 (UV1) Under Voltage	50% ≤ V < 88%	10	Mandatory Operation	20	110% ≥ V ≥ 88%	5 - 60
Level 2 (UV2) Under Voltage	V < 50%	No Ride Through	Cease to Energize	0.16	110% ≥ V ≥ 88%	5 - 60

The Generating Facility shall not cause the fundamental frequency line-to-ground voltage to exceed 138% of nominal voltage for a duration exceeding one fundamental frequency period (per IEEE 1547-2018 section 7.4). This will require temporary overvoltage protection (TOVP) to be enabled on the inverters as shown in figure 5.

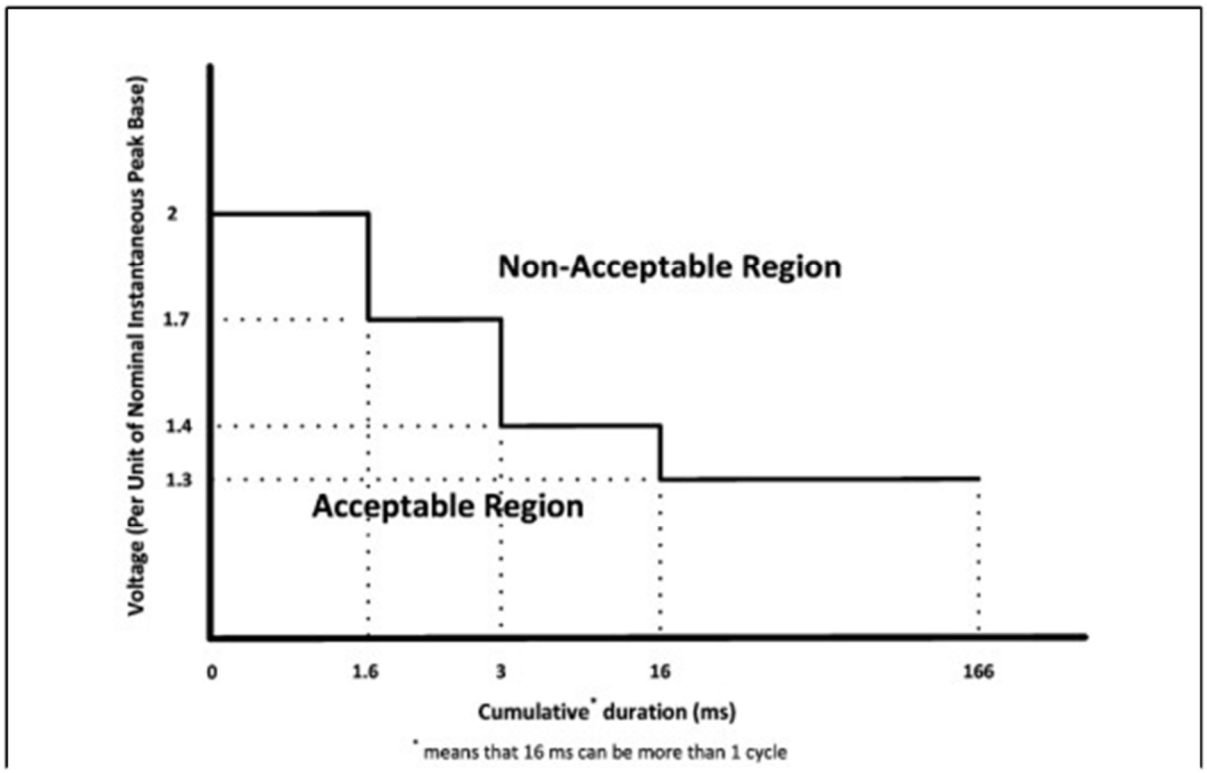


Figure 5: Transient Overvoltage Limits from IEEE 1547

4.9 Generator Islanding

Islanding is not permitted. The Interconnection Customer must ensure that the Generating Facility cannot energize any portion of the NSPI Distribution System if the NSPI circuit source is de-energized. In addition, the generators shall not remain energized if they become electrically separated from the NSPI Distribution System source. The Interconnection Customer will enable the anti-islanding (i.e., over/under frequency, over/under voltage, etc.) protection on their main intertie isolating device.

4.10 Thermal Limits and Overcurrent Protection

Thermal limits of NSPI equipment shall not be exceeded as a result of the addition of the generating facility.

Protection shall be provided to detect and cease energization for all phase-to-phase and phase-to-ground faults on the NSPI Distribution System.

4.11 Protection of Equipment and Fault Detection

The Interconnection Customer must ensure that their protection devices will detect abnormal system conditions and isolate their facilities from the NSPI Distribution System including, but not limited to, over and under frequency, over and under voltage, and anti-islanding.

4.12 Automatic Start/Restart of Generation Facilities

Individual generators are permitted to automatically start or restart after tripping from the Distribution System. This automatic restart may occur only after the Distribution System voltages have been restored, frequencies have stabilized at 60 Hz, and a 5 minute delay has expired.

4.13 Protection Coordination

The protection systems installed by the Interconnection Customer shall coordinate with NSPI's protection facilities. The Interconnection Customer shall submit details of the protection facilities and proposed settings to NSPI for review and acceptance. Any revision to settings must also be submitted to NSPI.

4.14 Voltage Variation

4.14.1 Voltage Flicker

The Interconnection Customer is to ensure that the operation of the Generating Facility does not cause voltage variations on the Distribution System that result in objectionable lamp flicker to other connected customers. The voltage variations will be measured at the POI, which is normally equivalent to the high-voltage terminals of a generator step-up transformer.

The acceptable limits of flicker emissions from any Generating Facility on NSPI's Distribution System, measured at the POI in accordance with the IEEE 1547-2018 (Table 25) are:

$$P_{st}95\% \leq 0.35$$
$$P_{lt}95\% \leq 0.25$$

Where P_{st} is the emission limit for the short-term flicker severity and P_{lt} is the long-term flicker severity.

In computing the flicker emission levels, only periods in which the Generating Facility is in operation shall be included. These limits apply to all consecutive periods.

4.14.2 Voltage Dips

The acceptable limits for voltage deviation are listed in Table 8. Operation of the Generating Facility at full load output, from on-line to off-line shall cause no more than a 2.5% step change in system voltage measured at the POI.

Table 8: Limits for Rapid Voltage Changes

ΔV/ V (%)	Occurrences
2.5%	≤ 1 time / hr
2.0%	≤ 5 times / hr
1.0%	≤ 50 times / hr
0.5%	≤ 500 times / hr
Dynamic Voltage Changes must be ≤ 2.5%	

4.15 Voltage & Current Distortion

The harmonic current injection from the Generating Facility to the Distribution System measured at the POI shall not exceed the limits established by IEEE 519-2022. These limits are shown below in Table 9.

Table 9: Maximum Harmonic Current Distortion in Percent of Maximum Demand Current

Individual Harmonic Order h (Odd Harmonics)					Total Demand Distortion
$2 \leq h < 11$	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h \leq 50$	
4.0%	2.0%	1.5%	0.6%	0.3%	5.0%

The Generating Facility must be tolerant of these harmonic distortion levels, which may be present in the absence of any harmonics generated by the Interconnection Customer's facility.

4.16 Voltage Regeneration

Sustained voltage regeneration from the Interconnection Customer's Interconnection Facilities following the loss of a supply phase on the Distribution System is not permitted. Regenerated voltages may not be well regulated and can be well below or well above acceptable levels or may be present at or near nominal voltage. Short-circuit protection on the regenerated phase may be inadequate. The Interconnection Customer shall identify the capability of their site to regenerate voltages and shall mitigate the risk of occurrence in the design of their facilities.

All generator step-up transformers core and winding configurations are capable of regenerating voltage, to some extent, for a lost Distribution System supply phase. Only some configurations are capable of reproducing the phase voltage at or near a nominal level. The Generating Facility's interconnection protection must be capable of detecting the loss of any phase to which the Generating Facility is connected.

4.17 Advanced Inverter Functions and Operating Requirements

All advanced inverter-based Generating Facilities shall comply with the Advanced Inverter Functions and Operating Requirements specified in the Interconnection Requirements document Section 6.17. All such inverter equipment shall be CSA certified and meet the functional requirements of CSA C22.3 No. 9.20 "*Interconnection of distributed energy resources and electricity supply systems*".

The following is a summary of advanced inverter functions and their default state:

- Anti-Islanding — Activated
- Voltage Ride Through — Activated
- Frequency Ride Through — Activated
- Volt-Watt Mode — Available
- Frequency-Watt Mode — Available
- Fixed Power Factor — Available
- Dynamic Volt-VAR Mode — Activated
- Ramp Rate – Normal Operation — Activated
- Ramp Rate – Reconnect Operation — Activated

4.18 Interface Control and Communication Requirements

4.18.1 Interface Communications

All inverter-based Generation Facilities shall have provisions for monitoring and control of the disconnecting device at the inverter or POI, as well as monitoring of real power output, reactive power output, power factor, voltage, current, frequency, and time. Information exchange requirements shall comply with CSA Std. C22.3 (Table D.1) unless otherwise specified by NSPI. The type of acceptable protocols shall be one of the two options as per the following:

Protocol	Transport	Physical layer
DNP3	N/A	RS-232
DNP3	TCP/IP	Ethernet

4.18.2 Supervisory Control and Data Acquisition (SCADA)

Connection to NSPI's SCADA system is not required but may be required in the future. The Generating Facility must have provisions for this connection.

5.0 LOCAL IMPACTS

The following analysis was based on generator data provided by the customer. Distribution system software produced by Cyme International (CYMDIST 9.4) was used for the following sections to determine the impact of the new generation on the existing system.

5.1 Configuration and Grounding

NSPI's primary Distribution System is a 3-phase, 4-wire multi-grounded common neutral system ("effectively grounded-wye"). This generally provides a single intentional ground path for short-circuit currents (one zero-sequence path) and has been utilized in the design of short-circuit protection applied to distribution feeder systems.

Following the addition of any generating facility to the Distribution System, the system must remain effectively grounded at all locations and have adequate short-circuit protection and protective device coordination as per DSIR Section 6.3.

5.2 Short Circuit Limitations

The design fault level of the 12.47 kV Distribution System is 9000 Amps, 194 MVA, although actual fault levels will vary from substation to substation and will decrease with distance from the substation.

Short-circuits on distribution feeders are detected and cleared by the operation of reclosers or circuit breakers, which then automatically reclose the circuit to restore service. If the short circuit remains (permanent fault), then the recloser or circuit breaker interrupts the circuit again and again recloses. Reclosing is a common utility practice, and this cycle may be repeated in succession up to three times.

The short circuit levels at the Brooklyn Solar generator site at its Point of Interconnection from [redacted] are shown in Table 10. The addition of the Solar generators did not affect the fault level at the Point of Interconnection and remain within the minimum design limit of 194 MVA for the NSPI 12.47 kV distribution system.

Table 10: Short Circuit and X/R Ratio Data at Solar Generator Site POI

Short Circuit Level and X/R Ratio at POI					
Feeder ID	Generator Status	Short Circuit Level (MVA)		X_0/R_0 Ratio	X_1/R_1 Ratio
[redacted]	Connected	12 (LG)	18 (LLL)	2.66	1.69
	Disconnected	12 (LG)	18 (LLL)	2.66	1.69

Regardless of the present short circuit levels on circuit [redacted] the Interconnection Customer shall design their facilities to withstand symmetrical fault levels of 9 kA (approximately 194 MVA). It is the responsibility of the Interconnection Customer to ensure that their equipment is rated to withstand these short circuit levels.

5.3 Equipment Thermal Limits

The installation of 4.8 MW solar inverters will create over-loading issues on the distribution facilities. The maximum steady state current produced by the generators is approximately 222 Amps at 12.47 kV which is above the thermal limits of the smallest conductor #4 AL (140 Amps) between the generator and the [redacted]. Section 3.0 of this report identified the required upgrades to the existing feeder section. Approximately, a total of 3.6 km of feeder section at Evangaline Trail is required to be reconductored to 2/0 AASC. Detailed field scoping is required to determine the final length of the line to be reconductored.

5.4 Impact on Transmission System

At maximum generation, IR#751 – Brooklyn Solar generator site injects 4.8 MW on [redacted] Substation through a 12.47 kV distribution circuit. This does not exceed the minimum substation load for [redacted] and is not expected to impact the existing transmission infrastructure.

5.5 Voltage Flicker Emission Limits at POI

The flicker value must adhere to the allowable flicker emission limits (Pst 95% ≤ 0.35) as per DSIR Section 6.14.1.

5.6 Voltage Unbalance

The voltage profile for distribution circuit [redacted] between [redacted] and the POI is shown in Figure 6 under peak load conditions with generators online.

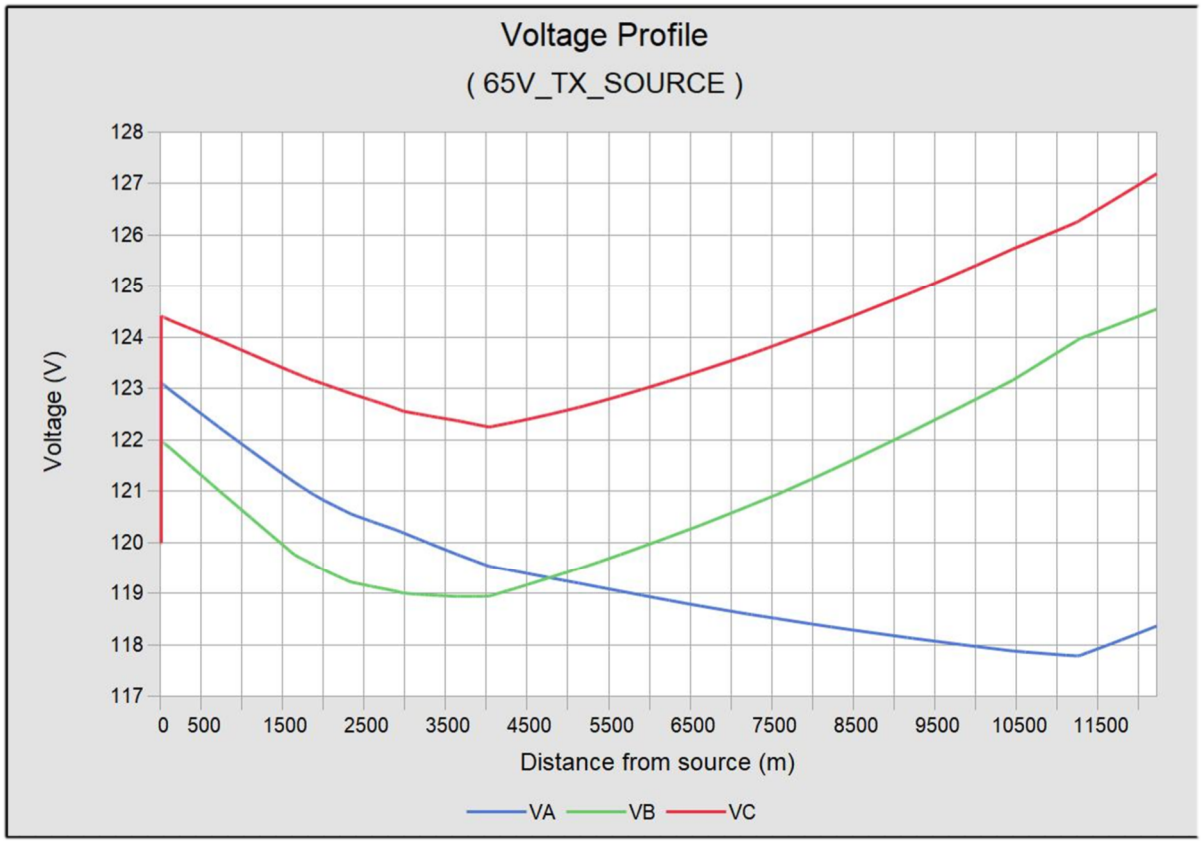


Figure 6: Voltage Profile at POI with Voltage Control Settings

The average voltage unbalance at the solar generator POI is approximately 3.1% when connected to the 12.47 kV system via circuit [redacted], though it may vary with load, time of day, and season. This is calculated with voltage control settings as per IEEE 1547-2018 Table 8 (discussed in Section 5.7). Modifications are required to reduce the voltage unbalance below 3%.

Rephasing: The line-to-line voltage on phase C is outside of the CSA allowable limits (0.95 per unit and 1.05 per unit) during peak load conditions at the POI with maximum generation. Rephasing the load downstream of the POI will bring the line-to-line voltage within the allowable limits based on load flow analysis using CYME 9.4 as shown in the Figure 7.

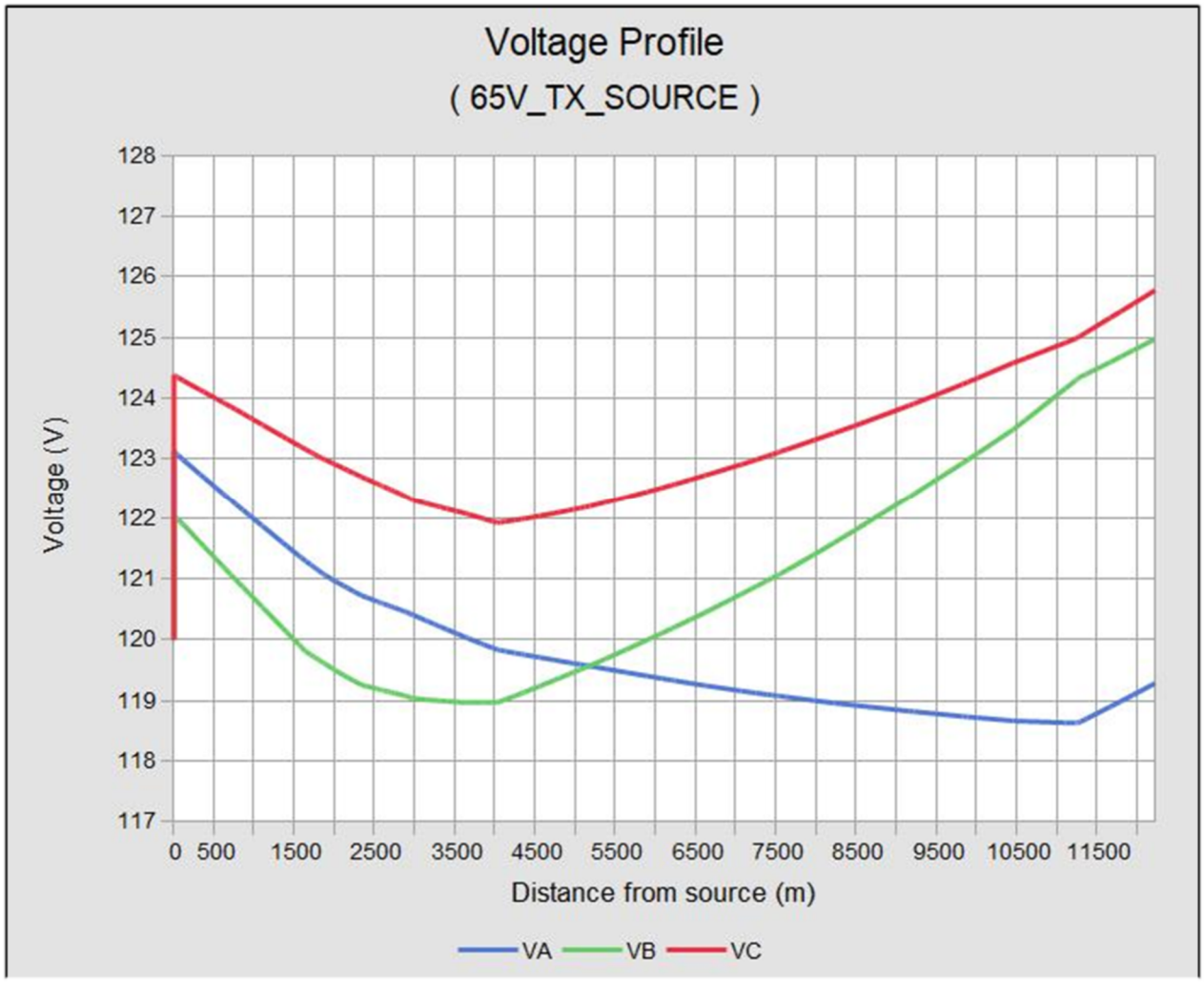


Figure 7: Voltage Profile at POI with Rephasing

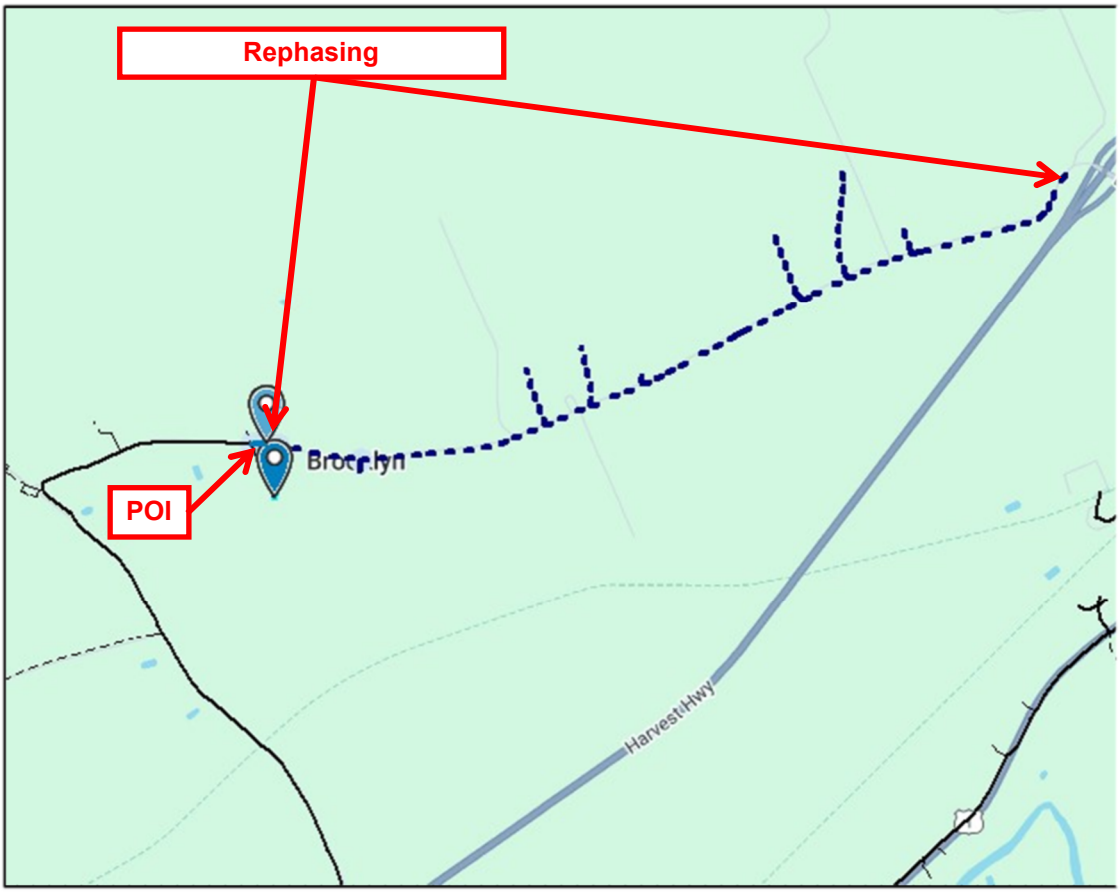


Figure 8: Rephasing of Loads

NSPI distribution circuits typically experience less than 3% voltage unbalance (defined as the maximum deviation from the average phase-to-phase voltage, divided by the average). However, NSPI cannot guarantee this under all loading conditions. The Interconnection Customer is responsible for ensuring the solar generators can operate under such conditions.

5.7 Voltage Regulation and Voltage Dip

As per section 6.17 of the DSIR, all inverter based Generating Facilities shall be CSA certified and meet the functional requirements of CSA C22.3 No. 9:20 “Interconnection of distributed energy resources and electricity supply systems”.

The addition of Brooklyn Solar farm site must not cause the voltage on circuit [redacted] to stray outside of these limits.

CYMDIST load flow solutions show that the voltage at the POI will change approximately by 3.86% under heavy load conditions as the generator goes from full load to no load (PF = 100%). Similarly, load flow solutions show that the voltage at the POI will change approximately by 2% under light load conditions as the generator goes from full load to no load (PF = 100%). Therefore, during peak load conditions it is outside the maximum allowable limit of 2.5% (per Table 8, Section 4.14.2).

IEEE 1547-2018 - Standard for Interconnecting Distributed Resources with Electric Power Systems defines the reactive power capabilities and voltage/power control requirements. Section 5.2 of IEEE 1547-2018 defines the minimum injection and absorption capability of DER's (Distributed Energy Resources). The minimum injection and absorption capability is defined as 44% of the nameplate apparent power (kVA) rating. It is the Interconnection Customer's responsibility to ensure that their solar generator meets the minimum injection and absorption capabilities.

Section 5.3.3 of IEEE 1547-2018 on voltage-reactive power mode explains that a DER shall actively control its reactive power output as a function of voltage following a voltage-reactive power piecewise linear characteristic. These characteristics are defined in Table 8 of Section 5.3.3 in the IEEE 1547-2018 document.

Voltage unbalance and voltage dip for the proposed Brooklyn solar generation site exceeded the Interconnection Requirements as discussed in the Sections 5.6 and 5.7. Therefore, permitted settings from IEEE 1547-2018 Table 8 are utilized. The following settings in Table 11 are required to meet the Interconnection requirements.

Table 11: Voltage-Reactive Power Settings for Brooklyn Solar

	Voltage Parameters (%)	Reactive Power Parameters (%)
1.	92.0 (V1)	44.0 (Q1)
2.	98.0 (V2)	0.0 (Q2)
3.	100.0 (V3)	0.0 (Q3)
4.	102.0 (V4)	-44.0 (Q4)

These settings are subject to change prior to commissioning of the generator. Interconnection customer is required to submit the Voltage-reactive power settings of their generator to NSPI prior to commissioning.

5.8 Protection and Control Settings

Should it become necessary in the future to alter the settings of the substation recloser [redacted] as a result of the new generation, any costs associated with modifying the device co-ordination settings or controls will be the responsibility of the Interconnection Customer**.**

6.0 INTERCONNECTION FACILITIES REQUIREMENTS

The following subsections outline the Interconnection Facility requirements and the responsibilities of the Interconnection Customer and NSPI for procurement and installation. All costs incurred by NSPI associated with this interconnection will be the responsibility of the Interconnection Customer.

In order to provide a safe and secure work environment, NSPI has established a Standard Protection Code. All interconnected facilities must be designed, constructed, and operated consistent with the most current revision of the Standard Protection Code (available on request).

NSPI will own the distribution spans to the gang-operated disconnect switch shown on the one line diagram in Appendix A and will have operational control of the recloser located at the POI. The Interconnection Customer will own the gang switch and all electrical equipment beyond the gang switch including poles and fixtures, overhead conductors, underground and subsea cables, transformers, grounding transformers, protective devices etc. Protection and control settings for the main recloser at the POI are provided in Appendix B.

6.1 Facilities Procured by NSPI at the Interconnection Customer's Expense

The following modifications will be required in order to provide a suitable supply to the site:

6.1.1 Recloser

A new electronic recloser complete with internal PTs; a remote protection cabinet; and electronic controller must be installed at the Point of Interconnection for the solar generator Site.

6.1.2 Primary Metering

Primary metering rack consisting of three metering class potential transformers rated 7,200-120V, and three metering class current transformers with CT ratios 300:5 A and rating factor 1.3. All instrument transformers used for metering will be specified, approved, and owned by NSPI.

The Interconnection Customer shall pay for the purchase and installation of a bi-directional revenue meter that shall be pole mounted below the primary metering rack. Revenue metering will be specified by NSPI; will meet Industry Canada requirements; will be installed before the solar generators (down-line of the interconnection recloser); and will be owned by NSPI.

6.1.3 Communications

For Generating Facilities of less than 5 MW, the Interconnection Customer is responsible for ensuring facilities are capable of monitoring and control as described in Section 4.18.

The implementation for monitoring and control as described in Section 4.18 is not required but may be requested by NSPI at a later date to be implemented at the Interconnection Customer's cost.

6.2 Procurement Security for Long Lead Equipment and Scoping

The following facilities are required to be purchased with procurement security funds:

- Primary metering rack consisting of three metering class potential transformers rated 7,200-120V, and three metering class current transformers with CT ratios 300:5 A and rating factor 1.3
- Electronic recloser complete with internal PTs; a remote protection cabinet; and electronic controller must be installed at the Point of Interconnection with Lightning Arrestor
- Scoping

The minimum procurement security to cover this equipment along with procurement, administration and scoping totals approximately $94,850 + HST. The estimated lead time for Primary Metering procurement is 12 months.

6.3 Facilities Procured by the Interconnection Customer

The Interconnection Customer is responsible for procurement of all facilities required for the operation of the solar installation.

6.3.1 Isolating Device – Gang-Operated Switch

A gang-operated, NSPI accessible, and lockable switch, capable of providing a visible break, is required between the Generating Facility and its connection point behind the meter. This shall meet NSPI standards.

6.3.2 Solar Generation Site

The engineering, procurement and construction of the solar generators, associated step-up transformers, and equipment grounding will be the responsibility of the Interconnection Customer. Final designs and equipment selection will be subject to review and acceptance by NSPI.

6.3.3 Step-Up Transformer

The Interconnection Customer will acquire and install generator step-up transformers:

2 x 2500 kVA, 0.6kV – 12.47 kV, Y-Yg, step-up transformers with a Grounded Wye (HV) - Delta (LV) configuration and an impedance of 5.75% and X/R=8 in accordance with their proposal.

6.3.4 Right of Way for 12.47 kV Extensions

The Interconnection Customer will provide the necessary easements/ROW to NSPI for the line extension or upgrades required to interconnect the Brooklyn Solar site to the distribution system. Ownership to the POI will be transferred to NSPI following line construction. Refer to Appendix D for ROW requirements.

The Interconnection Customer will be responsible for the construction of an access road along the line extension ROW to allow for construction and maintenance. The Interconnection Customer will also be responsible for the construction of the any line extension to the Brooklyn solar site from the gang-operated lockable switch. The Interconnection Customer is responsible for any costs associated with this work

6.4 Operational Control of Electrical Lines and Equipment

NSPI shall have operational control over any Interconnection Facilities it deems necessary to ensure reliability or serviceability of the Distribution System. Operational Control of the Interconnection Customer's high voltage and low voltage equipment shall be designated in the Standard Small Generator Interconnection and Operating Agreement.

The party having Operational Control is responsible for the safe and correct operation of electrical lines and equipment.

7.0 INTERCONNECTION FACILITIES COSTS

The Interconnection Customer shall pay the full actual cost of the upgrades and additions required to the NSPI Distribution System in order to accommodate their solar Generation Facility.

	Modifications Customer Funded	Estimate
1	[redacted]	
2		
3		
4		
5		
6		
7		
8		

8.0 CONCLUSIONS

This study was initiated to determine the requirements and conditions for the proposed interconnection of 4.8 MW of solar generation with inverters by the Interconnection Customer (IC) at the Brooklyn Road, Annapolis County, Nova Scotia. The Brooklyn Solar Farm facility is supplied via the 12 kV distribution feeder [redacted] from the [redacted].

The key findings of this report with respect to the impact of this development on the local distribution system are as follows:

- A gang operated, NSPI accessible, and lockable switch, capable of providing a visible break, is required between the Generating Facility and its connection point behind the meter
- Nova Scotia Power Inc. (NSPI) must add onto existing distribution facilities (at the Interconnection Customer's expense) in order to accommodate the Brooklyn Solar Farm Site.
  - The required work includes:
    - [redacted]

    The Interconnection Customer shall pay a capital contribution for any required line extensions, upgrades, and right-of-way acquisition necessary to extend the Distribution System to the Generating Facility. The line between POI and customer owned Gang operated switch is dedicated to serve the Interconnection Customer, all maintenance, repair and replacement costs are the responsibility of the Interconnection Customer. NS Power will perform and manage the maintenance of these facilities. Bell-Aliant owned equipment such as pole replacements, transfers, guy replacements, and customer owned equipment such as the gang operated switch is not included in these estimates.

- The cost estimate to complete the work as outlined in Section 7.0 of this report is $2,557,454 plus tax. The Interconnection Customer will pay any actual costs incurred by NSPI. All costing will be performed in accordance with NSPI standard practices. The Interconnection Customer must comply with the Generating Facility requirements listed in

Section 4 of this report. The Interconnection Customer must comply with the Interconnection Facility requirements listed in Section 6 of this report.

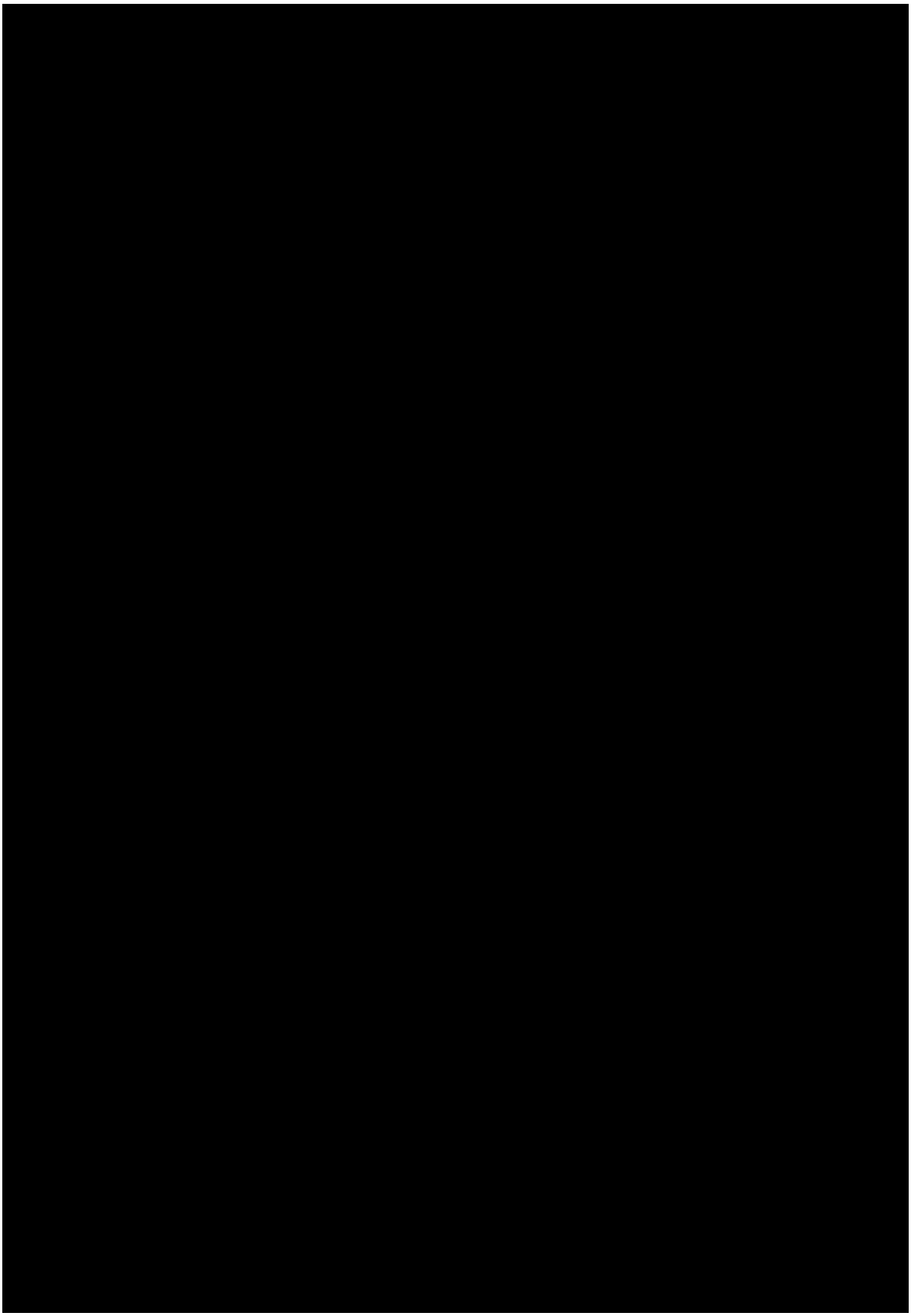
- Flicker data was not available for the solar generators at the Brooklyn Solar Site. Should at any future time flicker emissions from the site be of concern to NSPI or to other connected customers, then the Interconnection Customer will be given a reasonable amount of time to find an acceptable solution to lower the flicker levels. If, after notice has been provided and a reasonable amount of time has elapsed, the Interconnection Customer fails to make corrections, NSPI may disconnect the generating facility per Article 4.4.4 of Standard Small Generator Interconnection and Operating Agreement (SSGIA).
- NSPI requires that the Interconnection Customer operate the solar generators with a power factor as specified in Section 4.6 of this report.
- Protection and control settings for the Brooklyn Solar generation recloser and upstream devices have been included in Appendix B – Protection, Current, and Time curves. These settings are subject to change prior to the facility in-service date.
- NSPI shall have sole operational control over all NSPI owned high voltage equipment at the Brooklyn Solar Site. Operational Control of the Interconnection Customer's high voltage and low voltage equipment shall be designated in the Standard Small Generator Interconnection and Operating Agreement, per Section 6.4 of this report.

In addition to the interconnection requirements described in this report, it is the Interconnection Customer's responsibility to ensure that their electrical installation meets all applicable national, provincial, and municipal electrical construction and safety codes including, without limitation, the Electrical Installation and Inspection Act. Except as expressly permitted by law, all electrical equipment (including batteries and inverters) must have CSA or equivalent approval. The regulations require that electrical and communication installations must be performed under permits and be inspected. Application for permits and inspections can be obtained from the NSPI Electrical Inspection Authority. The following are general requirements and not all inclusive as to other requirements mandated by the Inspection Authority:

- The customer must provide two sets of electrical drawings to the Inspection Department for review before the commencement of any electrical work at the site.
- The electrical installation must comply with the Canadian Electrical Code, Part 1, and applicable electrical inspections bulletins.
- The electrical contractor(s) must obtain all necessary Wiring Permits before the commencement of any electrical work.
- No electrical equipment is permitted to be energized until it has received an inspection and acceptance by the Inspector.
- No electrical installation is permitted to be covered up until the installation has received an electrical inspection and acceptance by the Inspector. (Examples: underground cables and raceways and grounding conductors).
- The electrical contractor must arrange and schedule all necessary inspections.
- Electrical Equipment must be certified by an acceptable certification agency acceptable to the Nova Scotia Department of Environment and Labour. High voltage equipment such as padmount transformers must be built to an applicable CAN/CSA standard. Where there is no applicable CAN/CSA standard, the Inspection Department would require a special inspection to be performed by a recognized agency.

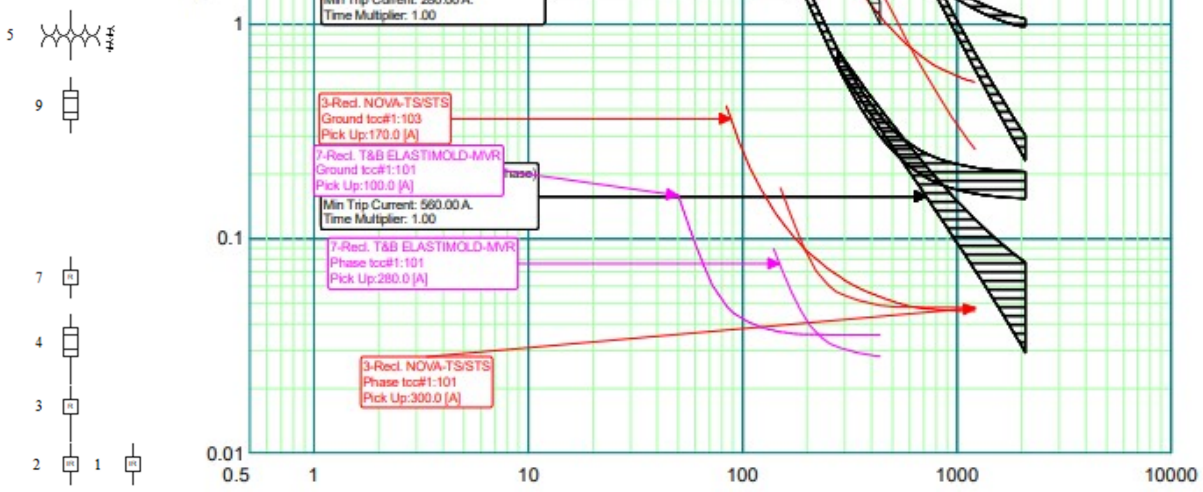
Appendix A

Single Line Diagram



Appendix B

Protection, Current vs Time Curves


Current in Amperes: x 1 at 25 kV, x 41.6667 at 0.6 kV and x 2.00481 at 12.47 kV.
1000
100
10
1
0.1
0.01
1 Minute
Time in Seconds
0.5
1
10
100
1000
10000
5-Transformer
Z=5.75 [%]
P=2500 [kVA]
0.60 [kV]
9-Fuse S&C SMD1A V SLO 34.5
Rating: 100E
12.47 [kV]
3-Recl. NOVA-TS/STS
Ground tcc#2:151
Pick Up:170.0 [A]
2-Recl. IntelliRupter (Initial Trip Ground)
S&C140
Min Trip Current: 280.00 A.
Time Multiplier: 1.00
2-Recl. IntelliRupter (Initial Trip Phase)
S&C133
Min Trip Current: 560.00 A.
Time Multiplier: 1.00
3-Recl. NOVA-TS/STS
Phase tcc#2:133
Pick Up:300.0 [A]
1-Recl. IntelliRupter (Initial Trip Ground)
S&C113
Min Trip Current: 280.00 A.
Time Multiplier: 1.00
3-Recl. NOVA-TS/STS
Ground tcc#1:103
Pick Up:170.0 [A]
7-Recl. T&B ELASTIMOLD-MVR
Ground tcc#1:101
Pick Up:100.0 [A]
Min Trip Current: 560.00 A.
Time Multiplier: 1.00
7-Recl. T&B ELASTIMOLD-MVR
Phase tcc#1:101
Pick Up:280.0 [A]
3-Recl. NOVA-TS/STS
Phase tcc#1:101
Pick Up:300.0 [A]
5
9
7
4
3
2
1

Appendix C

ROW Requirements

NOVA SCOTIA POWER An Emera Company

Vegetation Management

Reference:	Page:
VM-2.01	1 of 8

Title:	Date:
DISTRIBUTION EASEMENT AND RIGHT-OF-WAY STANDARD	2004 07 29

1. DISTRIBUTION EASEMENT AND RIGHTS OF WAY STANDARD

1.1 OBJECTIVE

The objective of this standard is to create the conditions that will facilitate Nova Scotia Power Inc.'s ability to deliver safe and reliable electrical service, through the creation of environmentally compatible utility corridors (physical rights of ways) that should require no vegetation management inputs for a period of 15 years following their establishment.

The standard is intended for general use in all new line extensions and/or new construction. In those circumstances where in the opinion of the engineer responsible for the job in question, for whatever reason this standard can not or should not be utilized, any engineering and or business alternatives employed must be directed at the attainment of the above objective. All such alternatives or solutions are to be considered off standard. As such, they are exceptions to standard practice which must be explicitly accepted by the engineer in charge who will thus become professionally responsible and accountable for their feasibility and suitability.

1.2 GENERAL

For new distribution line construction and/or distribution line extensions an appropriate easement for the right of way must be provided to Nova Scotia Power Inc.(NSPI). The physical right of way (ROW) must be developed as outlined below, prior to construction of the line and/or installation of any portion of the electrical plant. This standard is not intended to apply to secondary service drops that run from the distribution line to a residence or other such buildings.

The responsibility for obtaining easements (in a form as specified by NSPI) and developing the ROW rests with the individual(s) requesting the new service. In circumstances involving railway crossings and/or water crossings the responsibility remains with the service requester, however upon mutual agreement between NSPI and the service requester (s) these type of easements may be obtained by NSPI at the service requester(s)' cost.

All easements must grant the appropriate rights and privileges to NSPI and allow for the authorization by NSPI of Aliant and/or any other public utility to exercise these same easement rights and privileges.

Establishment of compatible vegetation where required will generally be considered part of NSPI's physical plant and as such, will not be the responsibility of the individual(s) requesting the new service.

1.3 EASEMENTS

In order to meet NSPI's needs an easement must be obtained for all new line construction and/or extensions. Such easements will be comprised of three component:

i) the easement document;
ii) an appropriate sketch detailing the location of the easement;
iii) a complete copy of the deed describing the land on which the easement is to be granted.

All line extensions and/or rebuilds require easements for the area over which the ROW will be immediately developed. Such easements may be private or public or any combination there-of. Government licences and/or permits are considered to be a form of public easement.

Generally an appropriate easement shall grant NSPI perpetual rights to:

a) install and maintain all required equipment to provide for the distribution of electrical and communication services; and

b) manage all vegetation on or intruding into the ROW including trees outside the defined physical parameters of the ROW, that are identified as an imminent danger to the line.

Additionally the easement shall include (as required) a covenant from the landowner (s) to refrain from:

i) planting or establishing any form of vegetation within the ROW which could reach a total height in excess of 4.6 m (15 feet); and

ii) cutting or removing without express permission from NSPI any compatible vegetation that may be established by NSPI as part of its continuing development of the right of way.

Where the proposed pole line will run on or near an existing public ROW (eg. transportation), additional easement must be obtained for that portion of the required distribution line right of way that would not be contained by the existing public right of way. While this will provide for the minimum required, consideration should be given to future easement requirements. Obtaining a full 20 foot easement across the private land will provide for all future needs should NSPI be forced to move the pole line.

1.3.1 Plans and Sketches Accompanying Distribution Easement

Whenever an easement is to be obtained, it must be accompanied by an appropriate “sketch”. In the case of subdivisions this will be the survey plan. In the case of adjoining properties it may be a hand drawn sketch (as per present practice). The sketch need not be drawn to scale. In the case of a new development/subdivision the service requester(s) must require the surveyor to show the location and width of our easement along both sides of all roadways where utility service will be required and the easement must be redlined..

For adjoining properties, depending on the location of the line it will be at the discretion of the Field Representative to decide whether a survey will be needed. Generally a hand drawn sketch will only be acceptable when the pole line will run in close proximity to some readily identifiable baseline, such as a public right of way. In cases where the pole line is to run through a property as opposed to along or close to one of its edges, a survey should be required.

It is preferred that the service requester/grantor hire the services of someone familiar with drawing sketches or plans such as a surveyor, engineer, architect etc. to assist them in supplying the sketch. In order to facilitate recording the sketch with the easement, the paper size for the sketch should not exceed 8.5"x 14". In cases where the service requester/grantor provides their own hand-drawn sketch, it must be neat, clear and contain all of the required information (see 1.3.1.1.)

The sketch, along with the easement must be recorded at the Registry of Deeds of the County. It is imperative that it contain sufficient information for a surveyor to be able to establish the easement shown, even if the power line has been removed.

1.3.1.1 Information Requirements for Sketches

(a) A graphic representation of the size and shape of the property which the utility line will be crossing together with driveways, buildings etc.

(b) Show and name the nearest public road in relation to the property and where the road leads in each direction. Show any major brooks and rivers.

(c) Show the names and civic addresses (if applicable) of the property owner(s) whose land we are crossing as well as adjoining property owners. If the property is registered in more than one name they too will have to be listed on the first page of the easement but not necessarily shown on the sketch. e.g. In the case where John Doe and his five siblings own the property it can be shown as John Doe et al.

(d) The location of the existing power line and the location of the line extension as well as the width of the easement to be acquired.

(e) Show approximate direction of North.

(f) Show the name of the community, village, town (Brookfield, Windsor, Tusket etc.) on the sketch.

(g) Show approximate length of the line across / along property as well as distances from the centre line of our power line to the property corners.

(h) The sketch must be approved and signed by the Regional Planner/Scoper that the customer is dealing with before it is recorded at the Registry of Deeds.

1.4 ROW DEVELOPMENT

All Row development must comply with the process, procedures and standards outlined in the document "Environmental protection procedures for T&D Facilities" (ENV 4.01).

Prior to development, all ROW must have a compatible vegetation plan established and or approved by NSPI. This plan must identify, what (if any) existing compatible vegetation exists and whether or not it is to be preserved during development and what (if any) compatible vegetation is to be established. All costs associated with compatible vegetation are to be included as part of NSPI's capital cost of establishing or extending the line.

In developing the ROW, unless otherwise specified by a professional forester working on behalf of NSPI, the service requester(s) must ensure that it is ground cleared of all incompatible vegetation for a distance of 6.1 m (20 feet) on either side of the proposed pole line. This includes any intruding limbs or branches that originate off the rights of way. Any trees outside the defined physical parameters of the ROW that are identified as an imminent danger to the proposed line must be removed as part of the ROW development. In developing the ROW, the service requester(s) must comply with the technical specifications for aerial trimming and ground cutting as identified in NSPI's standard vegetation management contract. Where the proposed pole line will run on or near an existing developed public ROW (e.g. transportation), additional ROW need only be developed for that portion of the required distribution line ROW that would not be contained by the existing public ROW. If the existing public ROW is not appropriately cleared, the service requester(s) is responsible to have it cleared as outlined above.

Appropriate buffer zones must be designated in conjunction with water courses and/or roadways as specified in ENV 4.01 document.

1.4.1 Mature Urban and Developing Urban Areas

Generally mature urban and developing urban areas are all those areas where there is significant residential development. This will normally equate to cities, towns and villages and associated suburban developments

Where the proposed pole line is to be run through such areas:

The surface area of the right of way must be grubbed and seeded down to herbaceous plants (must comply with erosion and sediment control principles, ENV 4.01, Section 2);

OR

All hardwood trees capable of obtaining a total height greater than 4.6 m (15

feet) must be treated with herbicides. The service requester(s) will be responsible to retreat any such vegetation that re-sprouts within two growing seasons of initial treatment. All herbicide application must comply with the NS Pest Control Products Act and regulations.

1.4.2 Rural and Wild Land Areas

Generally, rural areas are those areas were strip or spot development of residential property has occurred outside the boundaries of cities, towns or villages and their associated suburban developments. Wildland areas are those areas outside the boundaries of cities, towns or villages and their associated suburban developments where no residential development exists.

Where the proposed pole line is to be run through such areas:

where permissible under regulation (federal, provincial and/or municipal) all hardwood trees capable of obtaining a total height greater than 4.6 m (15 feet) must be treated to prevent subsequent re-growth. Generally this will require the application of a registered herbicide.

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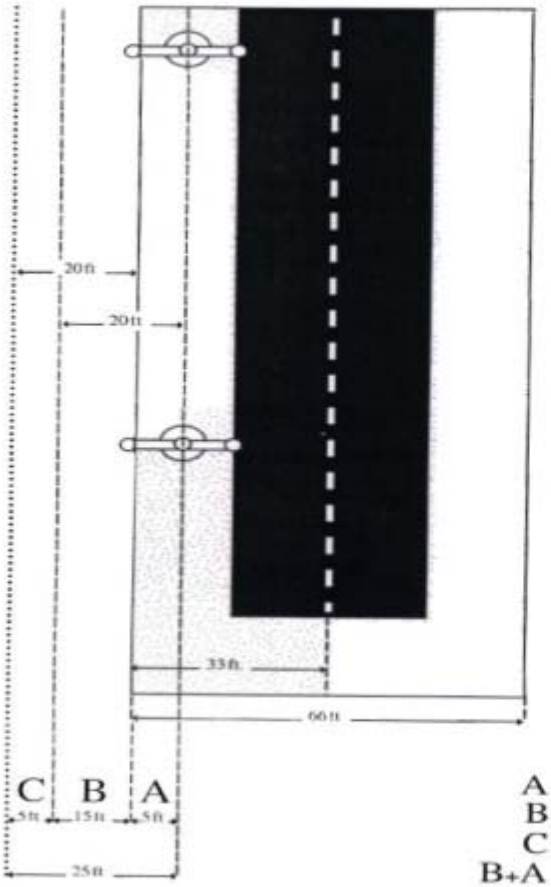
Easement Requirements and Related Row Development

Figure #1 Government Owned and Maintained Roadway



A	Public Easement available = 5 ft.
B	Required Easement on Private land = 15 ft.
C	Recomended additional Easement = 5 ft.
B+A	20 ft. required Easement
C+B	Recomended Easement on Private land
C+B+A	25 ft. of Easement, 20 ft. would be cleared, leaving 5 ft. for future Row development if poles and lines are required to be relocated.

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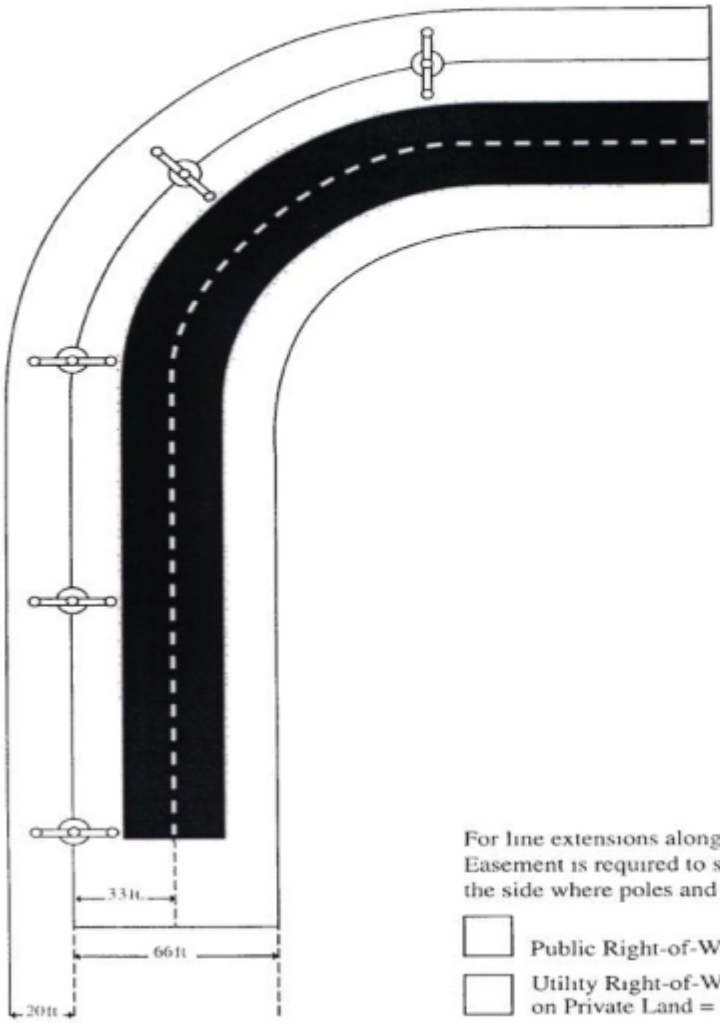
Easement Requirements and Related Row Development

Figure #2 Line Extensions



For line extensions along existing Public roads, Easement is required to support Row development on the side where poles and wires will be placed.

☐ Public Right-of-Way = 66 Feet

☐ Utility Right-of-Way on Private Land = 20 Feet