Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request
Project ID AG2-300

"Meadow Brook 138 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 The Potomac Edison Company (PE), a FirstEnergy company.

This Facilities Study was performed to satisfy the Phase 2 Facilities Study requirement of the PJM Tariff. The Facilities 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 has proposed a storage Generating Facility located in Frederick County, Virginia. The installed facilities for AG2-300 will have a total Maximum Facility Output (MFO) of 100 MW with 70 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the Potomac Edison Company as a direct connection to the existing Meadow Brook 138 kV Substation.

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

3. POINT OF CHANGE IN OWNERSHIP (PCO)

The Point of Change in Ownership (PCO) will be located at the Project Developer-owned dead-end structure outside the existing Meadow Brook substation fence line.

4. SCOPE OF PROJECT DEVELOPER 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 GSU 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, and Supervisory Control and Data Acquisition (SCADA) and telecommunications equipment to comply with the TO's Applicable Technical Requirements and Standards.

B. Transmission Owner Facilities Study Results

The following is a description of Transmission Owner facilities for physical interconnection of the proposed AG2-300 project to PE transmission system. These facilities shall be designed according to FirstEnergy Applicable Technical Requirements and Standards. Once built, PE will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES (TOIF)

1.1 New Interconnection Substation Line Terminal

Install one disconnect switch and one span of 138 kV conductor from the existing Meadow Brook substation to the Project Developer-owned dead-end structure at the Point of Change in Ownership (PCO).

- Installations
    - 0.1 miles of conductor 795 kcmil 26/7 ACSR shielded by (1) 7#8 Alumoweld and (1) OPGW
    - Disconnect switch and line exit facilities described in the Meadow Brook substation scope.
- Siting & Licensing
    - Ordinary Extension or Improvement will be required.
    - Assume minimal social and ecological impacts.
    - Assume no local opposition to the project.
- Scope of Work Assumptions:
    - Location of PCO assumed
    - Location of generator substation assumed
    - Assume no ground survey will be required for design and as-built.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.

1.2 AG2-300 Generator Substation

Energize and integrate generator Interconnection Facilities to the transmission system.

- Relay and Controls Scope of Work
    - Integrate Interconnection Facilities protection and controls to the transmission system.
- Ancillary Scope of Work
    - Project Management

        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Revenue Metering
        - Revenue Metering to be installed by PE.
    - Testing and Commissioning
        - Testing and commissioning services as required.

2. STAND ALONE NETWORK UPGRADES

None

3. NETWORK UPGRADES

3.1 Meadow Brook Substation Expansion

Install new 138kV breaker, replace existing bus disconnect switch, and install new bus disconnect switch.

- Below Grade Scope of Work:
    - Install (1) Lot of foundations, conduit, and grounding for new equipment.
- Above Grade Scope of Work:
    - Install (1) H-Frame Line Exit Structure.
    - Install (1) 138kV, 3000A, 40kAIC breaker with two (2) sets of CTs per bushing.
    - Install (2) 138kV, 2000A Bus Disconnect Switches.
    - Install (1) 138kV, 2000A Line Disconnect Switch Mounted on new H-Frame Structure.
    - Install (3) 138kV CCVTs, attached to new H-frame.
    - Install (3) 138 kV Surge Arrestors.
- Relay & Control Scope of Work
    - Review/revise relay settings, as needed
    - For the new AG2-300 138kV line:
        - Fiber network modifications to fiber patch panels or other, to enable protection communications to generator facilities.
    - Two (2) SEL-411L relays for primary and backup line protection over dedicated fiber.
    - Additional auxiliaries as needed to support the line protection.
    - Associated lockouts and auxiliaries as needed.
    - For the new 138kV breaker position, install:

        - One (1) SEL-451 relay for breaker failure, and control as needed
    - Additional lockouts and auxiliaries as needed
    - For general relaying support:
        - One (1) lot of SEL-3555 or similar data concentrator RTACs for use as PMU data concentration
    - Incorporate the new breaker and line into the existing DFR
- Additional Equipment to be Removed
    - Replace and dispose (1) 138 kV Disconnect Switch
- Scope of Work Assumptions:
    - Assumes existing control house can accommodate the (4) additional relays and associated new panels, if needed.
    - Assumes AC/DC systems are adequate for new equipment.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Environmental
        - Review drawings and verify if any permitting is required for below grade work.
    - Information Technology
        - Estimate SCADA work at Meadow Brook Substation to support HMI, breaker, relay, meter, MOAB, GOAB, data concentrator and disconnect switch installation.
        - Install/Test approximately 0.08 miles of 48F/SM from the Meadowbrook Control House to the AG2-300 PCO.
        - This build will be Underground ADSS will be utilized from the substation to the PCO just north of the Meadowbrook substation yard.
        - Install/Test approximately 0.06 miles of 48F/SM from the Meadowbrook Control House to the AG2-300 PCO.
        - This build will be Underground ADSS will be utilized from the substation to the PCO just north of the Meadowbrook substation yard.
    - Testing and Commissioning
        - Testing and Commissioning as required for new equipment.

3.2 Ridgeley Substation

Review and update relay settings.

- Below Grade Scope of Work:

- N/A

- Above Grade Scope of Work:
  - N/A
- Relay & Control Scope of Work
  - Review and update relay settings.
- Scope of Work Assumptions:
  - Existing relays will be used.
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Information Technology
    - N/A
  - Testing and Commissioning
    - Testing and commissioning services as required for revised relay settings.

3.3 Riverton Substation

Review and update relay settings.

- Below Grade Scope of Work:
  - N/A
- Above Grade Scope of Work:
  - N/A
- Relay & Control Scope of Work
  - Review and update relay settings.
- Scope of Work Assumptions:
  - Existing relays will be used.
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Information Technology
    - N/A
  - Testing and Commissioning

        - Testing and commissioning services as required for revised relay settings.

3.4 Double Toll Gate Substation

Review and update relay settings.

- Below Grade Scope of Work:
    - N/A
- Above Grade Scope of Work:
    - N/A
- Relay & Control Scope of Work
    - Review and update relay settings.
- Scope of Work Assumptions:
    - Existing relays will be used.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Information Technology
        - N/A
    - Testing and Commissioning
        - Testing and commissioning services as required for revised relay settings.

3.5 West Winchester Substation

Review and update relay settings.

- Below Grade Scope of Work:
    - N/A
- Above Grade Scope of Work:
    - N/A
- Relay & Control Scope of Work
    - Review and update relay settings.
- Scope of Work Assumptions:
    - Existing relays will be used.
- Ancillary Scope of Work
    - Project Management

        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Information Technology
        - N/A
    - Testing and Commissioning
        - Testing and commissioning services as required for revised relay settings.

3.6 Long Creek Substation

Review and update relay settings.

- Below Grade Scope of Work:
    - N/A
- Above Grade Scope of Work:
    - N/A
- Relay & Control Scope of Work
    - Review and update relay settings.
- Scope of Work Assumptions:
    - Existing relays will be used.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Information Technology
        - N/A
    - Testing and Commissioning
        - Testing and commissioning services as required for revised relay settings.

3.7 Buffalo Marsh Substation

Review and update relay settings.

- Below Grade Scope of Work:
    - N/A
- Above Grade Scope of Work:
    - N/A
- Relay & Control Scope of Work

- Review and update relay settings.

- Scope of Work Assumptions:
  - Existing relays will be used.
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Information Technology
    - N/A
  - Testing and Commissioning
    - Testing and commissioning services as required for revised relay settings.

4. Other Scope of Work

4.1 Revenue metering.

Provide revenue metering panel within existing Meadow Brook Control House. Integrate revenue metering to FE Meadow Brook substation.

- Below Grade Scope of Work:
  - (1) Lot of excavation, conduit, backfill, grounding, and wiring, between free standing CT/VT combo and revenue metering.
  - (1) Lot of foundations for free-standing 138kV CT/VT Combo Unit.
- Above Grade Scope of Work:
  - (1) set of 3-phase Free Standing 138kV CT/VT Combo Unit.
- Relay & Control Scope of Work
  - (1) New Revenue Metering Panel with test switches. The material for the revenue meter to be included in revenue metering support estimate.
- Scope of Work Assumptions:
  - It is assumed revenue metering signals will be pulled from the new 3-phase CCVT that is included in estimate for Meadow Brook substation relay protection.
  - It is assumed current and voltage signals will be pulled from new 3-phase free-standing CT/VT Combo Units. Costs for these combo units are located in the estimate for Meadow Brook substation.
  - Assumes enough room in Meadow Brook Control house to support a new revenue metering panel.
  - Assumes enough room in Meadow Brook substation to add in free standing CT/VT Combo Units.

- Assumes the same crew that is doing the expansion will be doing the metering and temp construction facilities are not needed.

- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Revenue Metering
    - Provide high end meter and engineering support for metering at existing Meadowbrook substation.
  - Information Technology
    - Scope is covered in Meadow Brook substation estimate.
  - Testing and Commissioning
    - Testing and commissioning services as required.

5. MILESTONE SCHEDULE FOR COMPLETION OF PE 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
Preliminary Engineering	1	2
Siting, Permitting & Real Estate	-	-
Detailed Engineering	3	29
Equipment Delivery	28	28
Construction	32	34
Testing and Commissioning	34	36

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

6.1 Scope Assumptions:

- Project Developer will coordinate design and alignment of proposed 138 kV generator lead line with the Transmission Owner for review of any clearance, right-of-way or right-of-way encroachment issues

with TO owned facilities.

- Project Developer will coordinate design and construction of proposed 138 kV lead line. For these areas, the Project Developer shall provide TO with proposed drawings prior to construction and as-built drawings, confirmed by as-built survey data post-construction.
- Transmission Owner's preference would be to limit interference and avoid transmission line crossings with new 138 kV terminal positions. As a minimum, Project Developer facilities should not encroach within 100 feet of TO centerline at blowout conditions. If Project Developer's line design does not comply with this requirement TO would need to review this area as a special exception.
- Additional costs will be incurred by the Project Developer, if final alignment of the 138 kV generator lead line causes encroachments, changes, or modifications to any existing or relocated TO facilities.
- Project Developer is responsible for making all arrangements for electric distribution service (if required) for its generation station. No costs or schedule are included herein.
- All new generator only and new generator plus load facilities must be isolated from the PE Transmission System by a Power Transformer with a winding configuration meeting the requirements in FirstEnergy's "Requirements for Transmission Connected Facilities" document.
- Revenue metering equipment. Current and voltage transformers shall be installed on the high voltage side of the GSU, on the generation side of the fault-interrupting device, and within the local zone of fault protection for the facility.

6.2 Cost Estimate Assumptions:

- The cost estimates provided in this report were developed as of February 6, 2026, based upon current market conditions. Hence, they are subject to significant changes in the event that project implementation is delayed. Notwithstanding the cost estimates from this report being used in the Generator Interconnection Agreement for the related project, PE reserves the right to re-evaluate and provide a more accurate cost estimate during the implementation phase of the project. In accordance with section 217 of the Open Access Transmission Tariff, the Project Developer will be responsible for 100 percent of the actual costs of the facilities required to accommodate its Interconnection Request.
- PE reserves the right to charge the Project Developer operation and maintenance expenses to maintain the Project Developer attachment facilities, including metering facilities, owned by PE. These costs will be specified in the Generator Interconnection Agreement.

6.3 Schedule Assumptions:

- This schedule assumes that all issues covered by the "Environmental, Real Estate and Permitting Issues" section of this document are resolved. Construction cannot begin until after all applicable permits and/or easements have been obtained.
- PE's ability to support this schedule also depends on the feasibility of taking the required outages to support construction. Outages that are determined to negatively impact system reliability or cause congestion may be delayed or denied, at any time, even if they are submitted on time based on the Outage Submittal Rules in section 4.2.1 of PJM Manual 03. This includes, but is not limited to, outages requested between the months of June and September, as well as January and March, which typically get denied due to summer and winter peak conditions. Therefore, the construction schedule will be adjusted as needed to accommodate any outage restrictions that have been identified by PE or the

Transmission Provider.

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 AG2-300 GIA, and in PJM Manuals M01 and M14D. The details of applicable revenue metering requirements are given in the "Requirements for Transmission Connected Facilities" posted on PJM website.

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

The revenue metering system (particularly the revenue metering current transformers) shall be designed to accurately meter the light loads that will occur when the facility is not generating power and only back-feeding station service from the Transmission Owner. This may require the use of high accuracy extended range current transformers.

Transmission Owner will obtain real-time, site-specific, generation data from PJM, via the required communication link from Project Developer to PJM. Transmission Owner will work with PJM and Project Developer to ensure the generation data provided to PJM meets Transmission Owner's requirements.

These requirements are in addition to any metering required by PJM.

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

- No additional land is required for the substation expansion.

9. APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS

The Requirements for Transmission Connected Facilities, Revision 7, dated January 27, 2026, shall apply.

The TPP-REF-003 Transmission Planning Criteria, Revision 10, dated December 19, 2023, shall apply.

10. ENVIRONMENTAL AND PERMITTING

The following are possible environmental, real estate and permitting issues:

- Environmental permitting, Real Estate acquisition, and notifications to the state's Public Utilities Commission (PUC) vary, some up to twelve (12) months after preliminary engineering is completed to secure the required approvals.
- Prior to agreement by Project Developer to purchase the property, a Phase 1 Environmental Assessment should be conducted for the entire site to avoid assumption of environmental liabilities by Project Developer or Transmission Owner.
- The Transmission Owner interconnection substation may involve environmental surveys, permits, approvals and plans with federal, state, and/or local agencies.
- Assumed Project Developer is to provide all access rights, easements, ROW and permits necessary to complete the Project to the satisfaction of Transmission Owner. Environmental permitting shall encompass all federal, state and local requirements, consultations and agency coordination. Confirmation of meeting all permitting requirements shall be provided to Transmission Owner, prior to start of construction. Following construction and energization, confirmation of permit closeout shall

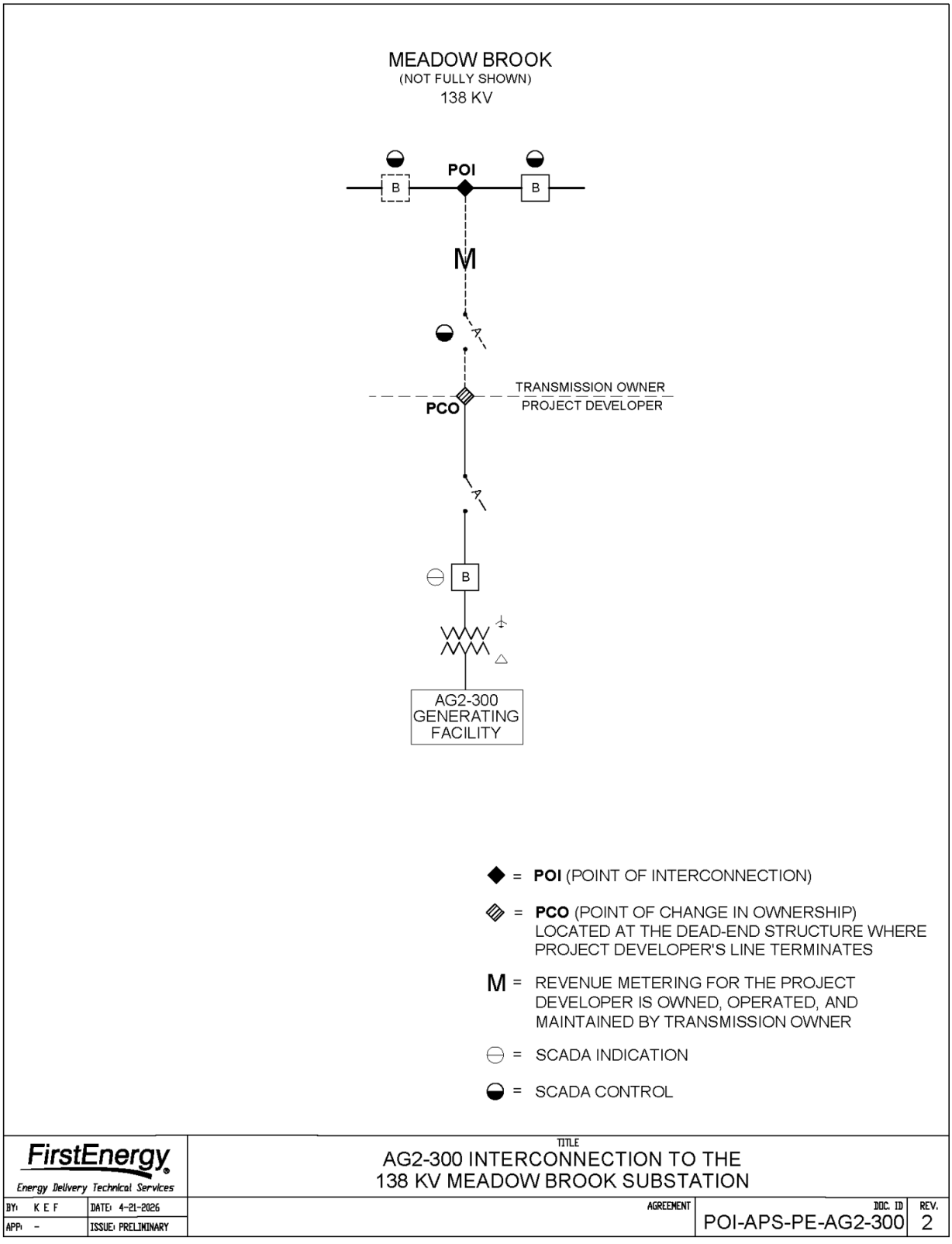
be provided to the satisfaction of Transmission Owner, prior to transfer of ownership. If any of these elements are not included in the final agreement between Transmission Owner and Project Developer, twelve (12) to eighteen (18) months should be added to the Project Schedule to secure necessary permits, and additional costs would apply.

- Project Developer will provide copies of all the relative environmental permits and other necessary approvals to Transmission Owner before Transmission Owner accepts the Interconnection Facilities.
- Project Developer is required to install an access road from the new interconnection substation to the nearest public road (must be approved by Transmission Owner) and obtain access rights for Transmission Owner. Project Developer is responsible for maintaining access road and ensure unimpeded access for Transmission Owner at all times.
- Project Developer is responsible for all property acquisition (including easements/rights-of-way (ROW)) for transmission, distribution and communication facilities needed for the generator interconnection.
- If Project Developer owns the project property, in fee title, Transmission Owner will require a fee property transfer for the interconnection substation site which may require subdivision approval, together with permanent access rights to and from the substation, as well as a perpetual easement for any transmission lines to the substation. Project Developer is responsible for all costs, including but not limited to subdivision, associated with the property transfer.
- If Project Developer leases the project property, the Project Developer will be required to obtain fee property from the underlying fee property owner, on behalf of Transmission Owner, for the interconnection substation site, together with permanent access rights to and from the substation, as well as a perpetual easement for any transmission lines to the substation.
- All property rights must be surveyed and metes and bounds descriptions prepared for incorporation into Transmission Owner's document forms, for transfer of title.
- The Transmission Owner interconnection substation and transmission line loop will involve PUC notification/approval.
- All work occurs within an existing transmission line right-of-way or on Project Developer's property with access to all existing structures possible via that property and the right-of-way following established access routes that do not cross wetlands or streams.
- Project Developer will develop, and secure regulatory approval for, all necessary Erosion and Sediment Control (E&SC) plans and National Pollutant Discharge Elimination System (NPDES) permits.
- Project Developer will obtain all necessary permits.
- Project Developer will conduct all necessary wetlands and waterways studies and permits.
- Project Developer will conduct all necessary historical and archaeological studies.
- If the Project Developer plans to cross the transmission line right-of-way with facilities or access roads, please refer to the Transmission Rights-of-Way Restrictions information located at:

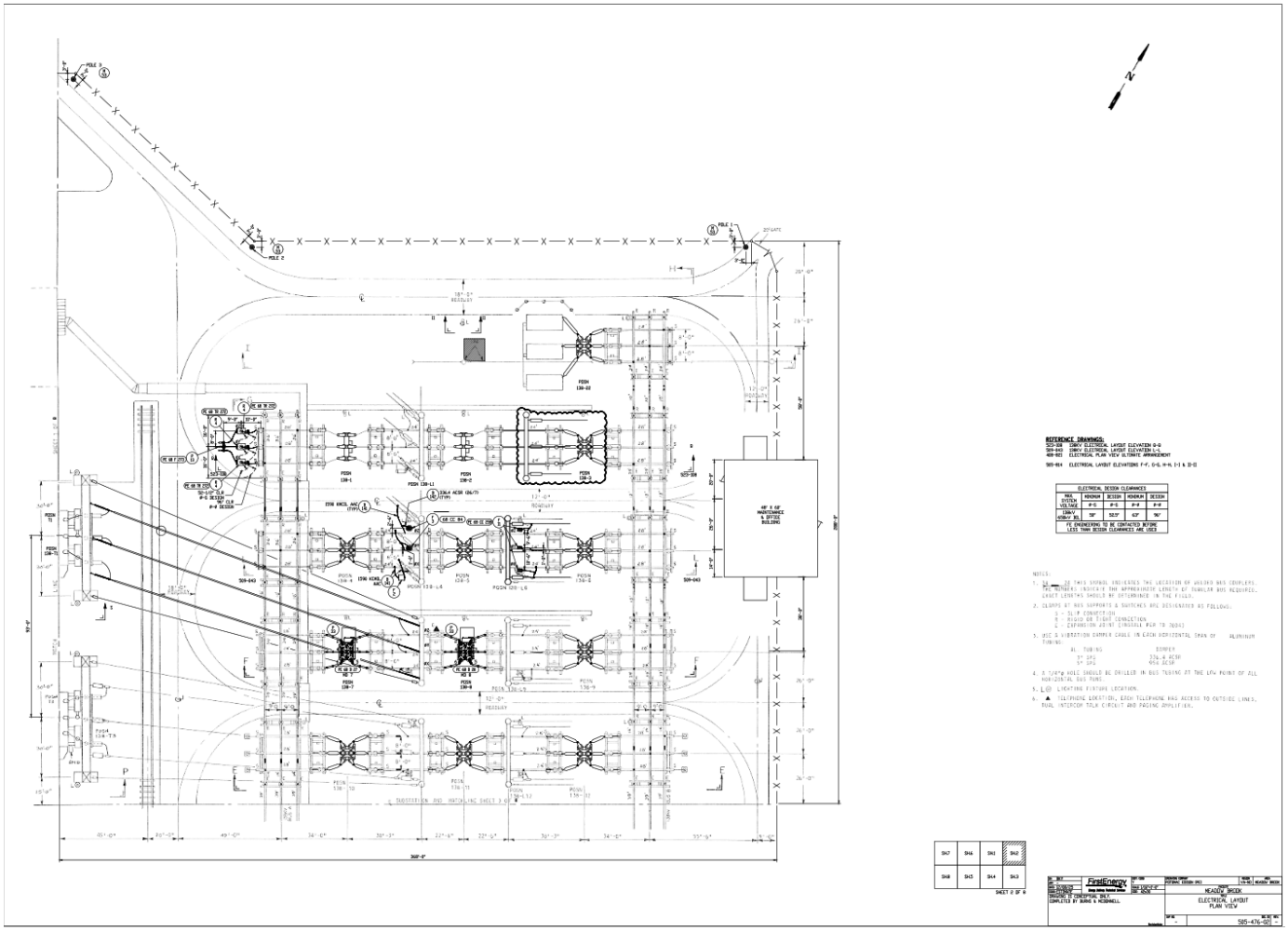
  https://www.firstenergycorp.com/help/safety/real-estate-power-lines/transmission-right-of-way.html#ROWform

C. APPENDICES

ATTACHMENT #1: SINGLE LINE DIAGRAM FOR THE PHYSICAL INTERCONNECTION



ATTACHMENT #2: SUBSTATION GENERAL ARRANGEMENT



ATTACHMENT #3: MATERIAL LIST AND EQUIPMENT RATINGS

Material/Equipment	Quantity
Remote Terminal Unit (RTU) (ea)	2
Insulator - Line - Porcelain/Glass (ea)	36
Steel Support Structure (ea)	4
Relay - Individual (ea)	3
Relay Panel (ea)	4
Circuit Breaker - 145 kV 40 kA (ea)	1
Anchor Bolt - Substation (ea)	32
Surge Arrester - 138 kV (ea)	3
Capacitor Coupled Voltage Transformer (CCVT) - 138 kV (ea)	3
Disconnect Switch - Substation - 138 kV (ea)	3
Switch - Motor Operator - Substation (ea)	3
Cable - Control/Communication (lf)	6720
Conductor - AAC (ft)	390
Conductor - ACSR (ft)	1742.4
Conduit - Rigid (lf)	381
Wire - Fiber - ADSS (ft)	1611.404
Wire - Fiber - Underground (ft)	2979.5
Wire - Shield - OHGW (lf)	580.8
Wire - Shield - OPGW (lf)	580.8

ATTACHMENT #4: PROTECTION SCOPE

Project Developer Protection Requirements:

At Generator Substation:

- The generation delivery points must comply with the technical requirements detailed in the FirstEnergy "Requirements for Transmission Connected Facilities" document.
- The Generator Step-Up (GSU) transformer(s) connecting to the FE system shall have a grounded-wye winding configuration on the FE side and a delta winding configuration on the generator side.
- A fully rated circuit breaker capable of interrupting the maximum available fault current is required at the point of interconnection (POI).
- A dedicated breaker failure to trip relay is required for the POI breaker to initiate direct transfer trip to FE substation(s) to effect remote clearing. Dedicated fiber is required on lines from the FirstEnergy station to generator facility to be used for protection including the above DTT and to enable line current differential protection. Two (2) SEL-411L relays for primary and backup line protection over dedicated fiber. Project Developer shall coordinate relay part numbers with FirstEnergy for compatibility in 87L schemes. All CTs at the POI voltage shall be C800. Project Developer must submit for approval all applicable system protective devices that need to coordinate with the FE transmission system.
- Redundant high speed protection schemes are required to protect the Project Developer owned equipment at POI voltage. Each zone of protection covering the POI voltage portion of the Project Developer's system, the GSU Transformer(s), and the POI voltage interconnection breaker, shall be protected by two independent relay schemes meeting the following redundancy requirements. Primary and backup relaying shall use independent CTs, and independent PTs or independent windings from the same PTs. Primary and backup relaying shall not have any common wiring, isolating switches, or auxiliary tripping relays. Redundancy of a protection system can be achieved by ensuring that there is no single point of failure between two locally independent primary and backup protection schemes for a given element. Relays from the same manufacturer are acceptable for both the primary and backup schemes.
- A protection scheme containing generator Intertie functions is required and must be able to provide tripping for the following functions: over-frequency, underfrequency, phase and zero-sequence overvoltage, phase undervoltage, directional overcurrent, and directional power. The current source and voltage source are to be at the Transmission POI voltage. The current source for the intertie relaying is preferred to be from CTs on the POI voltage interconnection breaker. The voltage source for the intertie relaying is preferred to be located between the high side of the GSU Transformer and the POI voltage interconnection breaker. If the PTs are located on the line-side of the breaker, PT primary-side fusing is required for isolation of a failed PT to prevent interruption of the FirstEnergy line.
- C800 CTs must be used on the POI voltage portion of the Project Developer's system, and the CTs should not saturate for the maximum expected through-fault current at the tap ratio in use.
- The relaying system and interrupting device control circuits shall have a reliable source of power independent from the AC system or immune to AC system disturbance or loss (for example - DC battery and charger) to assure proper operation of the protection scheme.
- If there are multiple existing utility feeds, they shall not be paralleled. Either a mechanical or electrical interlock shall be in place to prevent paralleling of service points.

The Project Developer is solely responsible for protecting its own equipment in such a manner that electrical faults or other disturbances on the FE system do not damage its equipment.

FirstEnergy Protection Requirements

To coordinate with proposed generator substation, the relay settings at the following stations will need adjusted (note that in some cases due to limitations of the existing relays, relays may need to be replaced):

Fiber Requirements:

- Fiber shall be installed between the new AG2-300 substation and Meadow Brook for protection communication. At least two (2) dedicated fiber pairs are required, for primary and backup line protection relaying.

At Meadow Brook Substation:

- Review/revise relay settings, as needed
- Fiber network modifications to fiber patch panel or other, to enable protection communications to generator facility.
- Install one (1) 138kV appropriately rated circuit breaker for 138kV application, two (2) CTs per bushing.
- Install one (1) SEL-451 relay for 138kV breaker failure to trip protection.
- Install three (3) 138kV PTs/CCVTs on the 138kV line exit terminal.
- For the 138kV line – Install a standard line protection relay panel with Primary SEL-411L and Backup SEL-411L each performing line differential protection over dedicated fiber.
- Install an SEL-3555 RTAC, or similar data concentrator RTACs, for use as PMU data concentration.
- Modify the existing 138kV transmission protection schemes to incorporate the new 138kV breaker.
- Incorporate the new breaker and line into the existing DFR.

At Ridgeley Substation:

- Review/revise relay settings, as needed

At Riverton Substation:

- Review/revise relay settings, as needed

At Double Toll Gate Substation:

- Review/revise relay settings, as needed

At West Winchester Substation:

- Review/revise relay settings, as needed

At Long Creek Substation:

- Review/revise relay settings, as needed

At Buffalo Marsh Substation:

- Review/revise relay settings, as needed

Short Circuit Data

The short circuit levels at the Meadow Brook 138 kV bus are the following:

Short Circuit values at 138 kV

Three phase faults = 37.6 kA

Single line to ground fault = 37.4 kA

Transmission System Impedances at 138 kV, 100 MVA base

Positive sequence Z1 = 0.00058 + j0.01110 per unit

Zero sequence Z0 = 0.00076 + j0.01129 per unit

The fault currents provided are bolted, symmetrical values for present, normal transmission system conditions with no proposed generation facilities in-service. Future increases in fault currents are possible and it is the Project Developer's responsibility to upgrade their equipment and/or protective equipment coordination when necessary. No generation assets were modeled.

ATTACHMENT #5: PRELIMINARY GEOTECHNICAL SUMMARY

Observation & Concern Table:

Category	Source	Risk	Comment
Surficial Soil Survey	USDA Soil Survey/Geophysical Report	Moderate	Fine grained soil
Geologic Formation/Group	USGS Geologic Survey/Geophysical Report	Moderate	Shallow bedrock
Karst	USGS/ TAMI 2	High	Bedrock mapped with dolomite and limestone, TAMI indicates karst features
Landslide Susceptibility	GIS/Google Earth/FEMA Risk Map/FE Files	low	Low risk inside and beyond substation limits
Coal Mining and Oil and Gas Wells	VA Geologic Survey/TAMI 2	Low	No coal mining. Gas wells are present in the area
Environmental Hazard	US Wetland Maps/FEMA	Moderate	moderate risk of flooding
Past Development	TAMI/GIS MAP/Historic Aerials	Low	Undeveloped except for substation

Site Background / Geologic Hazards

This review was conducted to determine potential geologic hazards and risks at the existing generator developer (Meadow Brook 138kV Substation) location (AG2-300). The reviewed location is in Stevens City, Frederick County, Virginia. This includes a proposed expansion to the existing Meadow Brook Substation. The proposed expansion would consist of the installation of one new breaker with SCADA control inside of the existing substation fence. The Meadow Brook Substation is operated by Potomac Edison. The Meadow Brook SVC station abuts Meadow Brook station at the western edge. FE reviewed the available Geological/Geophysical Investigation Report by GAI Consultants (dated August 9, 2013), and other related documents. The substation expansion was reviewed for surficial soils survey, geologic formation/group, karst, landslide susceptibility, coal mining and oil and gas wells resource mapping, environmental hazards, and past development. The review was performed to identify any geologic risks that could affect the project's budget, constructability, and/or schedule.

Surficial Soil Survey

The United States Department of Agriculture Web Soil Survey indicates that the site is currently mapped as the Carbo silt loam (5B), Carbo-Oaklet very rock silt loams (6C), Carbo-Oaklet Rock outcrop (7C), Oaklet silt loam (32C), and Timberville silt loam (40B). These series are generally comprised of clays over shallow bedrock. Some highly plastic and soft clays (CH) are mapped within the soil series and were also observed

within the soil borings performed at the site although the relative consistency of the clays may have been observed as soft due to karst related activity. Except for the Timberville silt loam, the soils are mapped as Hydrologic Soil Group (HSG) C or D classification indicating slow to very slow infiltration rates. The Timberville silt loam is listed as HSG B, indicating a moderate infiltration rate. Groundwater was not observed in any of the prior soil borings performed at the site in the available Report.

Geologic Formation/Group

The site is located in the Great Valley sub province of the Ridge and Valley Physiographic Province. The Ridge and Valley Physiographic Province is characterized by a broad, continuous, relatively flat valley or lowland underlain by easily eroded Paleozoic (Cambrian-Ordovician) carbonate rocks and shales. The United States Geological Survey Geologic Map indicates the site to be underlain by the Ordovician age Beekmantown Group consisting of interbedded limestone and dolomite.

As part of the Geological/Geophysical Investigation, geotechnical borings were performed by GAI and were reviewed and indicate that the site was originally underlain by clays and silts ranging from approximately 5 feet to 30 feet and underlain by limestone and/or dolomite bedrock. The variation in the depth to rock, would indicate that the underlying bedrock is pinnacled. Furthermore, soft layers and voids were observed within the soil, as well as soil seems and voids were observed within the rock. Grading was also performed at the site to achieve a level substation but based on available grading information, the cuts and fills were relatively minor (less than 5 feet).

Karst

The site is underlain by the Beekmantown Dolomite which is mapped to contain dolomite and limestone. As stated above, the signifiers of karst related features (pinnacled rock, soil and rock voids, soil seams within the rock) were observed in the borings, resulting in the performance of the geophysical study. The Transmission Asset Mapping Interface (TAMI 2) was reviewed, and karst is present at the site. A Technical Memorandum by Black & Veatch (dated May 25, 2023) was also provided to FE in which a sinkhole and Karst risk evaluation was performed. The site is a high risk for karst related construction concerns. Soil borings should be performed at the location of any new equipment.

Landslide Susceptibility

The Virigina Energy landslide tool which maps landslides that have occurred in the past, indicates that no landslides have occurred within the site vicinity. TAMI indicates that the site is relatively level in the north to south direction but slopes downward east to west approximately 20 feet over the span of the substation (including the Meadow Brook SVC station) which is approximately 1,900 feet. In addition a copy of the original Plan of Borings (dated October 23, 1978) was available with the site grading and was reviewed for any excessively steep slopes. However, no steep slopes were observed in the original site grading plan. Given the gentle sloping conditions, the likely occurrence of a landslide is low.

Resource mapping

The Virginia Energy Mineral Mining Site was reviewed for any coal mining (past or present) that has occurred in the site vicinity. No coal mining has occurred at the site or the site vicinity. In addition, no natural gas wells are located in the surrounding area of the site.

Environmental Hazards

Based on FEMA and U.S. Fish and Wildlife Service maps Meadow Brook runs in a north south direction to the west of the site and is prone to flooding, although the flood plain does not reach the limits of the site. The Timbersville silt loam soil is also listed as frequently flooded. An environmental study should still be conducted to confirm this prior to construction, however there appears to be a moderate risk that the site is prone to flooding. The FE region overseeing the substation should be consulted on the history of any flooding that has occurred at or near the site.

Past Development

The past development assessment of the site was based on aerial photography dating back to 1958. The substation was constructed sometime between 1984 and 1997. The station appears to have been expanded on the west side around 2009. The Meadow Brook SVC station appears to have been constructed between 2012 and 2014. Prior to the substation, the site appears to have been a farm field with dense tree lines surrounding the field. Other than the construction of the substation, there appears to be low risk of any prior development at the site.

Recommendations & Geotechnical Opinion

List of Observations/Concerns Interconnection Facilities – Meadow Brook 138 kV AG2-300:

1. This site is part of the Beekmantown Group. Existing borings are available from the site.
2. High potential for karst.
3. Low risk for landslides.
4. Moderate environmental impact risk.
5. No mining activity in the area. No gas wells are present in the site area.
6. Site was only developed for the construction of the substation.

Preliminary Geotechnical Opinion

The geotechnical conditions of this site seem to conclude that it is relatively moderate risk location for the improvements to the existing substation, due to the history of karst related issues at the site. Additional due diligence will be required to determine if the new equipment would be at risk of karst. Borings should be performed at the locations of any new equipment. The above estimate was based on available online resources and an available geotechnical report performed for the station. The use of the geotechnical report should only be used as reference and should not be used for the design of any new equipment.