Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AG2-088

“Midlothian 230 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 Battery Storage Generating Facility located in Chesterfield County, Virginia with a designated PJM Project ID of AG2-088. The installed facilities will have a total Maximum Facility Output (MFO) of 150 MW with 150 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

AG2-088 will interconnect with the Dominion transmission system via the existing Midlothian Substation.

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 two stations will be the 230kV disconnect switch 4-hole pad outside the Midlothian Substation 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 AG2-088 project 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 the disconnect switch, conductors and connectors.

The proposed Transmission Owner Interconnection Facility scope is detailed in Attachment #3 and Attachment #5.

2. STAND ALONE NETWORK UPGRADES

No Stand Alone Network Upgrades have been identified in this Facility Study Report.

3. NETWORK UPGRADES

Substation Expansion at Midlothian 230kV:

Midlothian Substation will be expanded to accommodate the new generation interconnection.

The proposed Network Upgrade scope is shown in Attachment #3 and Attachment #5.

4. OTHER SCOPE OF WORK

Other scope includes the metering accuracy CCVT's, metering accuracy CT's, and associated metering equipment.

5. MILESTONE SCHEDULE FOR COMPLETION OF [TO] WORK

Facilities outlined in this report are estimated to take 47 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	8
Permitting/Procurement	2	37
Construction	27	47

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

Assumptions can be found in Attachments #3-7

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 AG2-088 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.

Dominion 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

Dominion 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

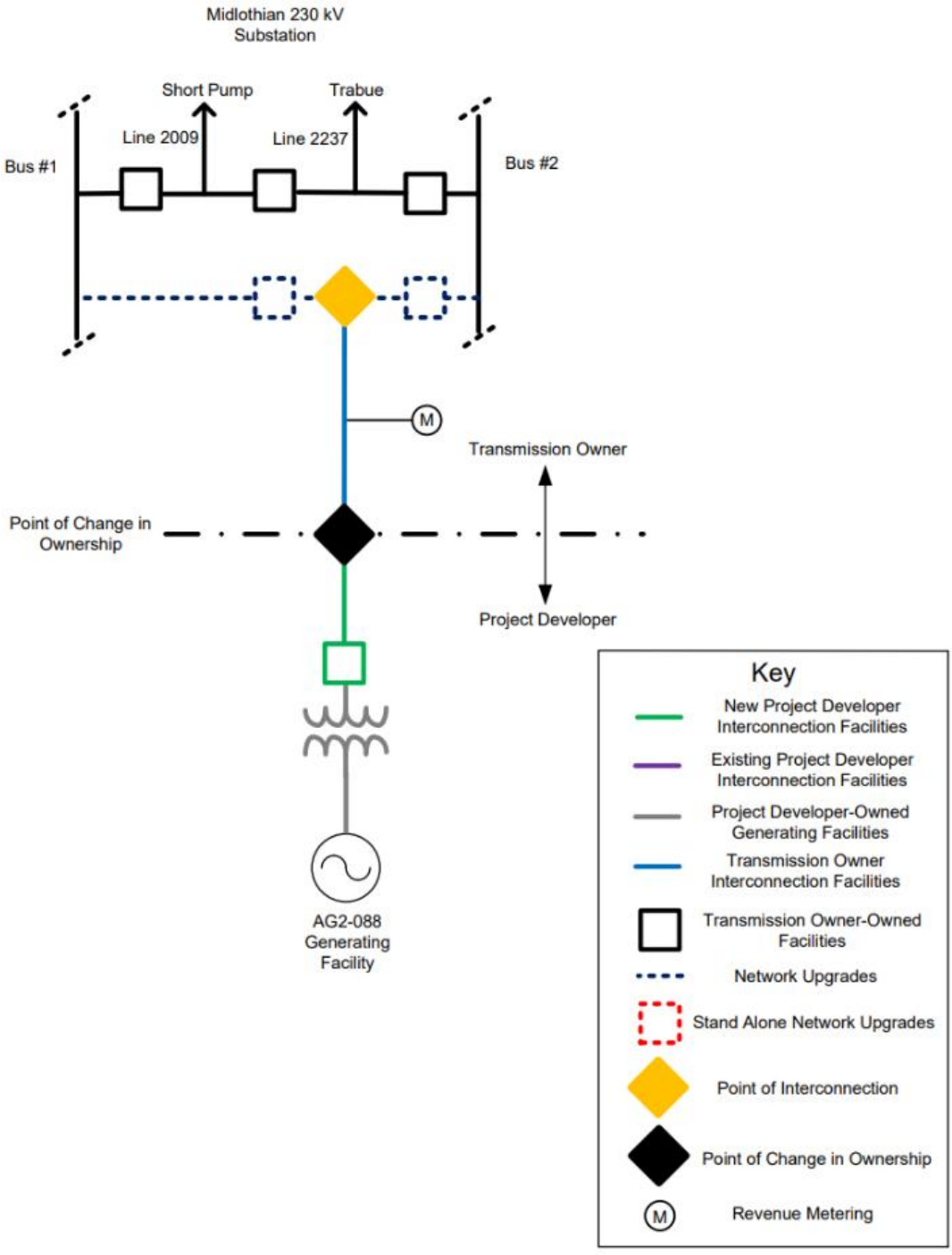
The Project Developer is responsible for the following expectations in the area Environmental and Permitting.

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

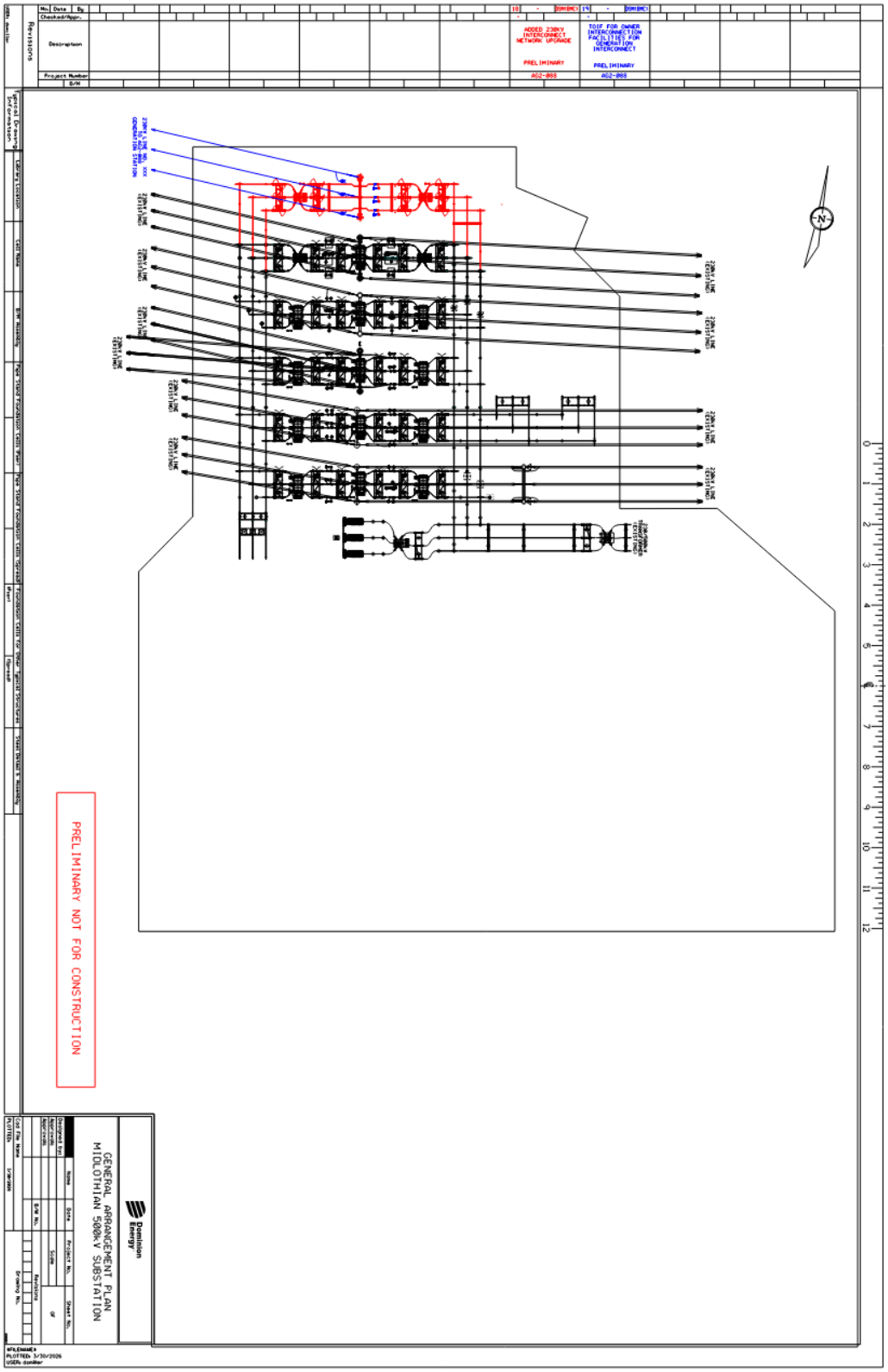
C. APPENDICES

Attachment #1:	Single line Diagram for the Physical Interconnection
Attachment #2:	Substation General Arrangement
Attachment #3:	Network Upgrade & Transmission Owner Interconnection Facility Scope - Substation
Attachment #4:	Transmission Owner Interconnection Facility Scope - Transmission
Attachment #5:	Network Upgrade – Transmission

Attachment #1: Single line Diagram for the Physical Interconnection



Attachment #2: Substation General Arrangement



Attachment #3: Network Upgrade & Transmission Owner Interconnection Facility Scope - Substation

Project Summary

Project number AG2-088 provides for the initial construction of a new 230kV generation interconnect line into the existing Midlothian Substation in Chesterfield County, Virginia.

The objective of this project is to add one new line position and two new 230kV breakers installed at Midlothian Substation to support the new battery storage facility built by Project Developer.

The Generating Facilities will be located outside the station. The Point of Change in Ownership between the two stations will be the 230kV disconnect switch 4-hole pad outside the Midlothian Substation fence. The Project Developer will bring its conductor to the demarcation point.

Transmission line engineering is to provide a new number for the new line between Midlothian Substation and the 230kV battery storage interconnect.

Other scope includes the metering accuracy CCVT's, metering accuracy CT's, and associated metering equipment.

Security and fence type – match existing fence.

Assumption:

Currently, the scope and estimate assume dominion standard spread footer foundation. 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:

1. Approximately 400 linear ft, 20 ft tall, perimeter fence around the station along with the security cameras and integrators as per existing fence standards
2. Two (2), 230kV, 4000A, 63kAIC, SF-6 circuit breaker
3. Four (4), 230kV, 4000A, 3-phase double end breaker switch
4. Three (3), 180kV, 144kV MCOV surge arrester
5. One (1), 230kV, heavy duty steel backbone (By Transmission)
6. One (1) 230kV, shield wire pole and one span shield wire (by Transmission)
7. Approximately 52 ft of cable trough
8. Station stone as required
9. Station lighting as required
10. Steel structures as required including switch stands, bus supports, and CCVT supports
11. Foundations as required including equipment and bus support stands
12. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per engineering standards

Remove substation material – Network Upgrade:

1. Approximately 316 linear ft, 20 ft tall, perimeter fence around the station along with the security cameras and integrators as per existing fence standards.

2. Conductors, connectors, conduits, control cables, and grounding materials as per engineering standards

Purchase and install relay material – Network Upgrade:

1. Two (2), 1510 – 24” dual SEL-351 transmission breaker with reclosing panel
2. Two (2), 4510 – SEL-2411 breaker annunciator
3. Two (2), 4526 – A circuit breaker fiber optic make-up box
4. One (1), 1603 – 24” SEL-451 islanding control scheme panel

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.

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

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

1. One (1), 230kV, 4000A, 3-phase center break gang operated switch (by Transmission)
2. Conductor, connectors, conduits, control cables, foundations, steel structures, and grounding material as per engineering standards

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

1. One (1), 1340 – 24” dual SEL-411L CD/Fiber line panel
2. One (1), 1323 – 24” SEL-487E/735 PMU and PQ Monitoring Panel

Purchase and install metering material – Other:

1. Three (3), 230kV, metering accuracy CCVT
2. Three (3), 230kV, 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: Transmission Owner Interconnection Facility Scope - Transmission

Preliminary Scoping Summary

This project serves to construct a new 230kV developer generation tie-in line from existing Midlothian Substation to a point of change in ownership (PCO) structure, which is located in Chesterfield County, VA. The new 230kV circuit will hereby be referred to as line 2XXX. The point of change in ownership (PCO) structure will be proposed structure 2XXX/4, which is to be installed outside existing Midlothian Substation on Dominion owned property. The PCO structure is the demarcation point between Dominion Energy and the developer. See **Figure 1** for the project location.

This scope only includes the installations for the “transmission ownership interconnection facilities” (TOIF) for the gen-tie line outside of Midlothian Substation. See the "Network Upgrade" (NW) scope for the remaining installations.

The proposed structures to be installed are two (2) 230kV steel 3-pole double deadend structures, and one (1) 230kV self-supporting switch structure. The new conductor and shield wire to be used will be twin bundled (2) 768.2 ACSS/TW (20/7) “Maumee” conductor and two (2) DNO-11410 OPGW.

Length of Route	**0.08 miles**
Location of the subject line (County/State)	**Chesterfield County, VA**
Total Number of Permanent Structures	**3**
CPCN/SCC Required?	**No**
New ROW Required?	**No**

This project will utilize current Dominion 230kV standards. The conceptual estimate includes cost for the following:

Transmission Owner Build - Permanent Facilities to be Installed

Structures: See attached spreadsheet for heights and loading information. All structures will be galvanized steel.

Structure Type	Dwg Number	Str. Qty.
230kV SC ENGR Steel DDE 3-Pole Structure	12.158	2
230kV SC Steel Self-Supporting Switch Structure – Includes one (1) Horizontal Mounted 4000A Switch	12.830	1

Wire:

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

Length (Miles)	Circuit	# If Bundled-Wire Type "Name"	Start-End
0.08	1	Twin Bundled (2) 768.2 ACSS/TW (20/7) "Maumee"	Existing BB 2XXX/1 – Proposed Str. 2XXX/4
0.08	2	DNO-11410 OPGW	Existing BB 2XXX/1 – Proposed Str. 2XXX/4

Transmission Owner Build - Existing Facilities to be Transferred or Modified

1. Install three (3) new conductor crossing strain insulators [Reference Drawing 32.338], two (2) new OPGW deadend assemblies [Reference Drawing 96.061], and two (2) new OPGW safety catches [Reference Drawing 96.100] on existing backbone structure 2XXX/1.

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. This project does require acquisition of a laydown yard.

3. The generalized structure height for this project is 75/60/75 ft for proposed structures 2XXX/2 and 2XXX/4. This was determined for the high-level estimate projects for Dominion Generation Interconnection Projects.

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

5. For detailed engineering, it is assumed LiDAR survey is required, including underground survey.

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

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

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

9. A substation general arrangement was provided by the conceptual substation engineering team. See **Figure 2** for the Midlothian Substation general arrangement used for this project.

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

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

12. The collector station will not share a fence, and the developer switchyard will be located to the east.

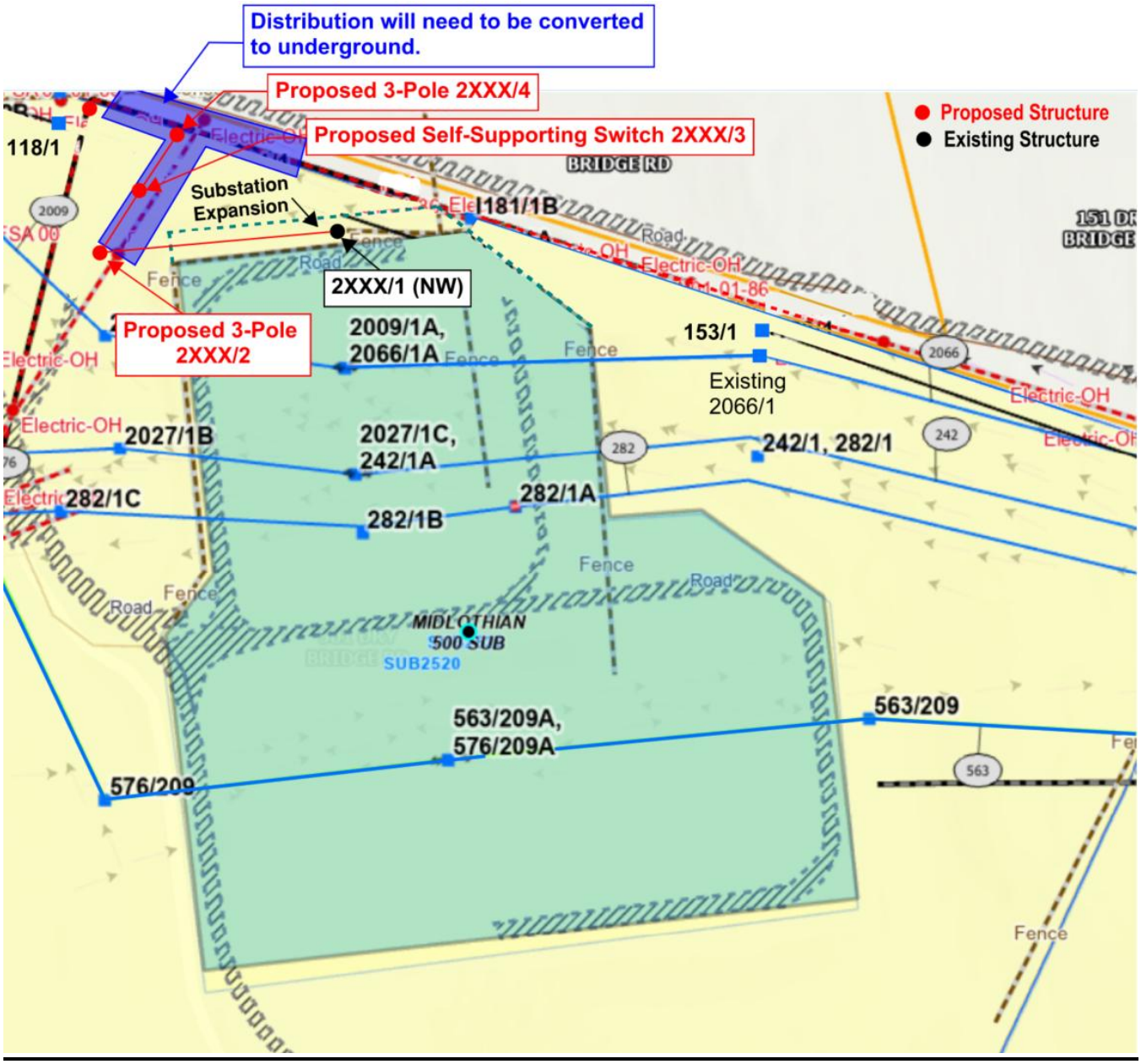
13. This project scope assumes that it is independent from other projects in the Transition Cycle.

14. The existing distribution line to the north and west of Midlothian Substation will need to be relocated and undergrounded.

Estimate Notes/Assumptions

1. This scope and estimate for project AG2-088 refers to the "transmission- ownership interconnection facilities" (TOIF). This includes the engineering, project management, and construction costs for the transmission assets between Midlothian Substation and structure 2XXX/4. See the "network upgrade" (NW) scope and estimate for the remaining installations associated with project AG2-088.
    a. One estimate has been provided for this scope.
        i. Transmission Ownership Interconnection Facilities (TOIF)
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. Survey costs were determined based on substation proposed location, fiber installation, and impacts on existing line.
5. Transition Cycle 2 - Phase 2 estimates utilize Dominion 2025 labor and material adjustment rates.
6. A high-level lump sum cost was provided by the distribution team for the relocating and undergrounding of the existing distribution in the area. The existing distribution is assumed to be undergrounded; however, an overhead relocation is an alternative option.
    a. The underground distribution will utilize direct buried conduits (not concrete encased).
    b. The relocated line will need bulk feeder capacity. The bulk feed distance will be 500 ft or less.
    c. It is assumed the distribution line crossing under the existing transmission lines in the area and the buck pole will not be an issue.

Figure 1 – Project Location



Attachment #5: Network Upgrade - Transmission

Preliminary Scoping Summary

This project serves to construct a new 230kV developer generation tie-in line into existing Midlothian Substation, which is to be located in Chesterfield County, VA. The new 230kV circuit will hereby be referred to as line 2XXX. To accommodate the new line, the spans between idle line structure I181/1 to existing idle line structure I153/1 are to be removed. Existing structure I181/1 will be removed and replaced. Existing structure I153/1 will be modified to remove the arms, add guy wire assemblies, and deadend the idle 153 line on the shaft of the existing structure. Backbone 181/1A (153/1A) is to be removed. See **Figure 1** for the project location.

This scope only includes the installations and removals associated with the network upgrades (NW) inside and outside of Midlothian Substation. See the "Transmission Owner Interconnection Facilities" (TOIF) scope for the remaining tie line installations.

The proposed structures to be installed are one (1) 230kV single circuit steel backbone structure, and one (1) 115kV single circuit steel deadend 3-pole structure .

Length of Route	**0.12 miles**
Location of the subject line (County/State)	**Chesterfield County, VA**
Total Number of Permanent Structures	**2**
CPCN/SCC Required?	**No**

This project will utilize current Dominion 115kV & 230kV standards. The conceptual estimate includes cost for the following:

Transmission Owner Build - Existing Facilities to be Removed

Structures:

Structure Type	Dwg Number	Str. Qty.
115kV Single Circuit Wood H-Frame Suspension	11.010	1
115kV Single Circuit Steel A-Frame Backbone Structure	11.905	1

Wire: Mileage listed is per circuit.

Length (Miles)	Circuit	# If Bundled-Wire Type "Name"	Start-End
0.06	1	Single (1) 545.6 ACAR (15/7) Conductor	Existing Str. I153/1A (I181/1A) – Existing Str. I181/1
0.06	1	3/8 Steel Shield Wire	Existing Str. I153/1A (I181/1A) – Existing Str. I181/1
0.06	1	Single (1) 4/0 Copper Conductor	Existing Str. I153/1 – Existing Str. I153/1A (I181/1A)
0.06	1	3#6 Alumoweld Shield Wire	Existing Str. I153/1 – Existing Str. I153/1A (I181/1A)

Transmission Owner Build - Permanent Facilities to be Installed

Structures: See attached spreadsheet for heights and loading information. The backbone structure will be galvanized steel, the engineered 3-pole will be weathering steel.

Structure Type	Dwg Number	Str. Qty.
230kV Single Circuit Steel Backbone Structure	12.901	1
115kV 3-Pole Steel SC DDE	12.158	1

Transmission Owner Build - Existing Facilities to be Transferred or Modified

1. Install three new conductor deadend assemblies [Reference Drawing 31.540] and one (1) new shield wire deadend assembly [Reference Drawing 43.011] on shaft of the existing structure I153/1.

2. Cut and transfer the existing single (1) 4/0 copper conductor for Line I153 from the conductor arms onto the shaft of the pole. See **Figure 1**.
3. Remove three (3) conductor arms from structure I153/1.
4. Install three (3) double 1 /2" guy wire assemblies [Reference Drawing 51.014] on the back side of existing structure I153/1.
5. Cut and transfer the existing single 3#6 Alumoweld shield wire for Line I153 from conductor arms onto the shaft of the pole. See **Figure 2**.
6. Cut and transfer the existing single 3/8 Steel shield wire for line I181 from existing structure I181/1 onto the ahead side of proposed structure I181/1.
7. Cut and transfer the existing single (1) 545.6 ACAR (15/7) conductor for line I181 from existing structure I181/1 onto ahead side of proposed structure I181/1.

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 structure I153/1 can also be re-used as part of this project. More information will need to be obtained on this structure during detailed design to confirm that it does not need to be replaced.

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

4. The generalized structure heights for this project are 75 ft for proposed structure 2XXX/1, and 65/50/65 ft for proposed structure I181/1. This was determined for the high-level estimate projects for Dominion Generation Interconnection Projects.

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

6. For detailed engineering, it is assumed LiDAR survey is required.

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

8. A substation general arrangement was provided by the conceptual substation engineering team. See **Figure 3** for the Midlothian Substation general arrangement used for this project.

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

10. This project scope assumes that it is independent from other projects in the Transition Cycle.

Estimate Notes/Assumptions

1. This scope and estimate refers to the “network upgrade (NW)". This includes the engineering, project management, and construction costs for the transmission assets inside Midlothian Substation. See the “transmission ownership interconnection facilities (TOIF)” scope and estimate for the remaining installations associated with project AG2-088.

    a. One (1) estimate has been provided for this project.

        i. Network Upgrade (NW)

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

5. 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.

6. The material costs for the guy wire assemblies will need to be included in the estimate.

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

Figure 1 – Project Location

