Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AG2-171

“Lunenburg-Nutbush 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 Lunenburg County, Virginia with a designated PJM Project ID of AG2-171. The installed facilities will have a total Maximum Facility Output (MFO) of 60 MW with 36 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

AG2-171 will interconnect with the Dominion transmission system via a newly constructed 115 kV single breaker substation, tapping the Lunenburg Substation – Nutbush D.P. 115kV line, approximately 1.89 miles from Lunenburg Substation and 3.48 miles from Nutbush D.P.

This project taps onto the 115 kV line 1005 into a single breaker substation called AG2-171, which is to be located in Lunenburg County, VA. The tap will be located between existing structures 1005/521 and 1005/522.

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 inside the Dominion station by the common 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
- 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 AG2-171 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 #3.

The proposed Option to Build (OTB) Transmission Owner Interconnection Facility scope is detailed in Attachment #4.

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 #5.

Upgrades to neighboring facilities:

Lunenburg Substation

The proposed neighboring facility scope is detailed in Attachment #6.

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 #3-6

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 AG2-171 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 PERMITING

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

The Project Developer is responsible for the following expectations in the area Environmental and Permitting.

- 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: Substation General Arrangement

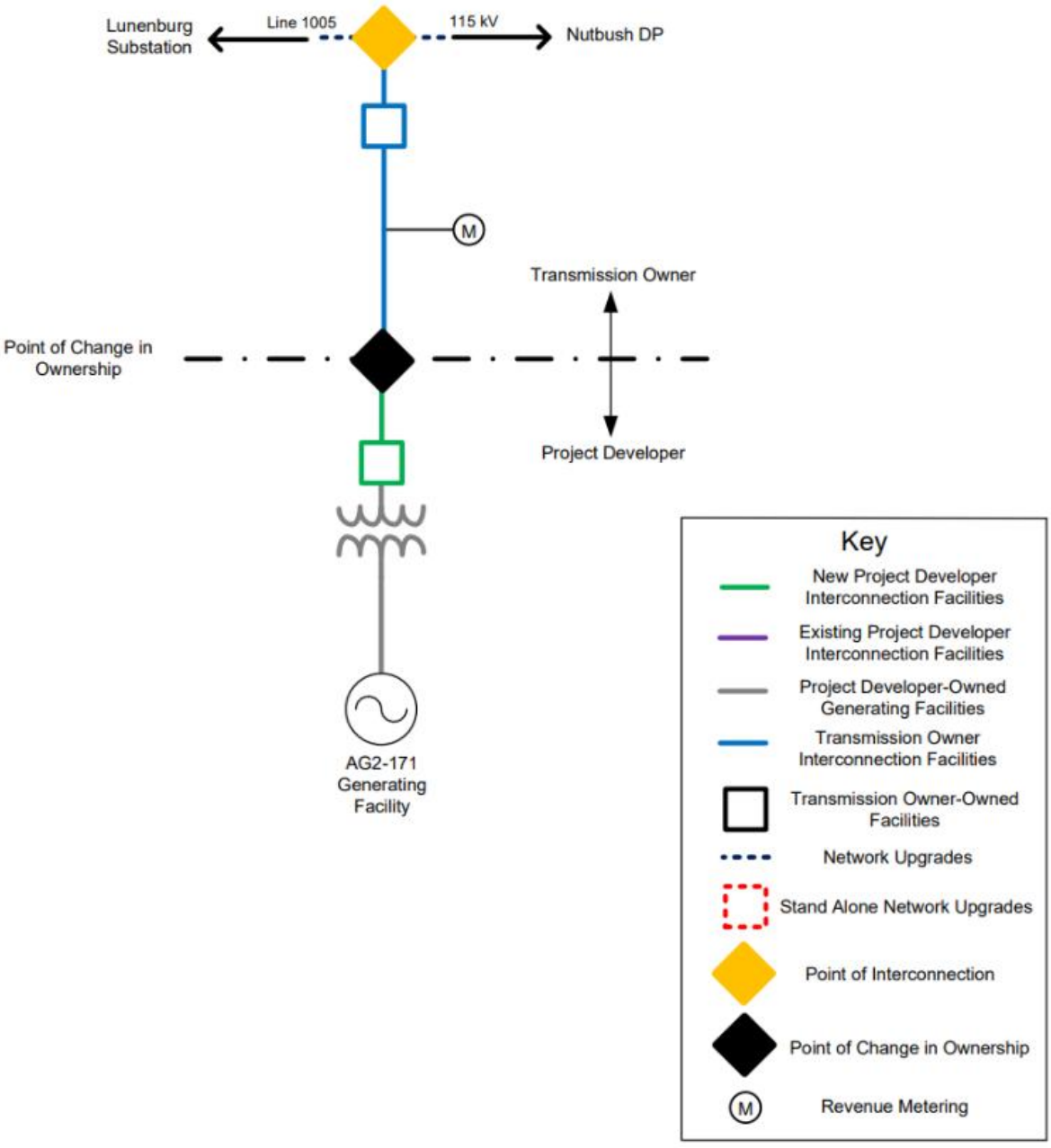
Attachment #3: Transmission Owner Interconnection Facility Scope

Attachment #4: OTB Transmission Owner Interconnection Facility Scope

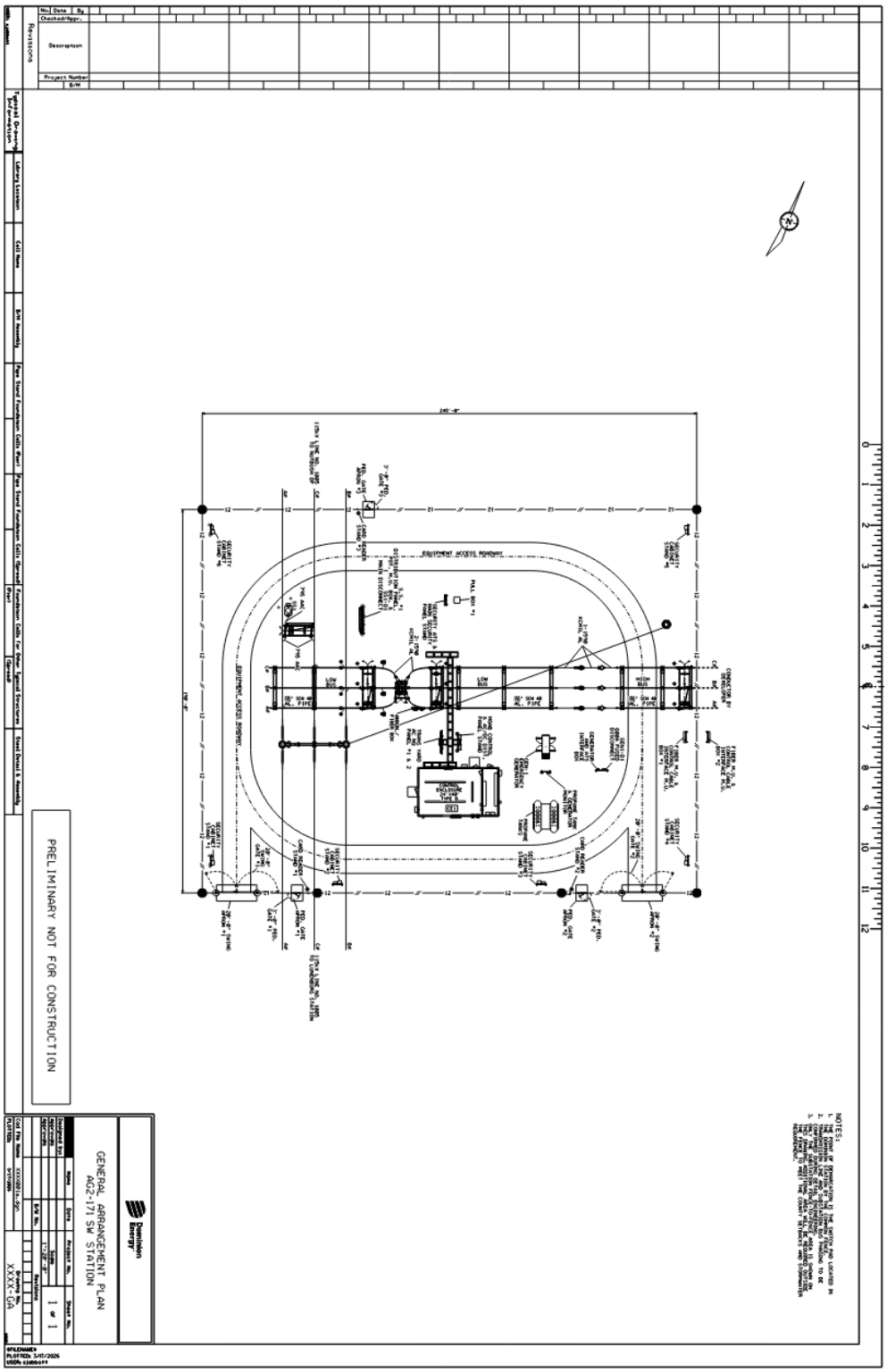
Attachment #5: Network Upgrade – Transmission Tie-in Scope

Attachment #6: Network Upgrade – Lunenburg Substation

Attachment #1: Single line Diagram for the Physical Interconnection



Attachment #2: Substation General Arrangement



Attachment #3: Transmission Owner Interconnection Facility Scope

Project Summary

Project number AG2-171 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 1005 between structures 1005/521 and 1005/522 in Lunenburg 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 share a common footprint and fence line with AG2-171 station. The Point of Change in Ownership between the Project Developer and this station will be the 115kV disconnect switch 4-hole pad inside the Dominion station by the common 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, connectors and associated equipment.

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

Additional work to be required at Lunenburg Substation.

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 – Transmission Owner Interconnection Facilities Upgrade:

1. Approximate station fence line dimensions of 245’ 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 870 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. Three (3), 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. 2Station stone as required
20. Station lighting as required
21. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
22. Foundations as required including control house, equipment, and bus support stands
23. 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), 4018 - 500A station service AC distribution panel
9. One (1), 4007 - 225A outdoor transmission yard AC NQOD
10. One (1), 4019 - 225A 3-phase throw over switch
11. One (1), 4016 - 600A PVT disconnect switch
12. One (1), 4153c - wall mount station battery monitor
13. One (1), 5613 – annunciator/RTU/communication panel
14. One (1), 5609 - fiber optic management panel
15. One (1), 4526_A - circuit breaker fiber optic make-up box
16. One (1), 5202 - 26” APP 601 digital fault recorder
17. Five (5), 4040 - security fiber/power make-up box
18. One (1), 5603 - station network panel no. 1
19. One (1), 5603 - station network panel no. 2
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), 5616 - station security panel
24. One (1), 5616 - station security fence panel
25. One (1), 4018 - 225A station service AC distribution panel branch breaker
26. One (1), 4821 – generator & ATS interface box
27. One (1), 4533 – security generator monitor
28. One (1), 4526_G – generator monitor fiber make-up box
29. One (1), 4042_D1C – sec utility – gen ATS
30. One (1), 1323 - 24” SEL-487E/735 PMU and PQ monitoring panel
31. Two (2), 4541 - control cable make-up box
32. Two (2), 4528A - generation fiber make-up box
33. One (1), high voltage protection (HVP) box (provided by IT) (to be verified during detail engineering)
34. 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 #4: OTB Transmission Owner Interconnection Facility Scope

Project Summary

Project number AG2-171 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 AG2-171 provides for the initial construction to add one new line position and one new 115kV breaker installed at AG2-171 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, 1005 line from Nutbush DP to Lunenburg Substation.

The Generating Facilities will share a common footprint and fence line with AG2-171 station. The Point of Change in Ownership between the Project Developer and this station will be the 115kV disconnect switch 4-hole pad inside the Dominion station by the common fence. The Project Developer will bring its conductor to the demarcation point.

Additional work to be required at Lunenburg Substation.

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 245’ 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 870 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. Three (3), 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. Station stone as required
20. Station lighting as required
21. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
22. Foundations as required including control house, equipment, and bus support stands
23. 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), 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), 4051 - power block
20. One (1), 4042_D1B - security utility - utility ATS
21. One (1), 4044 - 225A 1Ø outdoor main security AC NQOD
22. One (1), 4018 - 225A station service AC distribution panel branch breaker
23. One (1), 4821 – generator & ATS interface box
24. One (1), 4533 – security generator monitor
25. One (1), 4526_G – generator monitor fiber make-up box
26. One (1), 4042_D1C – sec utility – gen ATS
27. Two (2), 4541 - control cable make-up box
28. Two (2), 4528A - generation fiber make-up box

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 #5: Network Upgrade - Transmission Tie-in Scope

Preliminary Scoping Summary

This project taps onto the 115 kV line 1005 with a single breaker substation called AG2-171, which is to be located in Lunenburg County, VA. The tap will be located between existing structures 1005/521 and 1005/522. See **Figure 1** for the project location.

The proposed structures to be installed are two (2) 115 kV single circuit steel double deadend monopoles, one (1) 115 kV single circuit steel backbone, and two (2) steel static poles. The new conductor and shield wire to be used will be single (1) 768 ACSS/TW (20/7) "Maumee" conductor, dual (2) DNO-11410 OPGW at the AG2-171 cut-in, and single (1) DNO-11410 OPGW from the new monopole structures to Nutbush DP substation and Lunenburg substation. 7#7 Alumoweld will be utilized for shielding within AG2-171 Substation.

Length of Route	**5.37 miles**
Location of the subject line (County/State)	**Lunenburg County, VA**
Total Number of Permanent Structures	**5**
Total Number of Temporary Structures	**0**
CPCN/SCC Required?	**No**
New ROW Required?	**Yes**

New ROW Required:

ROW Length	ROW Width
0.08 Miles	25 ft.

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

Structure Type	Dwg Number	Str. Qty.
115 kV SC SUS DOM Monopole	11.555	2

Wire: Mileage listed is per circuit.

Length (Miles)	Circuit	# if Bundled-Wire Type "Name"	Start-End
1.85	1	3#6 Alumoweld Shield Wire	Lunenburg Substation – 1XXX/521
0.08	2	3#6 Alumoweld Shield Wire	1XXX/521 – 1005/522
3.44	1	3#6 Alumoweld Shield Wire	1005/522 – Nutbush DP Substation

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 DDE ENGR Monopole	11.462	2
115 kV SC Steel Backbone Structure	11.955	1
Steel Static Poles	9.008	2

Wire:

1. Mileage listed is per circuit
2. Conductor includes dampers. Static and Fiber includes dampers and splices.
    - Estimate includes approximately eleven (11) fiber splices

Length (Miles)	Circuit	# if Bundled-Wire Type "Name"	Start-End
0.04	1	Single (1) 768.2 ACSS/TW (20/7) "Maumee" Conductor	Proposed Str. 1XXX/521 – Proposed BB 1005/521 (1XXX/522)
0.04	1	Single (1) 768.2 ACSS/TW (20/7) "Maumee" Conductor	Proposed BB 1005/521 (1XXX/522) – Proposed Str. 1005/522
1.85	1	DNO-11410 OPGW	Lunenburg Substation – Proposed Str. 1XXX/521

0.08	2	DNO-11410 OPGW	Proposed Str. 1XXX/521 – Proposed Str. 1005/522
3.44	1	DNO-11410 OPGW	Proposed Str. 1005/522 – Nutbush DP Substation
0.17	1	7#7 Alumoweld Shield Wire	Between proposed static poles and backbones in AG2-171 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 1XXX from existing structure 1005/521 onto the back side of proposed structure 1XXX/521.
2. Cut and transfer the existing single (1) 336.4 ACSR (26/7) conductor for Line 1005 from existing structure 1005/522 onto the ahead side of proposed structure 1005/522.
3. Cut and transfer the existing single (1) 3#6 Alumoweld shield wire above Line 1XXX from existing structure 1005/521 onto the back side of proposed structure 1XXX/521.
4. Cut and transfer the existing single (1) 3#6 Alumoweld shield wire above Line 1005 from existing structure 1005/522 onto the ahead side of proposed structure 1005/522.
5. Install one (1) new OPGW deadend assembly [Reference Drawing 96.061] on two (2) existing backbone structures 1XXX/501B (1034/167) [Lunenburg Sub] and 1005/560 (Nutbush DP Sub).
6. Install two (2) new OPGW deadend assemblies [Reference Drawing 96.060] on six (6) existing structures 1XXX/501A, 1XXX/501, 1005/541, 1005/548, 1005/556 and 1005/559.
    a. Structure 1005/541 currently has a suspension OPGW assembly. It is assumed that this structure can be converted to a strain OPGW connection without any structure guying or reinforcements.

7. Install one (1) new OPGW jumper loop assembly [Reference Drawing 96.210] on five (5) existing structures 1XXX/501A, 1XXX/501, 1005/548, 1005/556 and 1005/559.
8. Install one (1) new OPGW safety catch assembly [Reference Drawing 96.100] on four (4) existing structures 1XXX/501B (1034/167), 1XXX/501A, 1005/559 and 1005/560.
9. Install one (1) new OPGW suspension assembly [Reference Drawing 96.020] on fifty-two (52) existing structures 1XXX/502 – 1XXX/520, 1005/523 – 1005/540, 1005/542 – 1005/547, 1005/549 – 1005/555 and 1005/557 – 1005/558.

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 also 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 1XXX/521 and 1005/522 structures. This was determined for the high-level estimate projects for Dominion Generation Interconnection Projects.

5. All deadend engineered steel structures outside the substation (Structures 1XXX/521 and 1005/522) will be designed for full-construction deadend loading for construction conditions.

6. Project area code required loading include: NESC Heavy, 95 mph wind, ¾" Ice & 30 mph wind.

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

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

9. A right of way width of 75’ is assumed based on DEV MapViewer. An additional 25 ft of right of way will be acquired for this project to accommodate the over-insulated 115 kV Dominion ROW preferences.

10. The transmission team has identified no encroachments within the project area based off the .kmz and DEV MapViewer.

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 share a fence and the developer switchyard will be located to the east.

Estimate Notes/Assumptions

1. This scope and estimate for project AG2-171 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.

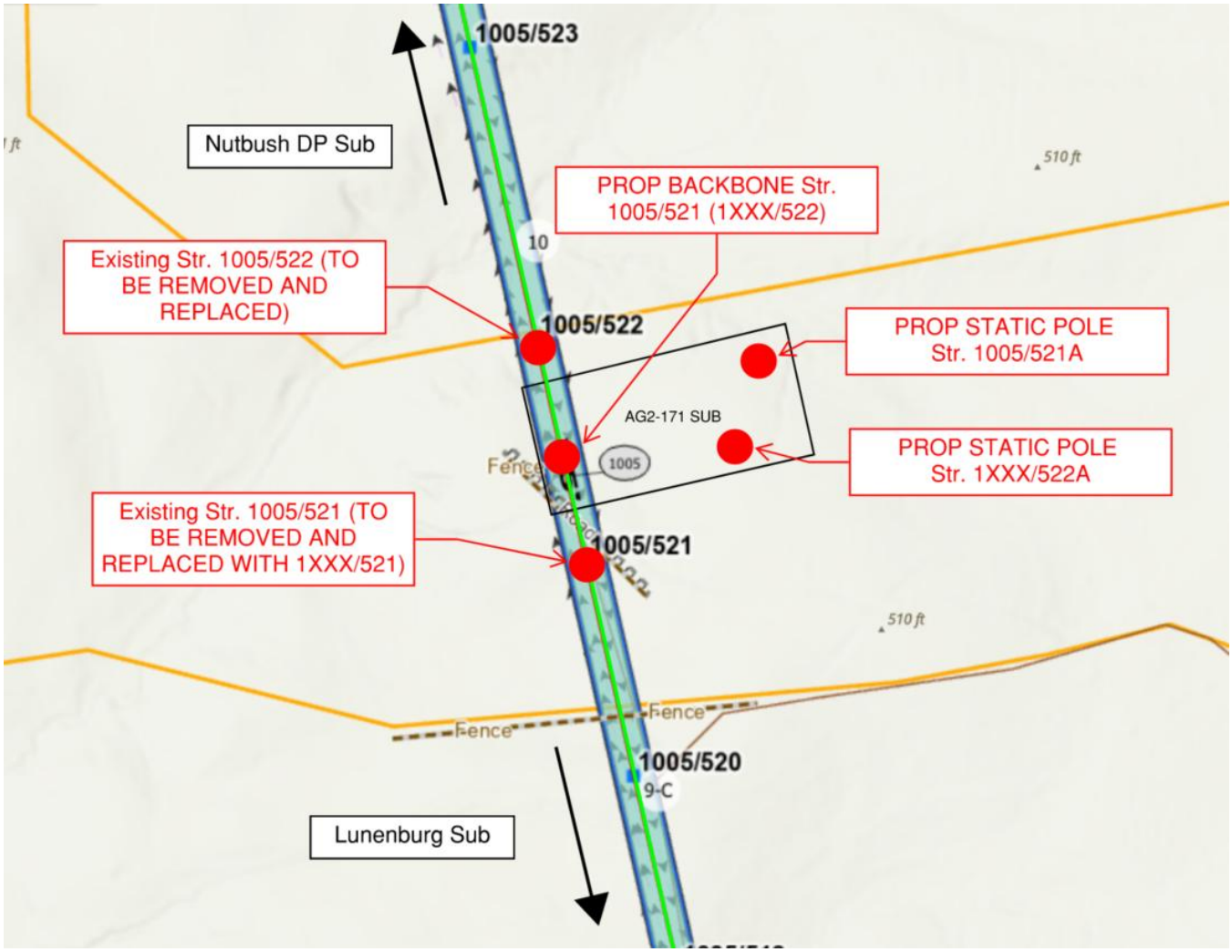
4. Since the proposed project is less than 5 miles from both existing substations, fiber will need to be installed for communication purposes. An additional 5k will be included on the general permitting cost due to the fiber installation.

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

6. 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.

7. Transition Cycle 2 - Phase 2 estimates utilize Dominion 2025 labor and material adjustment rates.

Figure 1 – Project Location



Attachment #6: Network Upgrade – Bird's Branch Substation

Project Summary

Project AG2-171 provides for drawing work, islanding panel addition, relay resets, and field support necessary. The line number may or may not be changed. Consult the Construction One Line. This scope is a Remote End Network Upgrade for the AG2-171 Generator Interconnect project. Also replace the existing line 1005 relay protection with DCB protection utilizing fiber optics due to the tap on the line. With the unidirectional line going to the new AG2-171 station, line protection was changed from the existing 1320 SEL-421 to the updated 1340 DCB/Fiber scheme.

Purchase and install relay material:

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

Remove relay material:

1. One (1), panel retirement (Panel 6)