Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request
Project ID AG2-288

"Stonewall 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 (FE).

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 Decision Point 2 (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 AG2-288 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)

The Generating Facility will interconnect with the Potomac Edison Company as a direct connect at the existing Stonewall 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 PCO will be located at the first dead-end (DE) structure outside the existing Stonewall 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 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 AG2-288 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 Stonewall Substation Line Terminal

- Description of Work
    - Add (1) 138kV Circuit Breaker, (2) install new bus disconnect switches, (1) line disconnect switch, (1) 3-phase surge arrestor set, and (1) 3-phase Capacitor Coupled Voltage Transformer (CCVT).
    - Extend new A-frame line exit structure within FE substation. Assume new line exit disconnect switch can be mounted onto A-frame take-off structure. Assume new CCVT can be mounted to A-frame take-off structure.
- Below Grade
    - Install (1) lot conduit and control cables to equipment
    - Install (1) lot of foundations for all equipment, control house, fences posts, and structures
- Above Grade
    - Install (1) 138kv dead-end/takeoff structure
    - Install (1) 138kv Circuit Breaker and (2) Circuit Breaker disconnect switches
    - Install (1) Motor-Operated Air-Break (MOAB) line switch
    - Install (1) 3-phase138kv surge arrester
    - Install (3) set of 3-phase CCVTs
- Relay & Control
    - Review/revise relay settings for all existing relays at Stonewall station
    - Existing 138kV bus differential scheme modifications to incorporate the new breaker position including CT wiring, trips, additional auxiliary relays and other wiring modifications as needed.
    - For the new 138kV line to generator station:
        - One (1) set of three (3) CCVTs for the generator lead line
        - Two (2) SEL-411L relays for primary and backup line protection over dedicated fiber to the generator station
        - Additional lockout and auxiliaries as needed to support the protection

- For the new 138kV breaker at Stonewall station:
  - One (1) 138kV circuit breaker with three (3) sets of CTs per bushing
  - One (1) SEL-451 relay for breaker failure, and control as needed
  - Additional lockout and auxiliaries as needed to support the protection

- Additional Equipment to be Removed
  - None.
- Scope of Work Assumption
  - Long Lead Material Assumption = 138kV breaker at 100 weeks
  - Included 4 foundations with A-Frame.
  - Assumed CCVT mounted to A-frame.
  - Assumed 1 bus support needed
  - Assumed that breaker/line can fit in 1 - 411 Fiber panel and there is space in the control house.
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Environmental
    - Review drawings and support permitting requirements for new foundations, if required.
  - Information Technology
    - Estimate SCADA work at Stonewall Substation to support breaker, relays, relay panel, meter, MOABs, Gang-Operated Air-Break switches (GOABs), and disconnect switches installation.
    - Fiber:
      - In-sub fiber run from Stonewall control house to developer-run fiber build at developer AG2-288 PCO (First Project Developer DE structure outside of Stonewall). Fiber only to the first DE structure outside of FE substation fence for communications and control to AG2-288 generation interconnection.
    - Network:
      - update points list as required
    - Install/Test approximately 0.06 miles of 48F/SM from the Stonewall Control House to the AG2-288 PCO.
    - Underground ADSS will be utilized from the substation control building to the PCO just north of the Stonewall substation yard.
    - Install/Test another approximate 0.06-mile fiber build of 48F/SM from the Stonewall Control House to the AG2-288 PCO.

        - Underground ADSS will be utilized from the substation control building to the PCO just north of the Stonewall substation yard.
    - Testing and Commissioning
        - Testing and Commissioning to support new equipment installation.

1.2 AG2-288 Generator Lead Line

Install one span from the existing Stonewall substation to Project Developer-Owned dead-end structure at the PCO.

- Installations
    - 0.1 miles of 795 kcmil 26/7 ACSR conductor, shielded by (1) OPGW and (1) 7#8 Alumoweld
- Siting & Licensing
    - Full Application 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
    - A 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.

1.3 AG2-288 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 Stephenson 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.

3.2 Inwood 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 Mechanicstown 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 Gore 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.

- Description of Work
    - Provide revenue metering panel within existing Stonewall Control House. Integrate revenue metering to FE Stonewall substation.
    - Add Combo 3-phase CT/VT Combo units for revenue metering to provide the needed voltage and current.
- Below Grade Scope of Work:
    - (1) Lot of excavation, conduit, backfill, grounding, and wiring, between free standing CT/VT combo units 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 current and voltage signals will be pulled from new 3-phase free standing CT/VT Combo Units. Costs for these combo units are included in this estimate for Stonewall substation.
- Assumes enough room in Stonewall Control house to support a new revenue metering panel.
- Assumes enough room in Stonewall substation to add in free standing CT/VT Combo Units.
- Assumes the same crew that is doing the Stonewall substation upgrade will be doing the metering and temp const 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 Stonewall substation.
  - Information Technology
    - Scope is covered in Stonewall 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 32 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	25
Equipment Delivery	24	24
Construction	28	30
Testing and Commissioning	30	32

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 11, 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 AG2-288 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

Not Applicable.

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 PERMITING

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

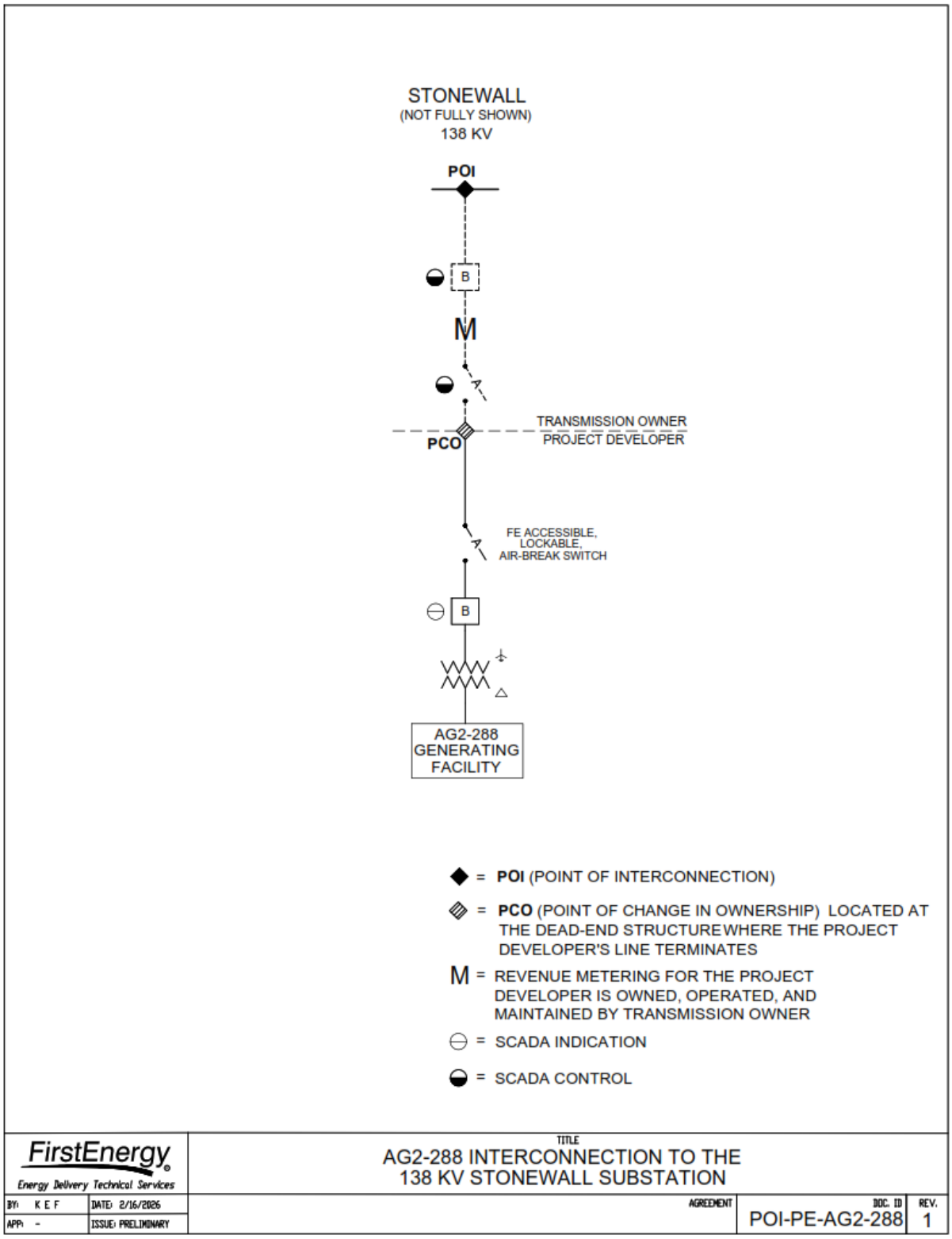
- Environmental permitting, Real Estate acquisition, and notifications to the state's Public Utilities Commission (PUC) vary, some up to twelve (12) months after preliminary engineering is completed to secure the required approvals.
- Prior to agreement by Project Developer to purchase the property, 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 to maintain 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:

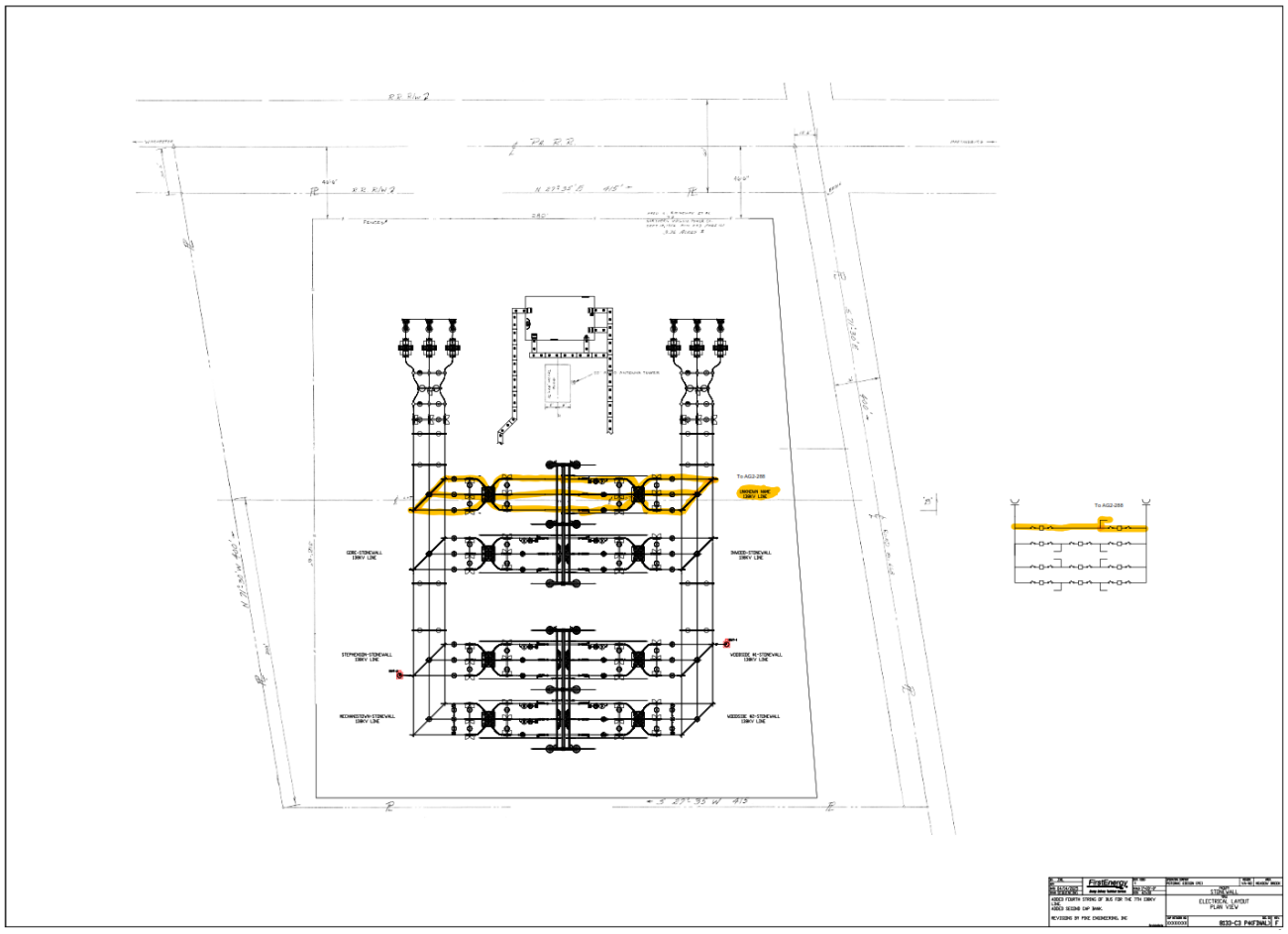
  https://www.firstenergycorp.com/help/safety/real-estate-power-lines/transmission-right-of-way.html#ROWform

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
Insulator - Line - Porcelain/Glass (ea)	36
Steel Support Structure (ea)	7
Hard Bus - 1.5 inch (ft)	60
Hard Bus - 3 inch (ft)	320
Relay - Individual (ea)	3
Relay Panel (ea)	2
Circuit Breaker - 145 kV 40 kA (ea)	1
Anchor Bolt - Substation (ea)	52
Insulator - Substation - 138 kV (ea)	3
Surge Arrester - 138 kV (ea)	3
Capacitor Coupled Voltage Transformer (CCVT) - 138 kV (ea)	3
Current Transformer - Freestanding (CT) - 138 kV (ea)	3
Potential Transformer (PT) - 138 kV (ea)	3
Disconnect Switch - Substation - 138 kV (ea)	3
Switch - Motor Operator - Substation (ea)	3
Cable - Control/Communication LF)	6670
Conductor - AAC (ft)	450
Conductor - ACSR (ft)	1742.4
Conduit - Rigid (LF)	651
Wire - Fiber - ADSS (ft)	1660.33
Wire - Fiber - Underground (ft)	2684
Wire - Shield - OHGW (LF)	1161.6

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 high side and a delta configuration on the low side. This establishes an effective ground on the transmission system and mitigates overvoltage conditions during ground faults. A delta connected winding on the low side provides isolation of zero-sequence currents such that the FE system will not be exposed to ground faults on the generator system.
- A fully rated circuit breaker is required at the point of interconnection (POI).
- Two (2) SEL-411L's for primary and backup current differential protection are required for the transmission line connecting the FE interconnection substation to the PCO. These relays will use direct fiber that is routed to the FE interconnection substation by diverse paths for primary and backup. Part number and firmware shall be sent to FE for approval to confirm communications compatibility. It is assumed the 87L channel shall also be used to communicate anti-islanding DTT to generator facility. It is assumed the 87L channel shall also be used for breaker failure DTT communications.
- Redundant 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: overfrequency, 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 circuit breaker control circuits must have a reliable source of power independent from the AC system or immune to AC system disturbance or loss, to assure proper operation of the protection system.
- 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's protection system shall be designed and constructed in accordance with all mandatory Protection and Control (PRC) standards established by the North American Electric Reliability Corporation (NERC). The Project Developer shall coordinate with FirstEnergy and the Regional Reliability Coordinator to determine all applicable PRC requirements and ensure the facility's design and operation achieve full compliance.
- Protection requirements for Woodside substation to be determined and provided by NextEra Energy Transmission (NEET).

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):

The interconnection of the new generator to the Bulk Electric System (BES) transmission network will initiate a review of existing protection schemes and may introduce new requirements to ensure compliance with the Protection and Control (PRC) standards established by the North American Electric Reliability Corporation (NERC). Additional protection system upgrades at the interconnecting station, and potentially at other affected stations, will be determined by FirstEnergy and the Regional Reliability Coordinator during subsequent stages of the project, prior to detailed design.

At Stonewall Substation:

- Review/revise relay settings for all existing line relays at Stonewall station
- Existing 138kV bus differential scheme modifications to incorporate the new breaker position including CT wiring, trips, additional auxiliary relays and other wiring modifications as needed.
- For the new 138kV line to generator station:
    - One (1) set of three (3) CCVTs for the generator lead line
    - Two (2) SEL-411L relays for primary and backup line protection over dedicated fiber to the generator station
    - Additional lockout and auxiliaries as needed to support the protection
- For the new 138kV breaker at Stonewall station:
    - One (1) 138kV circuit breaker with three (3) sets of CTs per bushing
    - One (1) SEL-451 relay for breaker failure, and control as needed
    - Additional lockout and auxiliaries as needed to support the protection

At Mechanicstown Substation:

- Review/revise relay settings, as needed

At Inwood Substation:

- Review/revise relay settings, as needed

At Gore Substation:

- Review/revise relay settings, as needed

At Stephenson 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 = 12.522 kA

Single line to ground fault = 8.77 kA

Transmission System Impedances at 138 kV, 100 MVA base

Positive sequence Z1 = 0.00527 + j0.03299 per unit

Zero sequence Z0 = 0.02007 + j0.07380 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.

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	Low	Low risk of flooding
Past Development	TAMI/GIS MAP/Historic Aerials	Low	Undeveloped except for substation and transmission lines

Site Background / Geologic Hazards

This review was conducted to determine potential geologic hazards and risks at the existing generator developer (Stonewall 138kV Substation) location (AG2-288). The reviewed location is in Clear Brook, Frederick County, Virginia. This includes proposed improvements to the existing Stonewall Substation. The proposed improvements would consist of the installation of one new breaker with SCADA control inside of the existing substation fence. The Stonewall Substation is operated by Potomac Edison. FE reviewed the available Geotechnical Engineering Report by Terracon (dated March 28, 2024), and other related documents available as part of this review. 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 Oaklet silt loam (32B). The Oaklet silt loam is listed as well drained with a Hydrologic Soil Group (HSG) rating of C which is considered a slow infiltration rate. The depth to water table is listed as greater than 80 inches. In addition, groundwater was not encountered in any of the prior borings performed for the 2024 study.

Geologic Formation/Group

The site is located in 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 Geotechnical Engineering Investigation, geotechnical borings were performed by Terracon and were reviewed and indicate that the site is underlain by fill materials consisting of sandy clays or silts, or crushed stone ranging from approximately 0.8 feet to 8 feet and underlain by slightly to moderately weathered limestone bedrock. In five of the borings, the limestone bedrock was within two feet of the ground surface.

Karst

The site is underlain by the Beekmantown Group which is mapped to contain dolomite and limestone. The Geotechnical Engineering Report indicates the potential for karst related features. The Transmission Asset Mapping Interface (TAMI 2) was also reviewed, and karst is present at the site. 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 7 feet over the span of the substation which is approximately 315 feet. 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 Wetlands maps there are no wetland features in the immediate site vicinity that present a flood risk to the site. An environmental study should still be conducted to confirm this prior to construction. 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 1947. The substation was constructed sometime between 1955 and 1958. The substation has the Gore-Stonewall 138kV transmission lines entering the station from the west which have an install date of 1957; the Inwood-Stonewall 138kV transmission lines entering from the north which have an install date of 2010; the Mechanicstown-Stonewall 138kV transmission lines entering from the east with an install date of 1985; and the Stephenson-Stonewall 138kV transmission lines entering the station from the south with an install date of 1957. Prior to the substation and transmission lines, the site appears to have been a farm 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 – Stonewall 138 kV AG2-288:

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. Low 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 and transmission lines

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, and the largest risk of development being that the site is located in a karst prone region. Additional due diligence will be required to determine if the new equipment would be at risk of karst. 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.