Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AG2-151

"Trice's Lake – James River Tap 115 kV"

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff, as well as the Application and Studies Agreement between the Project Developer and PJM Interconnection, LLC (PJM or Transmission Provider (TP)). The Transmission Owner (TO) is Virginia Electric and Power Company d/b/a Dominion Energy Virginia (Dominion).

This Facility Study was performed to satisfy the Phase 2 Facility Study requirement of the PJM Tariff. The Facility Study is intended to provide scope, cost and schedule estimates for the project as currently defined and approved for Phase 2 study. In the event project changes are made during DP2 that impact this report, updates will be provided as part of the Phase 3 report. Following execution of the project's final agreement, this report will not be updated to account for other changes made as part of the agreements modification clause and instead the scope change process will be followed.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed a Solar Generating Facility located in, Cumberland County, Virginia with a designated PJM Project ID of AG2-151. The installed facilities will have a total Maximum Facility Output (MFO) of 100 MW with 60 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

AG2-151 will interconnect with the Dominion transmission system via a newly constructed 115 kV Single Breaker substation, tapping the Trice's Lake DP – Bremo Substation 115kV line, approximately 0.85 miles from Trice's Lake DP and 5.72 miles from Bremo Substation.

This project serves to tap the 115 kV line 4 with a new substation called AG2-151, which is to be located in Cumberland County, VA. The tap will be located at structure 4/700 at Trices Lake Tap.

The proposed generation interconnection is shown on the single line diagram in Attachment #1.

3. POINT OF CHANGE IN OWNERSHIP

The Point of Change in Ownership between the Project Developer and this station will be the 115kV disconnect switch 4-hole pad on the transmission line structure outside AG2-151 station fence.

4. SCOPE OF PROJECT DEVELOPER INTERCONNECTION FACILITIES

Project Developer will design, build, own, operate and maintain the Project Developer Interconnection Facilities on Project Developer's side of the Point of Change in Ownership (PCO). This includes, but is not limited to:

- Circuit breakers and associated equipment located between the high side of the MPT(s) or GSU(s) and the Point of Change in Ownership
- Generator lead line from the Generating Facility to the Point of Change in Ownership
- Relay and protective equipment, telecommunications equipment, and Supervisory Control and Data Acquisition (SCADA) to comply with the TO's Applicable Technical Requirements and Standards

B. Transmission Owner Facilities Study Results

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AG2-151 projects to Dominion transmission system. These facilities shall be designed according to all Dominion Applicable Technical Requirements and Standards in effect March 20th, 2026. Dominion Energy Virginia – Electric Transmission Facility Interconnection Requirements, Procedure Version 25.0, dated October 1, 2025, shall apply. Once built, Dominion will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

The Transmission Owner Interconnection Facilities include the portion of the interconnection switching station which is associated solely with the single feed to the generating facilities collector station. The equipment associated with the Transmission Owner Interconnection Facilities includes, disconnect switch, conductors and connectors.

The proposed Transmission Owner Interconnection Facility scope is detailed in Attachment #4.

The proposed Option to Build (OTB) Transmission Owner Interconnection Facility scope is detailed in Attachment #5.

2. STAND ALONE NETWORK UPGRADES

No Stand Alone Network Upgrades have been identified in this facility studies report.

3. NETWORK UPGRADES

Transmission Line Tie-in for new interconnection substation:

The new single breaker interconnection substation will tap the existing 115kV transmission line.

The proposed Transmission Line Tie-in scope is shown in Attachment #6.

Upgrades to neighboring facilities:

Bremo Substation

The proposed neighboring facility scope is detailed in Attachment #7.

James River Substation

The proposed neighboring facility scope is detailed in Attachment #8.

Three Breaker Ring at Line 4 Trices Lake Tap:

AG2-151 and AH1-170 both contribute to the need for a new three breaker ring will be constructed at the Trices Lake Tap on Line 4.

The proposed Three Breaker Ring scope is shown in Attachment #9 and Attachment #10.

4. OTHER SCOPE OF WORK

Other Scope includes metering accuracy CCVT's and metering accuracy CT's.

In the event the PD selects OTB, The proposed OTB scope is detailed in Attachment #4.

5. MILESTONE SCHEDULE FOR COMPLETION OF [TO] WORK

Facilities outlined in this report are estimated to take 36 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule may be impacted by the timeline for procurement and installation of long lead items, the ability to obtain outages to construct and test the proposed facilities.

Description	Start month	Finish month
Detailed Design	1	10
Permitting/Procurement	2	26
Construction	18	36

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

Assumptions can be found in Attachments #3-9

7. REVENUE METERING REQUIREMENTS

All revenue metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AG2-151 GIA, and in PJM Manuals M01 and M14D. The details of applicable revenue metering requirements are given in the Dominion Energy Virginia – Electric Transmission Facility Interconnection Requirements (FIR) Rev 25.0 posted on PJM website.

The revenue metering will be installed on the Dominion side of the Point of Change in Ownership will be installed, owned and maintained by Dominion.

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

Land requirements for the Interconnection Substation needed for this interconnection project must meet the requirements in Dominion's Facility Interconnection Requirements and NERC Compliance Procedure FAC-001 posted on PJM's website.

The Project Developer would be responsible for the following expectations in the area of Real Estate.

- The land required for Dominion's substation and project specific areas around must be deeded over title-in-fee.
- Any additional land needed for Storm Water Management, Landscaping, and Wetlands/Wetlands Mitigation.
- Dominion Real Estate and Counsel will provide standard real estate checklist word document. Process needs to start at least 6 months prior to closing date.
- Required subdivision plat and associated documentation to be reviewed prior to subdividing parcel with the county.
- Suitable Access Road from Substation to a Virginia/North Carolina State Maintained Roadway.
- Dominion will require access road, transmission line and utilities easement to the Substation.
- Any other Land/Permitting requirements required by the Substation.

The Project Developer is responsible for the following expectations in the area Real Estate.

- Land and/or Permitting associated with the Generation Facility and the Generation Line to the Point of Change in Ownership (PCO) structure.

9. APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS

These facilities shall be designed according to all Dominion Applicable Technical Requirements and Standards in effect March 20th, 2026. Dominion Energy Virginia – Electric Transmission Facility Interconnection Requirements, Procedure Version 25.0, dated October 1, 2025, shall apply.

10. ENVIRONMENTAL AND PERMITTING

The Project Developer would be responsible for the following expectations in the area of Environmental and Permitting.

- Assessment of environmental impacts related to the Interconnection Facility and/or Network Upgrades including:

  Environmental Impact Study requirements

  Environmental Permitting

- Dominion will require a stormwater easement for substation specific stormwater design BMP's to allow access to and use of the facilities.

  A maintenance agreement should be in place in perpetuity for said stormwater facilities.

- Conditional Use Permit for Substation
- Any additional land needed for Storm Water Management, Landscaping, and Wetlands/Wetlands Mitigation
- Any other Permitting requirements required by the Substation

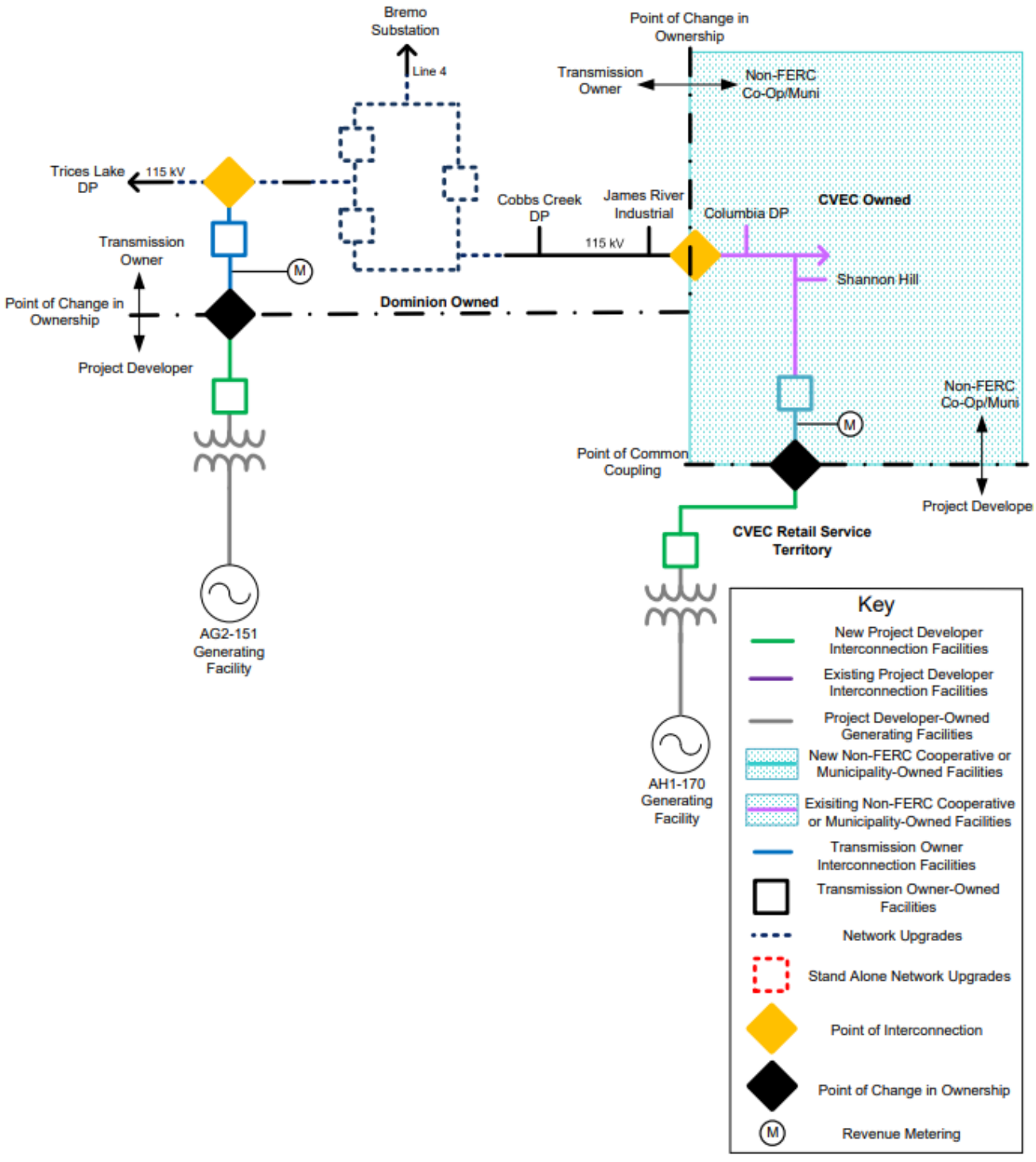
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- Environmental and/or Permitting associated with the Generation Facility and the Generation Line to the Point of Change in Ownership (PCO) structure.

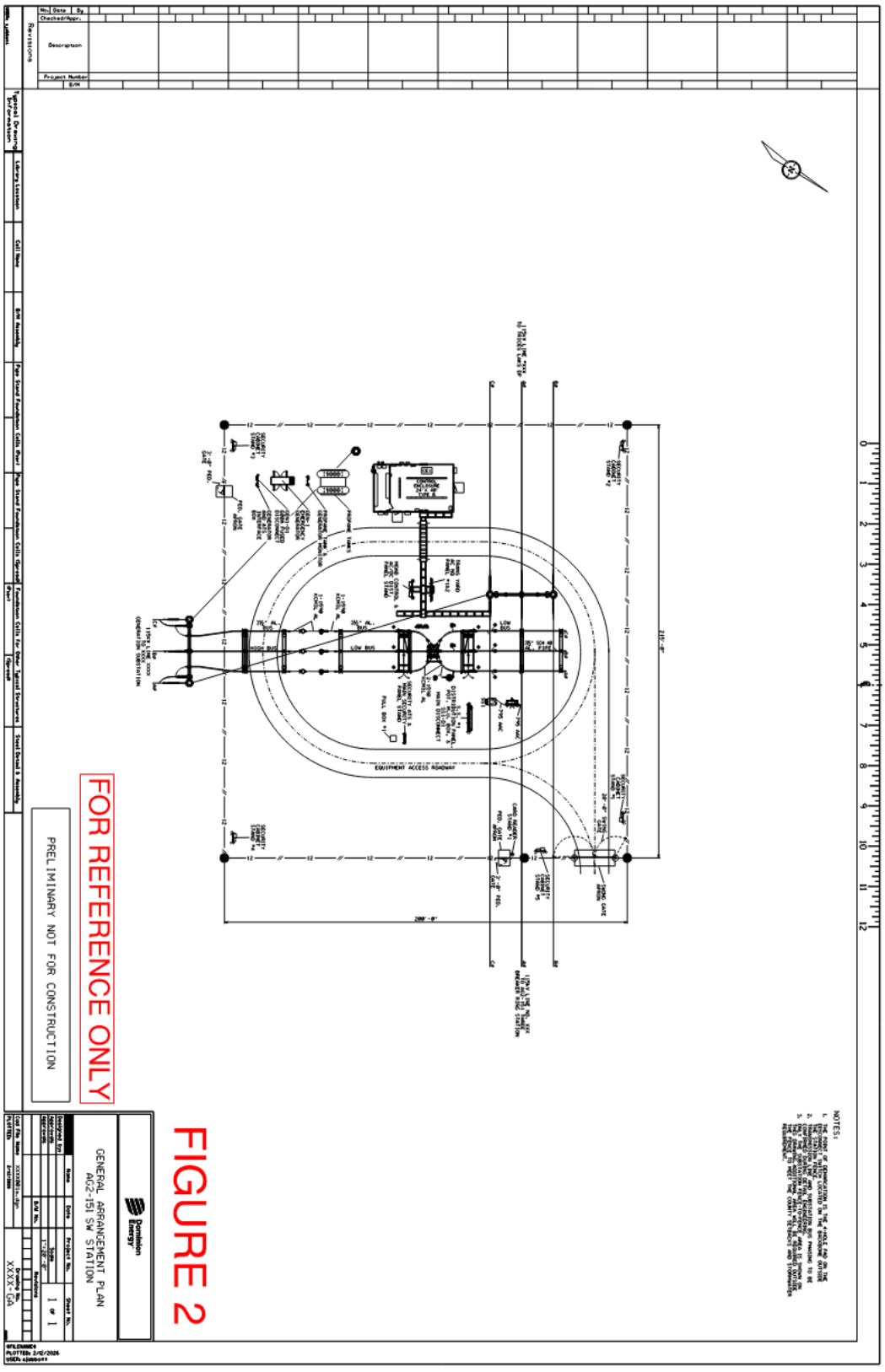
C. APPENDICES

Attachment #1:	Single line Diagram for the Physical Interconnection
Attachment #2:	AG2-151 Substation General Arrangement
Attachment #3:	Network Upgrade – Substation General Arrangement 3-Breaker Ring at Trice's Lake
Attachment #4:	Transmission Owner Interconnection Facility Scope
Attachment #5:	OTB Transmission Owner Interconnection Facility Scope
Attachment #6:	Network Upgrade – Transmission Tie-in Scope
Attachment #7:	Network Upgrade – Bremo Substation
Attachment #8:	Network Upgrade – James River Substation
Attachment #9:	Network Upgrade – Three Breaker Ring at Trice's Lake Tap – Substation
Attachment #10:	Network Upgrade – Three Breaker Ring at Trice's Lake Tap – Transmission

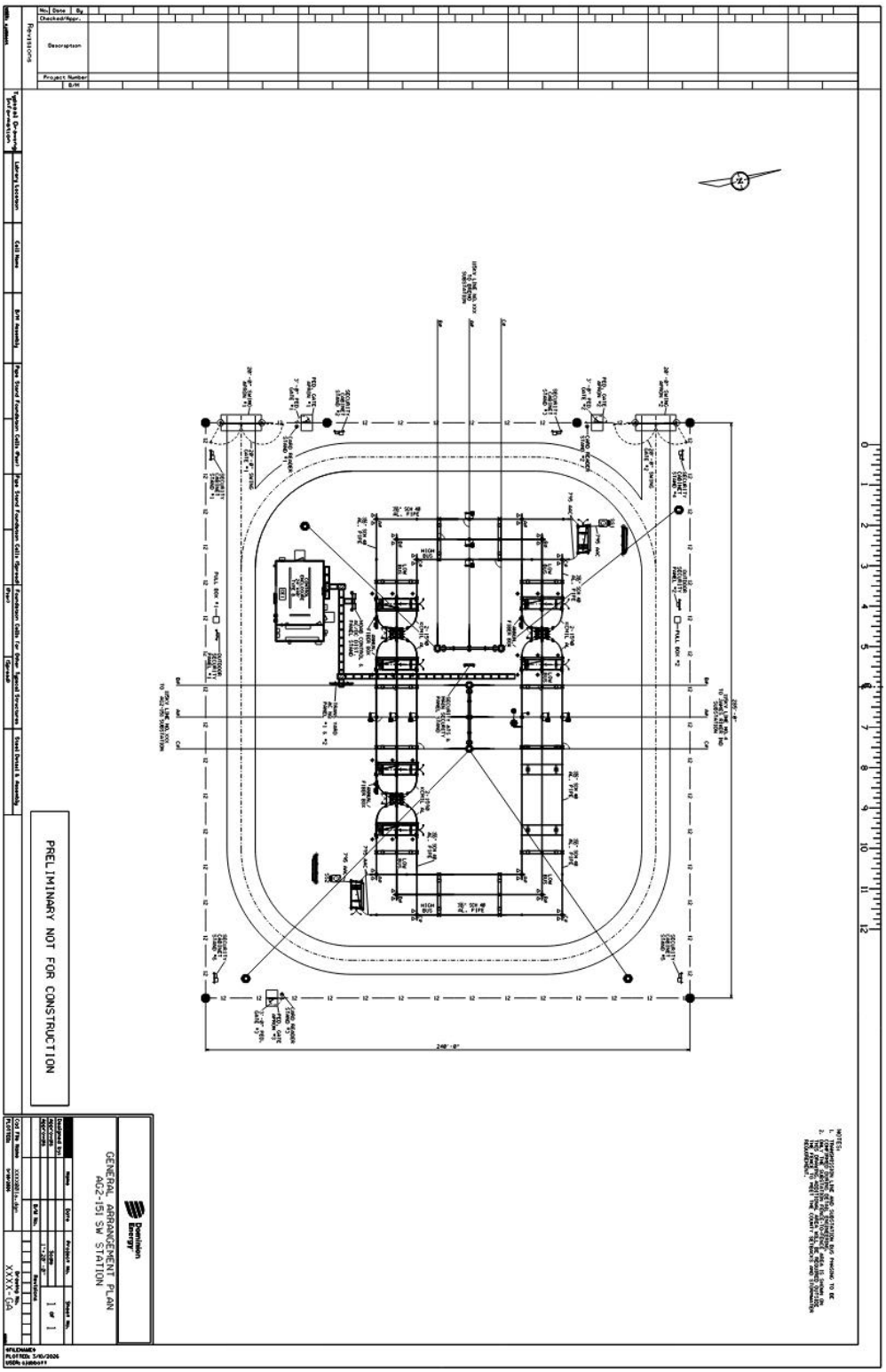
Attachment #1: Single line Diagram for the Physical Interconnection



Attachment #2: AG2-151 Substation General Arrangement



Attachment #3: Network Upgrade – Substation General Arrangement 3-Breaker Ring at Trice's Lake



Attachment #4: Transmission Owner Interconnection Facility Scope

Project Summary

Project number AG2-151 provides for the construction of a new single breaker interconnect facility and necessary network upgrades to support the new solar farm built by Project Developer.

This site is located along Virginia Electric and Power Company d/b/a Dominion Energy Virginia (Dominion) existing 115kV line 4 between structures 4/611 and 4/612 in Cumberland County, Virginia. The station will be positioned in such a way that the 115kV backbone (provided by Transmission Engineering) will accept the new line tap and terminate into this structure. A new 115kV circuit breaker will be installed at this terminal along with disconnect switches, arresters, and potential transformers.

The Generating Facilities will be located adjacent to AG2-151 station. The Point of Change in Ownership between the Project Developer and this station will be the 115kV disconnect switch 4-hole pad on the transmission line structure outside AG2-151 station fence. The Project Developer will bring its conductor to the demarcation point. The entire 115kV single breaker tap station will be Transmission Owner Interconnection Facilities. The Project Developer will provide the property and access to the switching station. All station permitting, site preparation and grading activities will be performed by the Project Developer.

The Transmission Owner Interconnection Facilities include the portion of the interconnecting switching station which is associated solely with the single feed to the generating facilities collector station. The equipment associated with the Transmission Owner Interconnection Facilities includes the disconnect switch, conductors and connectors.

Transmission line engineering is to renumber the existing line segment between the new 115kV single breaker station and Trice's Lake DP and between the new 115kV single breaker station and AG2-151 three breaker ring station.

Other scope includes metering accuracy CCVT's, metering accuracy CT's.

Additional work to be required at Trice's Lake DP

Security and fence type – design level 4.

Assumption:

Currently, the scope and estimate assume Dominion standard spread footer foundations. Once the soil information is available and it is prudent to change the design to “helical pile foundations” the Dominion team should be informed to adjust the project estimate at the earliest possible opportunity.

Since there is only one station service source (PVT), a second onsite generator source will be required.

Purchase and install substation material – Transmission Owner Interconnection Facilities Upgrade:

1. Approximate station fence line dimensions of 240’x190’. At a minimum, site preparation and grading will be required to extend 15’ beyond these dimensions for station grounding. Additional property and site prep may be required for proper grading and stormwater management, etc.
2. Approximately 860 linear ft of 5/8” chain link, 12 ft tall, perimeter fence around the station along with the security cameras and integrators as per design 4 fence standards
3. One (1), 115kV, 3000A, 40kAIC, SF-6 circuit breaker
4. Two (2), 115kV, 2000A, 3-phase center break gang operated switch
5. Three (3), 115kV, relay accuracy CCVT
6. Six (6), 90kV, 74kV MCOV surge arrester
7. One (1), 115kV, 2000A, 2-phase center break gang operated switch (for PVT)
8. One (1), 115kV, 100KVA power PT for station service
9. One (1), 115kV, 10 in-lb., 125VDC motor operator
10. One (1), 100kW, 1PHS, 240/120VAC generator
11. Two (2), 1000 gallon propane tanks
12. One (1), 600A, 240VAC station service ATS
13. One (1), shield wire pole and two spans of shield wire (by Transmission)
14. One (1), 115kV, heavy duty steel backbone (by Transmission)
15. One (1), 24’ x 40’ control enclosure
16. One (1), 125 VDC, 300 Ah station battery and 50 Amp charger (size to be verified during detail engineering)
17. Approximately 100 ft of cable trough
18. One (1), 38” x 38” x 42” precast yard pull box
19. One (1), 115kV, 2000A, 3-phase vertical mounted switch (by Transmission)
20. One (1), 115kV, heavy duty steel backbone (by Transmission)
21. Conductor, connectors, conduits, control cables, foundations, steel structures and grounding material as per engineering standards
22. 2Station stone as required
23. Station lighting as required
24. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
25. Foundations as required including control house, equipment, and bus support stands
26. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per engineering standards

Purchase and install relay material – Transmission Owner Interconnection Facilities Upgrade:

1. One (1), 1510 - 24” dual SEL-351-7 transmission breaker with reclosing panel
2. One (1), 4510 - SEL-2411 breaker annunciator
3. Two (2), 1340 - 24” dual SEL-411L CD/Fiber line panel
4. One (1), 4506 - 3-phase CCVT potential make-up box
5. One (1), 1603 - 24” SEL-451 islanding control scheme panel
6. One (1), 4000 - station service potential make-up box
7. One (1), 4548 - non-earthing switch MOAB control box
8. One (1), 4103 - non-earthing switch MOAB AC/DC distribution box
9. One (1), 4018 - 500A station service AC distribution panel
10. One (1), 4007 - 225A outdoor transmission yard AC NQOD
11. One (1), 4019 - 225A 3-phase throw over switch
12. One (1), 4016 - 600A PVT disconnect switch
13. One (1), 4153c - wall mount station battery monitor
14. One (1), 5613 - annunciator/RTU/communication panel
15. One (1), 5609 - fiber optic management panel
16. One (1), 4526_A - circuit breaker fiber optic make-up box
17. One (1), 5202 - 26” APP 601 digital fault recorder
18. Six (6), 4040 - security fiber/power make-up box
19. One (1), 5603 - station network panel no. 1
20. One (1), 5603 - station network panel no. 2
21. One (1), 4051 - power block
22. One (1), 4042_D1B - security utility - utility ATS
23. One (1), 4044 - 225A 1Ø outdoor main security AC NQOD
24. One (1), 5616 - station security panel
25. One (1), 5616 - station security fence panel
26. One (1), 4018 - 225A station service AC distribution panel branch breaker
27. One (1), 4821 – generator & ATS interface box
28. One (1), 4533 – security generator monitor
29. One (1), 4526_G – generator monitor fiber make-up box
30. One (1), 4042_D1C – sec utility – gen ATS
31. One (1), 1323 - 24” SEL-487/735 PMU and PQ monitoring panel
32. One (1), high voltage protection (HVP) box (provided by IT) (to be verified during detail engineering)
33. One (1), telephone interface box (to be verified during detail engineering)

Purchase and install metering material – Other:

1. Three (3), 115kV, metering accuracy CCVT
2. Three (3), 115kV, 500:5 metering accuracy CT
3. One (1), 1425 - 24” dual SEL-735 transmission and generator interconnect metering panel
4. One (1), 4524 - revenue metering CT make-up box
5. One (1), 4506 - 3-phase CCVT potential make-up box with metering (P4)

Attachment #5: OTB Transmission Owner Interconnection Facility Scope

Project Summary

Project number AG2-151 provides for the initial construction of a new 115kV interconnect facility and necessary network upgrades to support the new solar farm facility into Dominion transmission network in Cumberland County, VA. The Project Developer has selected 'Option to Build' as is their right to do so under the PJM Interconnection Service Agreement. By selecting this construction process method, the Project Developer shall secure all required real estate, obtain all necessary permits, perform site work including site preparation and grading, furnish equipment, construction personnel and ancillary materials as found in the facility study for construction of the switching station in compliance with Dominion Standards. Oversight by Virginia Electric and Power Company d/b/a Dominion Energy Virginia (Dominion) will include, but is not limited to, project management, engineering, permitting, survey, real estate, and construction methods when on site.

All equipment procured by Project Developer will be reviewed and approved by Dominion engineering teams.

The details of the Project Developer and Dominion responsibilities and approval processes are described in the associated "Dominion Option to Build Execution Plan" document.

Project Description

Project number AG2-151 provides for the initial construction to add one new line position and one new 115kV breaker installed at AG2-151 to support the new solar farm built by Project Developer. The site is located along Virginia Electric and Power Company d/b/a Dominion Energy Virginia (Dominion) existing 115kV, 4 line from Trice's Lake DP to AG2-151 three breaker ring station.

The Generating Facilities will be located adjacent to the AG2-151 station. The Point of Change in Ownership between the Project Developer and this station will be the 115kV disconnect switch 4-hole pad on the transmission line structure outside the AG2-151 station fence.

Dominion is to renumber the existing line segment between the new 115kV single breaker station and Trice's Lake DP and between the new 115kV single breaker station and AG2-151 three breaker ring station.

Additional work to be required at Trice's Lake DP and AG2-151 three breaker ring station.

Security and fence type – design level 4.

Option to Build, Transmission Owner Interconnection Facilities; Physical Facilities & Oversight – Dominion:

1. All Physical Engineering related oversight and approvals of activities related to equipment procurement, design, construction, and energization of switching station
2. All Construction and Methods oversight and approval of activities related to construction and energization of switching station
3. All Project Management oversight activities related to construction and energization of switching station
4. All Real Estate related oversight and approval of activities related to construction of switching station.
5. All Permitting related oversight and approval of activities related to construction of switching station
6. All Survey related oversight and approval of activities related to construction of switching station
7. All Construction and Methods oversight and approval of activities related to construction and energization of switching station
8. Review and approve all riser conductor, connectors, spacers, and bolts related to connection of the switching station to the Bulk Electric Transmission System
9. Review and approve all material related to the integration of the security fence software package back to the Corporate Security Fusion Center

Option to Build, Transmission Owner Interconnection Facilities; Physical Facilities – Project Developer:

1. Approximate station fence line dimensions of 240’ x 190’. At a minimum, site preparation and grading will be required to extend 15’ beyond these dimensions for station grounding. Additional property and site prep may be required for proper grading and stormwater management, etc.
2. Approximately 860 linear ft of 5/8” chain link, 12 ft tall, perimeter fence around the station along with the security cameras and integrators as per design 4 fence standards
3. One (1), 115kV, 3000A, 40kAIC, SF-6 circuit breaker
4. Two (2), 115kV, 2000A, 3-phase center break gang operated switch
5. Three (3), 115kV, relay accuracy CCVT
6. Six (6), 90kV, 74kV MCOV surge arrester
7. One (1), 115kV, 2000A, 2-phase center break gang operated switch (for PVT)
8. One (1), 115kV, 100KVA power PT for station service
9. One (1), 115kV, 10 in-lb., 125VDC motor operator
10. One (1), 100kW, 1PHS, 240/120VAC generator
11. Two (2), 1000 gallon propane tanks
12. One (1), 600A, 240VAC station service ATS
13. One (1), shield wire pole and two spans of shield wire (by Transmission)

14. One (1), 115kV, heavy duty steel backbone (by Transmission)
15. One (1), 24’ x 40’ control enclosure
16. One (1), 125 VDC, 300 Ah station battery and 50 Amp charger (size to be verified during detail engineering)
17. One (1), 115kV, 2000A, 3-phase vertical mounted switch (by Transmission)
18. One (1), 115kV, heavy duty steel backbone (by Transmission)
19. Approximately 100 ft of cable trough
20. One (1), 38” x 38” x 42” precast yard pull box
21. Station stone as required
22. Station lighting as required
23. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
24. Foundations as required including control house, equipment, and bus support stands
25. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per engineering standards

Option to Build, Transmission Owner Interconnection Facilities Relay Protection Equipment – Dominion:

1. All Protection & Controls Engineering oversight and approval of activities related to equipment procurement, design, construction, and energization of switching station
2. All relay panel installation methods oversight and approval of activities related to construction and energization of switching station
3. All relay, communications, security settings related to the connection of the switching station to the Bulk Electric Transmission System
4. One (1), 5616 – station security panel
5. One (1), 5616 – station security fence panel
6. One (1), 5603 network panel no. 1
7. One (1), 5603 network panel no. 2
8. One (1), high voltage protection (HVP) box (Provided by IT) (to be verified during detail engineering)
9. One (1), telephone interface box (to be verified during detail engineering)

Option to Build, Transmission Owner Interconnection Facilities Relay Protection Equipment – Project Developer:

1. Two (2), 1340 - 24” dual SEL-411L CD/Fiber line panel
2. One (1), 1323 - 24” SEL-487/735 PMU and PQ monitoring panel
3. One (1), 1510 - 24” dual SEL-351-7 transmission breaker with reclosing panel
4. One (1), 4510 - SEL-2411 breaker annunciator
5. One (1), 4506 - 3-phase CCVT potential make-up box
6. One (1), 1603 - 24” SEL-451 islanding control scheme panel
7. One (1), 4000 - station service potential make-up box

8. One (1), 4548 - non-earthing switch MOAB control box
9. One (1), 4103 - non-earthing switch MOAB AC/DC distribution box
10. One (1), 4018 - 500A station service AC distribution panel
11. One (1), 4007 - 225A outdoor transmission yard AC NQOD
12. One (1), 4019 - 225A 3-phase throw over switch
13. One (1), 4016 - 600A PVT disconnect switch
14. One (1), 4153c - wall mount station battery monitor
15. One (1), 5613 - annunciator/RTU/communication panel
16. One (1), 5609 - fiber optic management panel
17. One (1), 4526_A - circuit breaker fiber optic make-up box
18. One (1), 5202 - 26” APP 601 digital fault recorder
19. Six (6), 4040 - security fiber/power make-up box
20. One (1), 4051 - power block
21. One (1), 4042_D1B - security utility - utility ATS
22. One (1), 4044 - 225A 1Ø outdoor main security AC NQOD
23. One (1), 4018 - 225A station service AC distribution panel branch breaker
24. One (1), 4821 – generator & ATS interface box
25. One (1), 4533 – security generator monitor
26. One (1), 4526_G – generator monitor fiber make-up box
27. One (1), 4042_D1C – sec utility – gen ATS

Option to Build, Other – Project Developer:

1. Three (3), 115kV, metering accuracy CCVT
2. Three (3), 115kV, 500:5 metering accuracy CT
3. One (1), 1425 - 24” dual SEL-735 transmission and generator interconnect metering panel
4. One (1), 4524 - revenue metering CT make-up box
5. One (1), 4506 - 3-phase CCVT potential make-up box with metering (P4)

Attachment #6: Network Upgrade - Transmission Tie-in Scope

This project taps onto the 115 kV line 4 with a new substation called AG2-151, which is to be located in Cumberland County, VA. The tap will be located at structure 4/612. See **Figure 1** for the project location.

A new 115 kV developer generation tie-in line plans to be constructed into proposed AG2-151 substation to a point of change in ownership (PCO) structure, which is to be installed outside proposed AG2-151 substation The PCO structure is the demarcation point between Dominion and the developer. The new 115 kV circuit will hereby be referred to as line 1XX1. The PCO structure will be proposed structure 1XX1/1.

Transmission Owner Build

The proposed structures to be installed are two (2) 115 kV single circuit engineered steel double deadend monopoles, one (1) 115 kV single circuit steel backbone, and one (1) steel static pole. The new conductor and shield wire to be used will be single (1) 768.2 ACSS/TW (20/7) "Maumee" conductor and two (2) DNO-11410 OPGW. 7#7 Alumoweld will be utilized for shielding with AG2-151 substation.

This project will utilize current Dominion 115 kV standards. The conceptual estimate includes cost for the following:

Transmission Owner Build - Existing Facilities to be Removed

Structures – Existing structures 4/611, 4/612, and 4/613

Structure Type	Dwg Number	Str. Qty.
115 kV SC DOM Steel SUS Monopole	11.556	3

Transmission Owner Build - Permanent Facilities to be Installed

Structures: See attached spreadsheet for heights and loading information. The proposed structure finishes are to be weathering steel within the existing corridor based on existing structure finishes in the area. Otherwise, all structures will be galvanized steel.

Structure Type	Dwg Number	Str. Qty.
115 kV SC ENGR Steel DDE Monopole	11.462	2
115 kV SC Steel Backbone Structure	11.955	1
Steel Static Pole	9.008	1

Wire:

1. Mileage listed is per circuit
2. Conductor includes dampers and spacers. Static and Fiber includes dampers and splices.
    - Estimate includes approximately six (6) fiber splices

Length (Miles)	Circuit	# if Bundled-Wire Type "Name"	Start-End
0.11	1	Single (1) 768.2 ACSS/TW (20/7) "Maumee" conductor	Proposed Str. 4/611 – Proposed BB. 4/612 (1XXX/612)
0.13	1	Single (1) 768.2 ACSS/TW (20/7) "Maumee" conductor	Proposed BB. 4/612 (1XXX/612) – Proposed Str. 1XXX/613

0.11	2	DNO-11410 OPGW	Proposed Str. 4/611 – Proposed BB. 4/612 (1XXX/612)
0.13	2	DNO-11410 OPGW	Proposed BB. 4/612 (1XXX/612) – Proposed Str. 1XXX/613
0.05	1	7#7 Alumoweld Shield Wire	Between proposed static poles and backbones at AG2-151 substation

Transmission Owner Build - Existing Facilities to be Transferred or Modified

1. Cut and transfer the existing single (1) 336.4 ACSR (26/7) Conductor for Line 4 from existing structure 4/610 onto proposed structure 4/611.
2. Cut and transfer the existing single (1) 336.4 ACSR (26/7) Conductor for Line 1XXX from existing structure 1XXX/614 onto proposed structure 1XXX/613.
3. Cut and transfer the existing one (1) 3#6 Alumoweld Shield Wire for Line 4 from existing structure 4/610 onto proposed structure 4/611.
4. Cut and transfer the existing one (1) 3#6 Alumoweld Shield Wire for Line 1XXX from existing structure 1XXX/614 onto proposed structure 1XXX/613.

Scope Notes/Assumptions

1. Due to allocated amount of time, no PLS-CADD modeling was done for this project, which results in higher level scopes. Projects in the Transition Cycle 2 – Phase 2 will need to go through full conceptual engineering design prior reaching detailed engineering.

2. It is assumed that existing structures 4/610 and 1XXX/614 can be re-used as part of this project. More information will need to be obtained on these structures during detailed design to confirm that they do not need to be replaced.

3. This project does require acquisition of a laydown yard.

4. The generalized structure heights for this project are 90 ft for structures 4/611 and 1XXX/613. This was determined for the high-level estimate projects for Dominion Generation Interconnection Projects.

5. All deadend engineered steel structures outside the substation (Structures 4/611 and 1XXX/613) will be designed for full-construction deadend loading for construction conditions.

6. Project area code required loading include: NESC Medium, 100 mph wind, ¾" Ice & 30 mph wind.

7. For detailed engineering, it is assumed LiDAR survey is required, including underground survey and ROW file.

8. Crossing insulators will be used whenever crossing over substation fence.

9. An existing right of way width of 50' is assumed based on existing plan and profiles and DEV MapViewer. There is an existing gas line easement that runs parallel to the north side of line 4. It is assumed that line 4 can overlap with the gas line easement. Due to substation location and line angle, an additional 0.57 acres of right of way will be acquired for this project to accommodate the over-insulated 115 kV Dominion ROW preferences. For this project, the new ROW acquisitions are assumed to be triangular areas parallel to the existing ROW. It may be determined in detailed engineering that rectangular sections are preferred.

10. The PCO structure 1XX1/1 is located outside the proposed substation AG2-151 and will be installed on Dominion owned property. This structure will be the demarcation point between the developer and Dominion.

11. A wetland delineation has not been completed as part of this conceptual package.

12. A non-location specific substation general arrangement was provided by the conceptual substation engineering team. See **Figure 2** for the general arrangement used for this project.
13. The assumed reel lengths for this project are 12,000 feet.

14. Cross slopes are not accounted for in this conceptual design. Structures designed assuming a 1.5' foundation reveal at the center of the structure.

15. The collector station will not share a fence and the developer switchyard will be located to the South.

16. This project scope assumes that it is independent from other projects in the Transition Cycle. The following projects may impact the project scope if this assumption is incorrect.
    a. AG2-151 (3B) – Line 4 Substation Cut-In at Trices Lake Tap

Estimate Notes/Assumptions

1. Engineered steel pole costs were determined based off typical wind and weight spans, line angles, and average structure heights for each voltage. These inputs were used to derive an estimated steel pole weight, which was used to develop the structure costs. This was determined for the high-level estimate projects for Dominion Generation Interconnection Projects.

2. Engineered pole foundation costs were based off the projects' location and structure type in the regional soil profile map. The regional soil profile map used for this project is Piedmont.

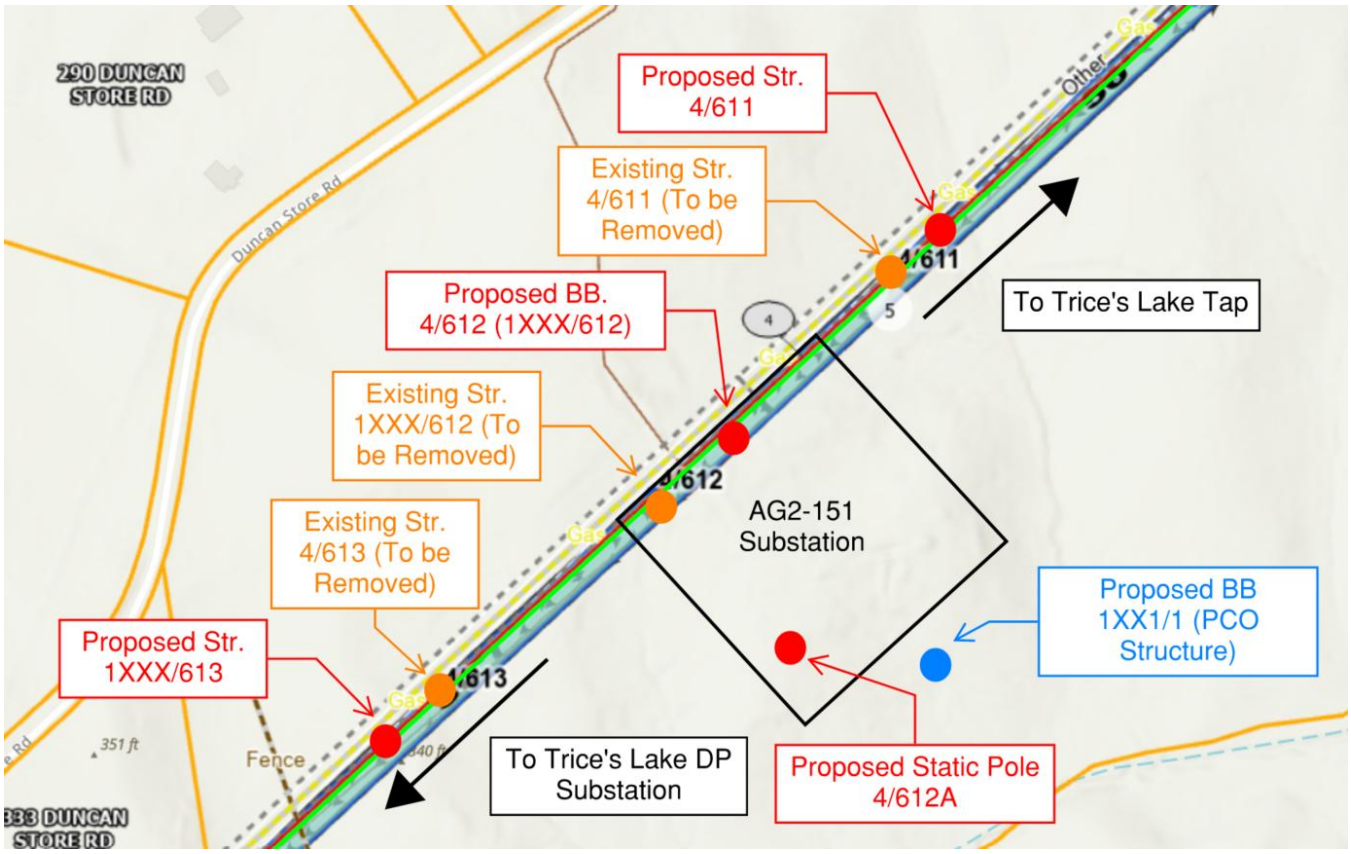
3. Survey cost were determined based on substation proposed location, fiber installation, and impacts on existing line.

4. It should be determined in detailed engineering if 115 kV over-insulated conductor assemblies are required for this project. For this estimate, over-insulated conductor assemblies were utilized.

5. The estimate associated with this scope includes a $50,000 cost to account for the AC mitigation study for cathodic protection crossing the UG gas line that runs parallel to line 4.

6. Transition Cycle 2 – Phase 2 estimates utilize Dominion 2025 labor and material adjustment rates.

Figure 1 – Project Location



Attachment #7: Network Upgrade – Bremo Substation

Project Summary

Project AG2-151/AH1-170 provides for drawing work, islanding panel addition, relay resets, and field support necessary to change line 4 destination from Columbia to AG2-151/AH1-170 Trice's Lake Tap network upgrade. This project is the network upgrade for the AG2-151 and AH1-170 generation interconnection projects. The line number may or may not be changed. Consult the Construction One Line. This scope is a Remote End Network Upgrade for the AG2-151/AH1-170 Trice's Lake Tap Network upgrade. Also replace the existing line 4 relay protection with line differential protection utilizing fiber optics due to the shortening of the line and remove line 4 wave trap at Bremo Substation due to the powerline carrier function now being performed over fiber optics. Transmission engineering will terminate the fiber at one of the backbone legs and substation engineering will install 2" PVC conduits from the new static pole to the control enclosure.

Purchase and Substation - Network Upgrade:

1. Remove - One (1), 115kV, 1200A wave trap
2. Two (2) runs of 2" conduits from backbone leg to the cable trough
3. Conduit tracer wires, 1/C #10, green
4. Foundations as required
5. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per engineering standards.

Purchase and install relay material - Network Upgrade:

1. One (1), 1603 – 24" SEL-451 islanding control scheme panel
2. One (1), 1340 – 24" Dual SEL-411L CD/Fiber line panel
3. One (1), Panel retirement (Panel 9)

Attachment #8: Network Upgrade – James River Substation

Project Summary

Project AG2-151 and AH1-170 provides for drawing work, relay resets, and field support necessary to change line 4 destination from Bremo to AG2-151/AH1-170 Trice's Lake Tap point network upgrade. This scope is a Remote End Network Upgrade for the AG2-151/AH1-170 network upgrade project.

Attachment #9: Network Upgrade – Three Breaker Ring at Trice's Lake Tap – Substation

Project Summary

The Generation Interconnect project AG2-151 requires the construction of a new 115kV three breaker ring switching station at transmission structures 4/700 named the Trice's Lake Tap in Cumberland County, VA.

The objective of this project is to build a 115kV three breaker ring bus to support AG2-151 single breaker tap at the existing Trice's Lake Tap. The site is located along Virginia Electric and Power Company d/b/a Dominion Energy Virginia (Dominion) existing 115kV, 4 line from Bremo Substation, James River Ind. and Trice's Lake DP. This project serves as a network upgrade for the AG2-151 single breaker tap station supporting a solar facility developed by Project Developer. Dominion will be responsible for land acquisition, permitting, site preparation, and grading activities.

Transmission line engineering is to renumber the existing line segment between the new 115kV three breaker ring switching station and Bremo Station as well as between the new 3 breaker ring station and Trice's Lake DP. The existing line segment between the new 115kV three breaker ring switching station and James River Substation shall remain line 4.

Additional work to be required at Bremo, Trice's Lake DP, and James River Ind.

Security and fence type – design level 4.

Assumption:

Currently, the scope and estimate assume Dominion standard spread footer foundations. Once the soil information is available and it is prudent to change the design to "helical pile foundations" the Dominion team should be informed to adjust the project estimate at the earliest possible opportunity.

Purchase and install substation material – Network Upgrade:

6. Approximate station fence line dimensions of 285'x 240'. At a minimum, site preparation and grading will be required to extend 15' beyond these dimensions for station grounding. Additional property and site prep may be required for proper grading and stormwater management, etc.
7. Approximately 1,050 linear ft of 5/8" chain link, 12 ft tall, perimeter fence around the station along with the security cameras and integrators as per design 4 fence standards
8. Three (3), 115kV, 3000A, 40kAIC, SF-6 circuit breaker
9. Six (6), 115kV, 2000A, 3-phase center break gang operated switch
10. Nine (9), 115kV, relay accuracy CCVT
11. One (1), 115kV, 2000A wave trap
12. One (1), line tuner
13. Nine (9), 90kV, 74kV MCOV surge arrester
14. Two (2), 115kV, 2000A, 2-phase center break switch (for PVT's)
15. Two (2), 115kV, 100KVA power PT's for station service
16. Two (2), 115kV, 10 in-lb., 125VDC motor operator
17. Two (2), 115kV, heavy duty steel backbone (by Transmission)
18. Four (4), shield wire poles and four spans of shield wire (by Transmission)
19. One (1), 24' x 40' control enclosure
20. One (1), 125 VDC, 300 Ah station battery and 50 Amp charger (size to be verified during detail engineering)
21. Approximately 164 ft of cable trough
22. Two (2), 38" x 38" x 42" precast yard pull box
23. Station stone as required
24. Station lighting as required
25. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
26. Foundations as required including control house, equipment, and bus support stands
27. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per engineering standards

Purchase and install relay material – Network Upgrade:

34. Three (3), 1510 - 24" dual SEL-351-7 transmission breaker with reclosing panel
35. Three (3), 4510 - SEL-2411 breaker annunciator
36. One (1), 1340 - 24" dual SEL-411L DCB/PLC line panel
37. Two (2), 1340 – 24" dual SEL-411L CD/Fiber line panel
38. Three (3), 4506 - 3-phase CCVT potential make-up box
39. One (1), 1603 - 24" SEL-451 islanding control scheme panel
40. Two (2), 4000 - station service potential make-up box
41. Two (2), 4548 - non-earthing switch MOAB control box

42. One (1), 4103 - non-earthing switch MOAB AC/DC distribution box
43. Two (2), 4018 - 500A station service AC distribution panel
44. Two (2), 4007 - 225A outdoor transmission yard AC NQOD
45. Two (2), 4019 - 225A 3-phase throw over switch
46. Two (2), 4016 - 600A PVT disconnect switch
47. One (1), 4153c - wall mount station battery monitor
48. One (1), 5618 - SEL-3555 communications panel
49. One (1), 1255 - station annunciator panel
50. One (1), 5021 - SEL-2411 RTU panel
51. One (1), 5609 - fiber optic management panel
52. Three (3), 4526_A - circuit breaker fiber optic make-up box
53. One (1), 5202 - 26” APP 601 digital fault recorder
54. Six (6), 4040 - security fiber/power make-up box
55. One (1), 5603 - station network panel no. 1
56. One (1), 5603 - station network panel no. 2
57. One (1), 4051 - power block
58. One (1), 4042_D1B - security utility - utility ATS
59. One (1), 4044 - 225A 1Ø outdoor main security AC NQOD
60. Two (2), 4040 – 100A 1Ø outdoor security AC NQOD
61. One (1), 5616 - station security panel
62. One (1), 5616 - station security fence panel
63. Two (2), 4018 - 225A station service AC distribution panel branch breaker
64. One (1), high voltage protection (HVP) box (provided by IT) (to be verified during detail engineering)
65. One (1), telephone interface box (to be verified during detail engineering)

Attachment #10: Network Upgrade – Three Breaker Ring at Trice Lake Tap - Transmission

This project serves to cut in 115 kV line 4 into a new substation which is to be located in Cumberland County, VA. The line is to be cut-in near existing structure 4/700 at Trices Lake Tap. Line 4 is being renumbered to 1XX1 between AG2-151 substation and Bremo substation. Additionally, the existing tap line to Trices Lake DP will be re-routed and terminated at AG2-151 Substation. Line 4 is being renumbered to 1XXX between AG2-151 Substation to Trices Lake DP. See **Figure 1** for the project location.

The proposed structures to be installed are five (5) 115 kV single circuit engineered steel double deadend 3-poles, one (1) 115 kV single circuit steel double deadend monopole, two (2) 115 kV single circuit steel backbones, and four (4) steel static poles. The new conductor and shield wire to be used will be single (1) 768.2 ACSS/TW (20/7) "Maumee" conductor and two (2) DNO-11410 OPGW. One (1) DNO-11410 will be installed from existing structure 1XX1/8516 to proposed structure 1XX1/8475. 7#7 Alumoweld will be utilized for shielding with AG2-151 substation.

Length of Route	**4.72 miles**
Location of the subject line (County/State)	**Cumberland County, VA**
Total Number of Permanent Structures	**12**
Total Number of Temporary Structures	**0**
CPCN/SCC Required?	**No**
New ROW Required?	**Yes**

New ROW Required:

ROW Length	**ROW Width**
0.07 Miles (See Note 1)	120 ft.
0.06 Miles (See Note 2)	120 ft.

Notes:

1. Additional ROW to be acquired will be from edge of ROW near proposed structure 1XX1/8475 to AG2-151 substation fence.
2. Additional ROW to be acquired will be from the AG2-151 substation fence to edge of gas line easement near proposed structure 1XXX/601.

This project will utilize current Dominion 115 kV standards. The conceptual estimate includes cost for the following:

Transmission Owner Build - Existing Facilities to be Removed

Structures – Seven (7) existing structures to be removed: 4/601, 4/601A, 4/601B, 4/700, 4/700A, 4/700B, and 4/8475.

Structure Type	Dwg Number	Str. Qty.
115 kV SC DOM DDE H-Frame	11.617	1
115 kV SC DOM DDE H-Frame	11.610	1
115 kV SC DOM DDE H-Frame	1-0004-02-039A	1
115 kV SC DOM SUS H-Frame	1-0004-03-95A	1
Wave Trap Pole	11.840	1
115 kV Self-Supporting Switch	11.830	2

Wire: Mileage listed is per circuit.

Length (Miles)	Circuit	# if Bundled-Wire Type "Name"	Start-End
0.12	1	Single (1) 636 ACSR (24/7) conductor	Existing Str. 4/8475 – Existing Str. 4/8474
0.11	1	Single (1) 636 ACSR (24/7) conductor	Existing Str. 4/701 – Existing Str. 4/601
0.11	1	3#6 Alumoweld Shield Wire	Existing Str. 4/701 – Existing Str. 4/601
0.12	2	3#6 Alumoweld Shield Wire	Existing Str. 4/8475 – Existing Str. 4/8474
3.66	1	3#6 Alumoweld Shield Wire	Existing Str. 4/8475 – Existing Str. 4/8508
0.62	1	DNO-9700 OPGW	Existing Str. 4/8508 – Existing Str. 4/8513
0.11	1	3#6 Alumoweld Shield Wire	Existing Str. 4/8513 – Existing Str. 4/8516

Transmission Owner Build - Permanent Facilities to be Installed

Structures: See attached spreadsheet for heights and loading information. The proposed structure finishes are to be weathering steel within the existing corridor based on existing structure finishes in the area. Otherwise, all structures will be galvanized steel.

Structure Type	Dwg Number	Str. Qty.

115 kV SC ENGR Steel DDE 3-Pole	12.158 – 115 kV Config.	5
115 kV SC ENGR Steel DDE Monopole	12.235 – 115 kV and Single Circuit Config.	1
115 kV SC Steel Backbone Structure	11.955	2
Steel Static Poles	9.008	4

Wire:

3. Mileage listed is per circuit
4. Conductor includes dampers and spacers. Static and Fiber includes dampers and splices.
    - Estimate includes approximately seventeen (17) fiber splices

Length (Miles)	**Circuit**	**# if Bundled-Wire Type "Name"**	**Start-End**
0.12	1	Single (1) 768 ACSS/TW (20/7) "Maumee" conductor	Proposed BB. 4/698 (1XXX/599) – Existing Str. 4/701
0.09	1	Single (1) 768 ACSS/TW (20/7) "Maumee" conductor	Proposed BB. 4/698 (1XXX/599) – Proposed Str. 1XXX/601

0.10	1	Single (1) 768 ACSS/TW (20/7) “Maumee” conductor	Proposed BB. 1XX1/8473 – Proposed Str. 1XX1/8475
0.12	2	DNO-11410 OPGW	Proposed BB. 4/698 (1XXX/599) – Existing Str. 4/701
0.09	2	DNO-11410 OPGW	Proposed BB. 4/698 (1XXX/599) – Proposed Str. 1XXX/601
0.10	2	DNO-11410 OPGW	Proposed BB. 1XX1/8473 – Proposed Str. 1XX1/8475
4.39	1	DNO-11410 OPGW	Proposed Str. 1XX1/8475 – Existing Str. 1XX1/8516
0.02	1	Underground Fiber	Existing Str. 4/8516 – Bremo Substation (See Note 1)
0.09	1	7#7 Alumoweld Shield Wire	Between proposed static poles and backbones in AG2-151 substation

Notes:

1. Underground fiber cable will be brought to Bremo substation fence. Conceptual substation scope of work will include the underground cable fiber work to be installed inside the station.

Transmission Owner Build - Existing Facilities to be Transferred or Modified

1. Cut and transfer the existing single (1) 636 ACSR (24/7) conductor for Line 1XX1 from existing structure 1XX1/8476 onto proposed structure 1XX1/8475.
2. Cut and transfer the existing single (1) 636 ACSR (24/7) conductor for Line 1XXX from existing structure 1XXX/602 onto proposed structure 1XXX/601.
3. Cut and transfer the existing one (1) 3#6 Alumoweld Shield Wire for Line 1XX1 from existing structure 4/8476 onto proposed structure 1XX1/8475.
4. Cut and transfer the existing one (1) 3#6 Alumoweld Shield Wire for Line 1XXX from existing structure 1XXX/602 onto proposed structure 1XXX/601.
5. Install one (1) new OPGW deadend assembly [Reference Drawing 96.061] on one (1) existing structure 4/8516 (Outside Bremo Sub).
6. Install two (2) new OPGW deadend assemblies [Reference Drawing 96.060] on thirteen (13) existing structures 4/8484, 4/8487, 4/8490, 4/8491, 4/8493, 4/8498, 4/8499, 4/8507, 4/8508, 4/8510, 4/8513, 4/8514, and 4/8515.
7. Install one (1) new OPGW jumper loop assembly [Reference Drawing 96.210] on eleven (11) existing structures 4/8484, 4/8487, 4/8490, 4/8491, 4/8498, 4/8499, 4/8507, 4/8510, 4/8513, 4/8514, and 4/8515.
8. Install one (1) new OPGW suspension assembly [Reference Drawing 96.020] on twenty-eight (28) existing structures 4/8476 – 8483, 4/8485 – 8486, 4/8488 – 8489, 4/8492, 4/8494 – 8497, 4/8499A, 4/8500 – 8506, 4/8509, 4/8511 - 8512.

Scope Notes/Assumptions

1. Due to allocated amount of time, no PLS-CADD modeling was done for this project, which results in higher level scopes. Projects in the Transition Cycle 2 – Phase 2 will need to go through full conceptual engineering design prior reaching detailed engineering.

2. It is assumed that all existing structures can be re-used as part of this project. More information will need to be obtained on these structures during detailed design to confirm that they do not need to be replaced.

3. This project does require acquisition of a laydown yard.

4. The generalized structure heights for this project are 65/50/65 ft for structures 4/700, 4/699, 1XXX/600, 1XX1/8474, and 1XX1/8475 and 110 ft for structure 1XXX/601. This was determined for the high-level estimate projects for Dominion Generation

Interconnection Projects.

5. In detailed engineering, it will need to be determined if the adjacent 230 kV line 2027 structures near Trices Lake Tap will need to be replaced to make taller due to the re-routing of the line 4 into AG2-151 substation.

6. All deadend engineered steel structures outside the substation (Structures 4/699, 4/700, 1XXX/600, 1XXX/601, 1XX1/8474, 1XX1/8475) will be designed for full-construction deadend loading for construction conditions.

7. Project area code required loading include: NESC Medium, 100 mph wind, ¾" Ice & 30 mph wind.

8. For detailed engineering, it is assumed LiDAR survey is required, including underground survey and ROW file.

9. Crossing insulators will be used whenever crossing over substation fence.

10. An existing right of way width of 50' from Trices Lake DP to Columbia DP and 195' from Trices Lake Tap to Bremo Substation is assumed based on existing plan and profiles and DEV MapViewer. An additional 0.13 miles of 120 ft of right of way will be acquired to AG2-151 substation for this project to accommodate the over-insulated 115 kV Dominion ROW preferences.

11. A wetland delineation has not been completed as part of this conceptual package.

12. A non-location specific substation general arrangement was provided by the conceptual substation engineering team. See **Figure 2** for the general arrangement used for this project.

13. The assumed reel lengths for this project are 12,000 feet.

14. Cross slopes are not accounted for in this conceptual design. Structures designed assuming a 1.5' foundation reveal at the center of the structure.

15. This project scope assumes that it is independent from other projects in the Transition Cycle. The following projects may impact the project scope if this assumption is incorrect.
    a. AG2-151 (SB) – Line 4 Substation Cit-In near existing structure 4/612

Estimate Notes/Assumptions

1. This scope and estimate for project AG2-151 refers to the "transmission-owner-to-build" execution approach. The transmission owner estimate includes the engineering, project management, and construction costs for the transmission assets on this project.

    a. One estimate has been provided for this scope.

        i. Transmission Owner Build (TO)

2. Engineered steel pole costs were determined based off typical wind and weight spans, line angles, and average structure heights for each voltage. These inputs were used to derive an estimated steel pole weight, which was used to develop the structure costs. This was determined for the high-level estimate projects for Dominion Generation Interconnection Projects.

3. Engineered pole foundation costs were based off the projects' location and structure type in the regional soil profile map. The regional soil profile map used for this project is Piedmont.

4. Since the proposed project is less than 5 miles from an existing substation, fiber will need to be installed for communication purposes. An additional 5k will be included on the general permitting cost due to the fiber installation.

5. Survey cost were determined based on substation proposed location, fiber installation, and impacts on existing line.

6. The estimate associated with this scope includes a $50,000 cost to account for the AC mitigation study for cathodic protection crossing the UG gas line that runs parallel to line 4.

7. It should be determined in detailed engineering if 115 kV over-insulated conductor assemblies are required for this project. For this estimate, over-insulated conductor assemblies were utilized.

8. Transition Cycle 2 – Phase 2 estimates utilize Dominion 2025 labor and material adjustment rates.

Figure 1 – Project Location

