Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request Project ID AH1-460

"Hooversville - Scalp Level 115 kV"

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff, as well as the Application and Studies Agreement between the Project Developer and PJM Interconnection, LLC (PJM or Transmission Provider (TP)). The Transmission Owner (TO) is Mid-Atlantic Interstate Transmission, LLC (MAIT).

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 (PD) has proposed a solar Generating Facility located in, Somerset, Pennsylvania with a designated PJM Project ID of AH1-460. The installed facilities will have a total Maximum Facility Output (MFO) of 66.0 MW with 39.6 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the MAIT transmission system via a newly constructed 115 kV three (3) breaker ring bus station, tapping the Hooversville – Rachel Hill 115 kV line, Line Code PNT-115-HH, approximately 3.35 miles from Hooversville and 3.65 miles from Scalp Level Tap.

The construction of the new interconnection station will result in the splitting of the existing Hooversville – Rachel Hill 115 kV line into two lines on the transmission system. New line designations are to be determined.

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 will be located at the first dead-end structure, owned by the Project Developer, outside the new three (3) breaker ring bus interconnection station fence line.

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
- The easements and associated rights of way for the TO owned substation along with the 115 kV line taps to the station will be acquired by the Project Developer and transferred to the TO at no cost. Site

preparation for the TO owned substation, including clearing, grading and an access road, as necessary, is assumed to be by the Project Developer. The access road design must be approved by FirstEnergy to ensure it provides adequate access to the substation to support construction and maintenance activities. Route selection, line design, and right-of-way acquisition for the Project Developer's facilities are not included in this report and are the responsibility of the Project Developer.

B. Transmission Owner Facilities Study Results

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AH1-460 project to MAIT transmission system. These facilities shall be designed according to FirstEnergy Applicable Technical Requirements and Standards. Once built, MAIT will own, operate, and maintain these Facilities.

1. **TRANSMISSION OWNER INTERCONNECTION FACILITIES:**

1.1 New Interconnection Station Line Terminal

Install line terminal equipment within the AH1-460 interconnection station. Install up to 0.1 miles of conductor from AH1-460 interconnection station to the Project Developer-owned dead-end structure outside of FE station fence.

- Structures Installed
    - 0.1 miles of conductor 795 kcmil 26/7 ACSR shielded by (1) 7#8 Alumoweld
    - Station line exit facilities, including dead end structures and disconnect switches, described in the AH1-460 interconnection substation scope.
- Siting and Permitting
    - Full application will be required.
- Scope of work Assumptions
    - Location of PCO assumed
    - Location of generator substation assumed
    - A ground survey will be required for design and as-built.
    - Cost of mobilization/demobilization shared with line Loop scope of work.
    - Assume minimal social and ecological impacts.
    - Assume no local opposition to the project.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.

1.2 AH1-460 Generation Facilities

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
        - Project management will be required for this asset.
    - Revenue Metering
        - Metering is provided by MAIT.
    - Testing and Commissioning
        - Testing and commissioning services as required for revised relay settings.

2. STAND ALONE NETWORK UPGRADES

2.1 New Interconnection Station

A new three (3) breaker ring bus station will be constructed along Hooversville – Rachel Hill 115 kV transmission line to interconnect AH1-460 with the MAIT system.

The new station will be located approximately 3.65 miles from Scalp Level Tap and approximately 3.35 miles from Hooversville. The Project Developer will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection switching station and the associated facilities. The Project Developer will also be responsible for the rough grade of the property and an access road to the proposed three-breaker ring bus site.

- Below Grade
    - Install ground grid.
    - Install cable trench, conduit, and control cables to equipment.
    - Install foundations for all equipment, control house, fences posts, and structures.
- Above Grade
    - Install (1) medium control house with battery system and RTU
    - Install (3) 115 kV CB with bushing CTs (2 sets per bushing)
    - Install (6) 115 kV CB disconnect switches (2 high stand and 4 low stand)
    - Install (3) 115 kV MOAB line switches (no stands)
    - Install (3) sets of 115 kV CCVTs with stands
    - Install (9) surge arresters
    - Install (3) dead end structures
    - Install (1) SSVT
    - Install outdoor pipe bus and shield wire

- Relaying & Control:
    - Interconnection 115 kV line:
        - Two (2) SEL-411L relays for primary and backup line protection over dedicated fiber
        - Additional auxiliaries as needed to support the line protection
    - Hooversville 115 kV line:
        - One (1) SEL-421 relay for primary line protection over dedicated fiber
        - One (1) SEL-411L relay for backup line protection over dedicated fiber
        - Additional auxiliaries as needed to support the line protection
        - Install One (1) SEL-2411 with the new protection telecommunication scheme to implement the Anti-Islanding signal receive from the Hooversville substation.
    - Rachel Hill 115 kV line:
        - One (1) SEL-421 relay for primary line protection over dedicated fiber
        - One (1) SEL-411L relay for backup line protection over dedicated fiber
        - Install One (1) SEL-2411 with the new protection telecommunication scheme to implement the Anti-Islanding signal receive from Scalp Level
        - Additional auxiliaries as needed to support the line protection
    - General Relaying Support:
        - One (1) SEL-451 relay for breaker failure, and control as needed for each CB (3 total)
        - Additional lockouts and auxiliaries as needed
        - One (1) lot of SEL-3350 or similar data concentrator RTACs for relay remote access
        - One (1) lot of Arbiter 1094b or similar GPS Clocks for timing
        - One (1) lot of Qualitrol TWS systems for traveling wave monitoring, for networked lines >100kV
        - One (1) lot of SEL-3555 or similar data concentrator RTACs for use as PMU data concentration
        - One (1) lot of TR3000 or similar digital fault recorders (DFR)
- Scope of Work Assumptions
    - Assumed an 125 VDC Battery System
    - Assumed a RTAC RTU will be needed for the control enclosure
    - Assumed 40 kA CBs
- Transmission owner Permits Required:
    - Project Developer will provide the rough graded site and access road.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling,

material management and project development as required

- Environmental Scope Assumptions:
  - Road Bonds are required
  - Environmental Filming (Documentation of Existing roads are required
  - Environmental Access and Road Crossing Permit Fees is required
  - Environmental Development of Permit Binder is required
  - Environmental Cultural Resource Consultation is required
  - Environmental Construction walk down is required
  - RTE consultation letters are required
  - Wetland delineations and WDR are required
  - Stormwater permits and local approvals are assumed
  - Internal environmental engineering and external project management costs are included
  - A phase 1-A site assessment is included
- Information Technology
  - Network equipment and scopes described in sections 2.2, 2.3, and 2.4.
- Distribution
  - Backup station service power from region.
  - Scope
    - Existing:
      - PN Scalp Level - Circuit # 607790885 - Circuit Name 009321-11 - 324 AW - 13.2/23 kV - Single Conductor
      - Wood Poles installed in 1964 35' height
    - Add up to 0.80 Mile Tap line at about 200’ span lengths. Tap near J-1580511 (Lat/Long 40.193048, -78.872914)
      - Install (3) Dead End Structures
      - Install (1) Tap Structure
      - Install (17) Tangent Structures
- Scope of Work Assumptions
  - New Poles are wood direct embed
  - No guying needed
  - Assumed Conductor for new line to match existing
  - 10% Forestry needed, assumed minor clearing/grubbing everywhere else.
  - Assumed roughly 0.8 miles of Access Roads in ROW corridor
  - Assumed 1 parcel (0.03 mile) of new ROW needed along Hill Road to get to

Hooversville-Rachell Hill 115 kV ROW corridor.

- Assumed 0.80 mile of existing ROW can be used for new 12.47 kV circuit.
- Assumed Environmental Permitting needed
- Assumed no wetlands.

- Real Estate & Right of Way Scope:
  - Real Estate & Right of Way will be needed for new station. Project Developer to provide leased land to FE.
- Testing and Commissioning
  - Testing and Commissioning of all relays and electrical equipment.
- Standard Design References:
  - FirstEnergy's *Requirements for Transmission Connected Facilities*: www.pjm.com/planning/design-engineering/to-tech-standards.aspx.
  - PJM Protection Standard (PJM Manual 7): https://pjm.com/-/media/documents/manuals/m07.ashx

- MAIT Protection Specification
  - Refer to *Attachment 2* of this document

2.2 ADSS Fiber Installation

- Install/Test approximately 3.35 miles of new 96F/SM ADSS fiber from the AH1-460 substation control house to a new splice point on the "Riser to Quemahoning" fiber cable. (P1-PN-N-00020536)
- Underground ADSS will be utilized for approximately 0.32 miles from the substation control building to the riser pole of structure 962411.
- Aerial ADSS Fiber will be utilized for approximately 2.09 miles from riser pole structure 962411 to the structure 954511.
- Underground ADSS will be utilized for approximately 0.71 miles from the structure 954511 to structure 167301B1412.
- Aerial ADSS Fiber will be utilized for approximately 0.23 miles from structure 167301B1412 to the splice point on structure RH-41611.
- Assumptions:
  - It is assumed that the new substation build will include conduit builds for necessary Project Developer connections.
  - Assumed that two fiber cables are required to the Project Developer PCO, but they will not need to be independently routed.
  - Assumed that the fiber build under RPA PN-25 -221027-160312 (Quemahoning to Scalp Level to Rachel Hill - 2025) is complete prior to this scope.
  - Assumed that no fiber diversity is required for relaying protection for the 115kV line

2.3 MPLS Equipment

- Estimated design, installation, and testing/commissioning for MPLS equipment for SCADA transport at AH1-460 Substation. Assumed SCADA work is included in this cost.
- Estimated cost associated with Crossbow engineering and materials at AH1-460 Substation.

2.4 In-Sub Fiber Runs

- Estimated (2) in-sub fiber builds from the new AH1-460 substation to the Point of Change in Ownership.

2.5 New interconnection substation – FE Option to Build Scope

FirstEnergy work at new interconnection substation

- Above Grade
    - Install (1) security system and camera system.
    - Install (1) indoor security AC cabinet.
- Relay and Control Scope of Work
    - Install (1) network fiber termination rack.
    - Programming of SCADA RTU.
- Scope of Work Assumptions
    - Assumed Developer will install camera foundations and conduits to FirstEnergy standards.
    - Assumed 2 weeks of testing and commissioning for testing to Transmission Control Centers.
    - Assumed Project Developer will install fiber from generator station to OTB station and bring fiber into control house.
    - Assumed Project Developer will install high security fencing.
    - FirstEnergy will be responsible for network fiber.
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development as required.
    - Information Technology
        - Refer to sections 2.2, 2.3 & 2.4 for SCADA backhaul connection and MPLS installation
    - Testing and Commissioning
        - Testing of new site to Transmission Control Center; perform functional testing as required

3. NETWORK UPGRADES

3.1 Hooversville Substation

- Description of Work
    - Install new relays and revise relay settings at Hooversville.
    - Removal of back-up relaying, wave trap, line tuner, and associated equipment on the Rachel Hill terminal.
- Above Grade
    - See Relay and Control scope
- Relay & Control
    - Fiber equipment and upgrades, as needed to support the line protection
    - Upgrades to the Rachel Hill 115 kV line terminal
    - Upgrade the firmware of one (1) SEL-421 relay for primary line protection over dedicated fiber
    - Install one (1) SEL-411L relay for backup line protection over dedicated fiber
    - Install One (1) SEL-2411 to the existing/new protection telecommunication scheme to implement the Anti-Islanding signal transmit to the new substation (FESub1).
    - Review/revise relay settings as needed.
- Additional Equipment to be Removed
    - Removal of back-up relaying, wave trap, line tuner, and associated equipment on the Rachel Hill terminal.
    - Removal of (2) UPLCs and (1) SEL421
    - Removal of (1) Wave Trap and (1) Line Tuner
- Scope of Work Assumptions
    - SEL411L relay is replacing the existing SEL421 BU relay and will fit in the existing space per print PN-186-12-14
    - SEL 2411 will fit in existing panel per print PN-186-12-15
    - Upgrade of SEL421 firmware is part of the Testing and Commissioning scope
- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Information Technology
        - Assumed that the existing SCADA transport at Hooversville Substation is sufficient for additional SCADA telemetry.
    - Testing and Commissioning
        - Testing and Commissioning to support new relays and revision of relay settings.

3.2 Rachel Hill Substation

- Description of Work
    - Install new relays and revise relay settings at Rachel Hill.
    - Removal of back-up relaying, wave trap, line tuner, and associated equipment on the Hooversville terminal.
- Relay & Control
    - Fiber equipment and upgrades, as needed to support the line protection
    - Upgrades to the Hooversville 115 kV line terminal
    - Upgrade the firmware of one (1) SEL-421 relay for primary line protection over dedicated fiber
    - Install one (1) SEL-411L relay for backup line protection over dedicated fiber
    - Install One (1) SEL-2411 to the existing/new protection telecommunication scheme to implement the Anti-Islanding signal transmit to the new substation (FESub1).
    - Review/revise relay settings as needed.
- Additional Equipment to be Removed
    - Removal of back-up relaying, wave trap, line tuner, and associated equipment on the Hooversville terminal.
    - Removal of (2) UPLCs and (1) SEL421
    - Removal of (1) Wave Trap and (1) Line Tuner
- Scope of Work Assumptions
    - SEL411L is replacing the existing SEL421 BU relay and will fit in existing panel per print PN-308-12-05
    - SEL2411 will fit in existing panel 1A per print E-6572 (cannot find a front panel view for panel 1A)
    - Upgrade to firmware for SEL421 is covered in the Testing and Commissioning scope
- Ancillary Scope of Work:
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Information Technology.
        - Assumed that the existing SCADA transport at Rachel Hill Substation is sufficient for additional SCADA telemetry.
    - Testing and Commissioning
        - Testing and Commissioning to support new relays and revision of relay settings.

3.3 Scalp Level

- Description of Work
    - Install new relays and revise relay settings at Scalp Level.
- Above Grade
    - Installation of relay panel
- Relay & Control
    - Review/revise relay settings as needed.
    - Fiber equipment and upgrades, as needed to support the line protection
    - Install One (1) SEL-2411 to implement the Anti-Islanding signal receive from the Rachel Hill Substation.
    - Install One (1) SEL-2411 to implement the Anti-Islanding signal transmit to the new substation (FESub1).
    - A handoff scheme shall be implemented at Scalp Level, where the breaker status received from Rachel Hill shall be combined with 115kV line airswitch statuses at Scalp level, and this combined status shall be transmitted to the new substation (FESub1).
- Scope of Work Assumptions
    - assume SEL2411 panel install as there is room in the existing control house for a panel per print E-16470-01 and cannot find front panel prints
- Ancillary Scope of Work:
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Information Technology
        - Assumed that the existing SCADA transport at Scalp Level Substation is sufficient for additional SCADA telemetry.
    - Testing and Commissioning
        - Testing and Commissioning to support new relays and revision of relay settings.

3.4 Hooversville – Rachel Hill 115 kV HH Line General Description:

Loop Hooversville-Rachel Hill 115kV HH Line into the proposed AH1-460 interconnection station, approximately 3.65 miles from the Scalp Level Tap and 3.35 miles from Hooversville 115 kV Substation. The new interconnection substation will be located east of the Hooversville-Rachel Hill 115kV HH Line with the loop occurring between structures 80 and 81.

- Existing Conditions:
    - Per TAMI the existing line is constructed on single circuit, multi-pole wood and H-frame structures. Existing conductor is 636 kcmil 24/7 ACSR shielded by (2) 3/8" EHS Steel.
    - Per GIS View, there does not appear to be distribution under-build along the length of the project area on the Hooversville - Rachel Hill 115kV HH Line.

- Install:
    - (2) single circuit steel monopole dead-end structures on concrete foundations
    - 0.2 miles of conductor 795 kcmil 26/7 ACSR shielded by (1) 7#8 alumoweld and (1) OPGW
    - Transfer existing conductor and shield wire to new dead-end structures
- Removal:
    - Approximately 0.01 miles of 636 kcmil 24/7 ACSR conductor and (2) 3/8" EHS Steel shield wire.
- Siting/Licensing Assumptions:
    - Full Application will be required.
    - Assume minimal social and ecological impacts.
    - Assume no local opposition to the project.
- Scope of Work Assumptions:
    - Outage can be obtained to perform line construction.
    - A ground survey will be required for design and as-built. Cost of mobilization/demobilization shared with Estimate PN-T-00022898.
    - It is assumed the existing conductor and shield wire are in adequate condition and can be transferred. An engineering analysis during project development will be required.
    - It is assumed the adjacent structures are in adequate condition and can handle the new loading. An engineering analysis during project development will be required.
    - The loop cut-in and substation location were not provided in detail. A general area was provided. Specific substation location and layout will be required during project development and execution. Scope of project may change.
- Ancillary Scope of Work:
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Access Roads
        - Access roads will be required, terrain is flat, approximately 0.3 miles.
    - Forestry
        - Approximately 0.4 acre of forestry clearing required.
    - Environmental
        - No wetland/stream crossings
        - Costs split with estimate PN-S-00023789
        - Road Bonds are required
        - Environmental Filming (Documentation of Existing roads are required
        - Environmental Access and Road Crossing Permit Fees is required

        - Environmental Development of Permit Binder is required
        - Environmental Cultural Resource Consultation is required
        - Environmental Construction walk down is required
        - RTE consultation letters are required
        - Wetland delineations and WDR are required
        - Stormwater permits and local approvals are assumed
        - Internal environmental engineering and external project management costs are included
        - A phase 1-A site assessment is included
    - Real Estate and Right of Way
        - Rights & restrictions review on existing line
        - New ROW

4. OTHER SCOPE OF WORK

4.1 Revenue Metering

- Description of Work
    - Provide revenue metering panel within new AH1-460 Control House. Integrate revenue metering to interconnection substation.
    - Provide new 3-phase 115 kV Free-standing CT/VT Combo Units.
- Below Grade Scope of Work:
    - (1) Lot of excavation, conduit, backfill, grounding, and wiring between Free Standing CT/VT Combo units to revenue metering.
    - (1) Lot of foundations for Free-standing CT/VT 115 kV Combo Unit.
- Above Grade Scope of Work:
    - (1) set of 3-phase Free Standing CT/VT Combo Unit 115 kV.
- 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 located in this estimate request P1-PN-S-00025531.
    - Assumes enough room in AH1-460 Control house to support a new revenue metering panel.
    - Assumes enough room in AH1-460 substation to add in free standing CT/VT Combo Units.
    - Assumes the same crew that is constructing the OTB FE Work scope will be adding the revenue metering panel and freestanding CT/VT combo units. Temp const facilities and construction general conditions

- Ancillary Scope of Work
    - Project Management
        - Provide project management, coordination, administration, scheduling, material management and project development if required.
    - Revenue Metering
        - Provide high end revenue meter and engineering support for revenue metering at FE Station AH1-460.
    - Testing and Commissioning
        - Testing and commissioning services as required

4.2 Option to Build Oversite

FirstEnergy oversight of Project Developer design and construction of new interconnection substation on a relatively high risk location from preliminary civil desktop study review.

- Below Grade:
    - Must Meet FirstEnergy Standards - Option to Build
- Above Grade:
    - Must Meet FirstEnergy Standards - Option to Build
- Relaying & Control:
    - Must Meet FirstEnergy Standards - Option to Build
- Scope of Work Assumptions:
    - Engineering Oversight for review/comment of OTB site Design for meeting FirstEnergy Standards
    - Geotechnical/Site/Civil oversight for review/comment of OTB site grading design for meeting FirstEnergy Standards
    - Construction Oversight assumed for 6 months (note: potential for additional oversight for Geotech/site/civil site construction for challenging projects)
    - Project Developer Responsible for Apparatus Testing of Devices and supplying results to FirstEnergy
    - FirstEnergy Commissioning Oversight is assumed for duration of construction.
- Ancillary Scope or Work:
    - Project Management
        - Coordinate with Project Developer and provide project management, coordination, administration, scheduling, material management and project development for FirstEnergy scope of work.
        - Provide Construction oversight for project construction duration
    - Forestry
        - Completed by Project Developer.

- Real Estate & Right of Way
  - Support as required for Transfer of Property to FirstEnergy upon Construction Completion
  - Internal support including document review, project planning meetings, assistance with transfer of assets if required.
- Environmental
  - Environmental review of Proposed Site
- Testing & Commissioning
  - Commissioning Review of the Project Developer Supplied Information and Witness of Critical Testing

5. MILESTONE SCHEDULE FOR COMPLETION OF [TO] WORK

Facilities outlined in this report are estimated to take 42 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	5	30
Detailed Engineering	3	30
Equipment Delivery	32	32
Construction	33	40
Testing and Commissioning	38	42

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

6.1 Scope Assumptions

- Project Developer will coordinate design and alignment of proposed 115 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 115 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 115 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 115 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 MAIT Transmission System by a Power Transformer with a winding configuration meeting the requirements in FirstEnergy's "Requirements for Transmission Connected Facilities" document.

6.2 Cost Estimate Assumptions

- The cost estimates provided for this project were developed as of March 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, MAIT 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.
- MAIT reserves the right to charge the Project Developer operation and maintenance expenses to maintain the Project Developer attachment facilities, including metering facilities, owned by MAIT. 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.
- MAIT'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 MAIT 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 AH1-460 GIA, and in PJM Manuals M01 and M14D. The details of applicable revenue metering requirements are given in the FirstEnergy Corporation 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

Land requirements for the interconnection substation needed for this interconnection project must meet the requirements in the following documents posted on PJM website.

- Requirements for Transmission Connected Facilities
- Geotechnical Design Requirements

The appropriate land requirements for a new interconnection substation are dependent on several electrical and physical factors/attributes. FirstEnergy will ultimately have to evaluate every property individually to assess the feasibility of construction, as well as any additional requirements that may be needed to support geotechnical and environmental concerns.

As a preliminary guide for site selection, FirstEnergy has provided a list of specifications for the substation size, Siting and Geotechnical standards, and Environmental requirements. It is important to note that these specifications are general, and as such, no construction activities should be performed on a selected site without prior approval from FirstEnergy.

8.1 Site Dimensions and Layout:

The typical new interconnection substation is a three-breaker-ring bus tapping an existing transmission line. The standard layout and dimensions of the substation are based on the voltage level of the interconnection system.

Below is a table summary of the typical substation dimensions for AH1-460. The standard requirement for a parking area has been included. However, Environmental, Geotechnical, and other factors may significantly increase the area required. For example, sites that require stormwater detention facilities will require area in addition to the typical dimensions provided in the table.

3 Breaker Ring Bus Voltage	Dimension Size (ft)	Dimension Acres	Dimension size w/ 100ft buffer (ft)	Acre size w/ 100ft buffer	Parking (15 cars) 230ftx60ft	Total Acres (Buffer + Parking)
115	228x228	1.35	328x328	2.7	0.5	3.2

8.2 Real Estate Transfer

The preferred method for conveying a property to the TO is by “fee simple” transfer. If there are subdivisions or other conditions that hinder the ability for the Project Developer to convey the property by “fee simple”

transfer, the TO may allow the use of an exclusive easement. These conditions should be discussed with the TO, and the accepted method of transfer should be confirmed early in the Interconnection process.

The Project Developer is required to obtain the following documents in the sequence listed below:

- Acquire the Interconnection Facilities property in fee from the property owner.
- Acquire an easement from the property owner for the Interconnection Facilities to the TO's T-Line (using the TO's template), if the size of property acquired doesn't sufficiently bi-sect the TO's existing right of way. If the property acquired by the Project Developer sufficiently overlaps the TO's existing right of way, this Interconnection Facilities easement is not needed.
- Provide access agreements to the TO from the property owners and Project Developer (this may be required if an exclusive easement is being used instead of conveying property to the TO in "fee simple".
- Provide an assignment of appropriate easement rights to the TO upon project completion. (Note: assignment must include all of TO's language in order to safely, operate and maintain facilities. It's critical that TO's easement templates are used when Project Developer is acquiring easements intended to be assigned to the TO.
- Provide deed conveyance of "fee simple" property for the Interconnection Facilities to the TO upon project completion and prior to transfer of title to personal property.

Document Exhibits:

Project Developer shall provide a survey and legal description detailing the location of the substation (preferably located adjacent to an existing transmission line right of way), ingress-egress to the substation from a dedicated public roadway, and easement for distribution and communication facilities and/or transmission facilities if necessary. This drawing shall be prepared by a licensed and registered surveyor and include at a minimum (ingress-egress, distribution and communication facilities locations may not need to be shown on the survey if property being conveyed is by "fee simple"):

- Legal description and survey of fee property being conveyed, including all lot split requirements
    - When property is conveyed to the TO by fee simple, the Project Developer is required to submit a completed Phase I Environmental Site Assessment (ESA) to the TO in accordance with all the requirements outlined in ASTM E 1527-05 prior to the start of construction of a substation property that will be transferred to the TO. Furthermore, if the Phase I ESA completed for the property documents the presence of any recognized environmental conditions (RECs), the Project Developer shall bear the cost and responsibility to complete a Phase II ESA in accordance with ASTM Standard E 1903-97 (Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process), however, final approval and property conveyance shall be at the sole discretion of the TO.
- Legal description for new transmission right of way (if "fee simple" conveyance is not used)
- Legal description for new distribution right of way (if "fee simple" conveyance is not used)
- Legal description for any other energy-related facilities that may be required (if "fee simple" conveyance is not used)
- Legal description for ingress-egress to a dedicated public roadway (if fee simple conveyance is not used)
- Survey drawing that shows:

- New right of way along with the location of existing easements
- Other existing facilities on the property
- Names of adjoining property owners
- Basic drawing features: title block, north arrow, legend, graphic scale

8.3 Geotechnical and Siting Requirements:

Project Developer shall refer to Geotechnical Design Requirements provided on PJM's website. In addition, below are a list of standard siting guideline to account for when selecting a property for the interconnection substation:

- Slopes steeper than 2:1 and/or taller than 10' shall have slope stability performed.
- Factor of Safety (FS) shall be 1.5 for permanent condition.
- Minimum road width shall be 16'. AutoTurn Analysis shall be performed to accommodate the design vehicle needed inside the substation curve widening to be provided as necessary.
- Longitudinal slope for main access road to substation shall be 0.5%-10%. This is a mandatory design specification.
- Slope across the substation pad shall be 0.5%-2%.
- Every 20' vertical slope shall require a bench.

Site Grading and Preparation Responsibility:

It is the responsibility of the Project Developer to properly vet a proposed substation location. The proposed location should be reviewed by a Civil Engineer to determine the site's suitability for construction and operation as a substation (refer to Attachment 5 to FE's preliminary Geotechnical summary report). This should include a review of available information regarding the specific site location that should be considered when estimating constructability, risk, cost, and schedule. The substation is considered the substation and all associated FirstEnergy Facilities needed to operate and maintain the site such as, access roads, stormwater management facilities, walls/structures, and utilities. This review should include, but is not limited to:

- Geologic Hazards
  - Karst
  - Geologic formation/group
    - Hard bedrock (shallow bedrock difficult to excavate)
    - Weak bedrock
  - Landslide susceptibility and topography
  - Surficial soils survey
  - Coal resource mapping
- Environmental Hazards
  - Flood mapping
  - Wetland Mapping
  - Any pollution information that could affect construction.
  - Corrosivity
- Past development
  - Mining activity
  - Previously reclaimed site

9. APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS

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

The GeoTechnical Design Requirements, dated July 20, 2022, shall apply.

The FirstEnergy Approved Vendor List, dated February 6,2026, 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 of 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

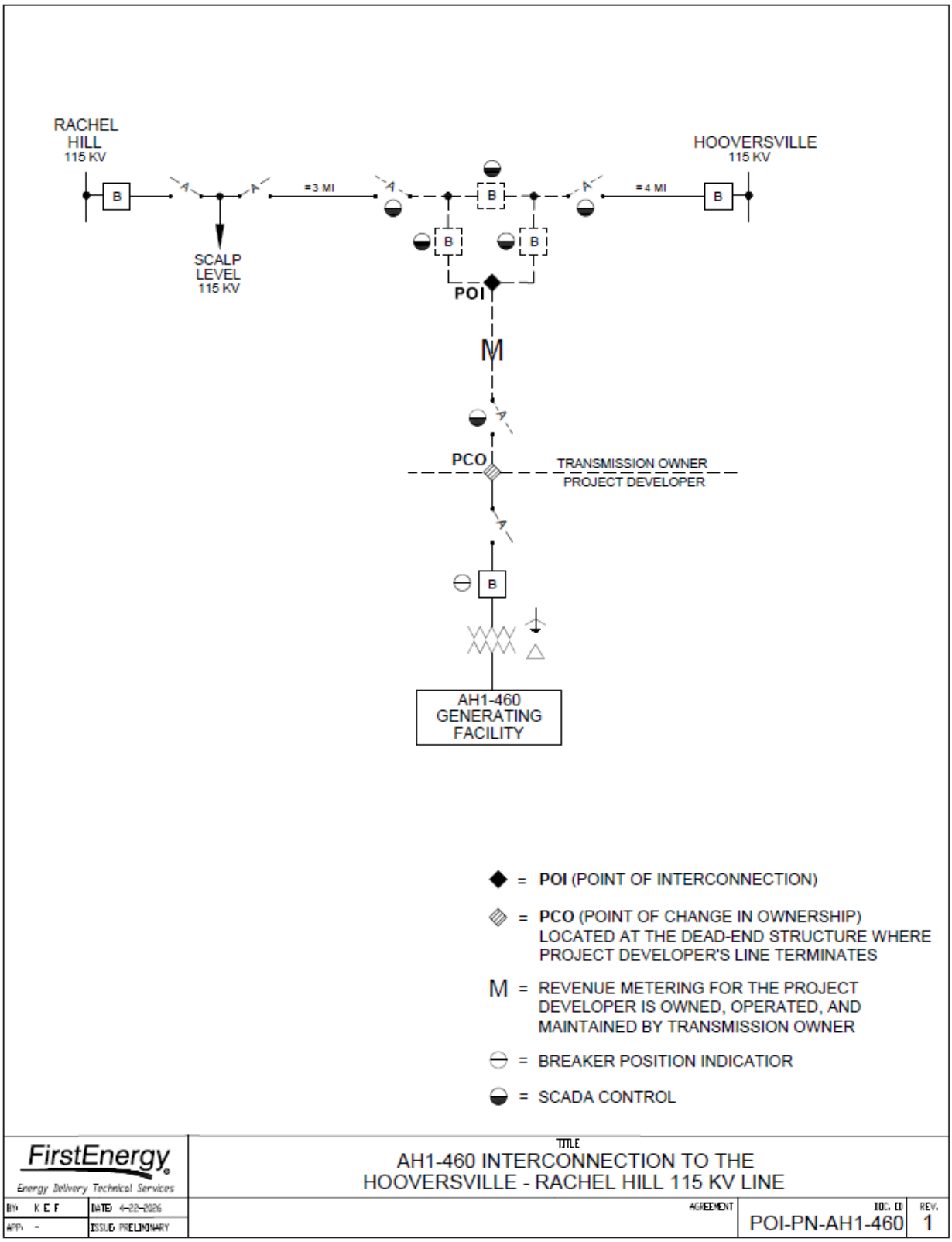
well as a perpetual easement for any transmission lines to the substation.

- 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:

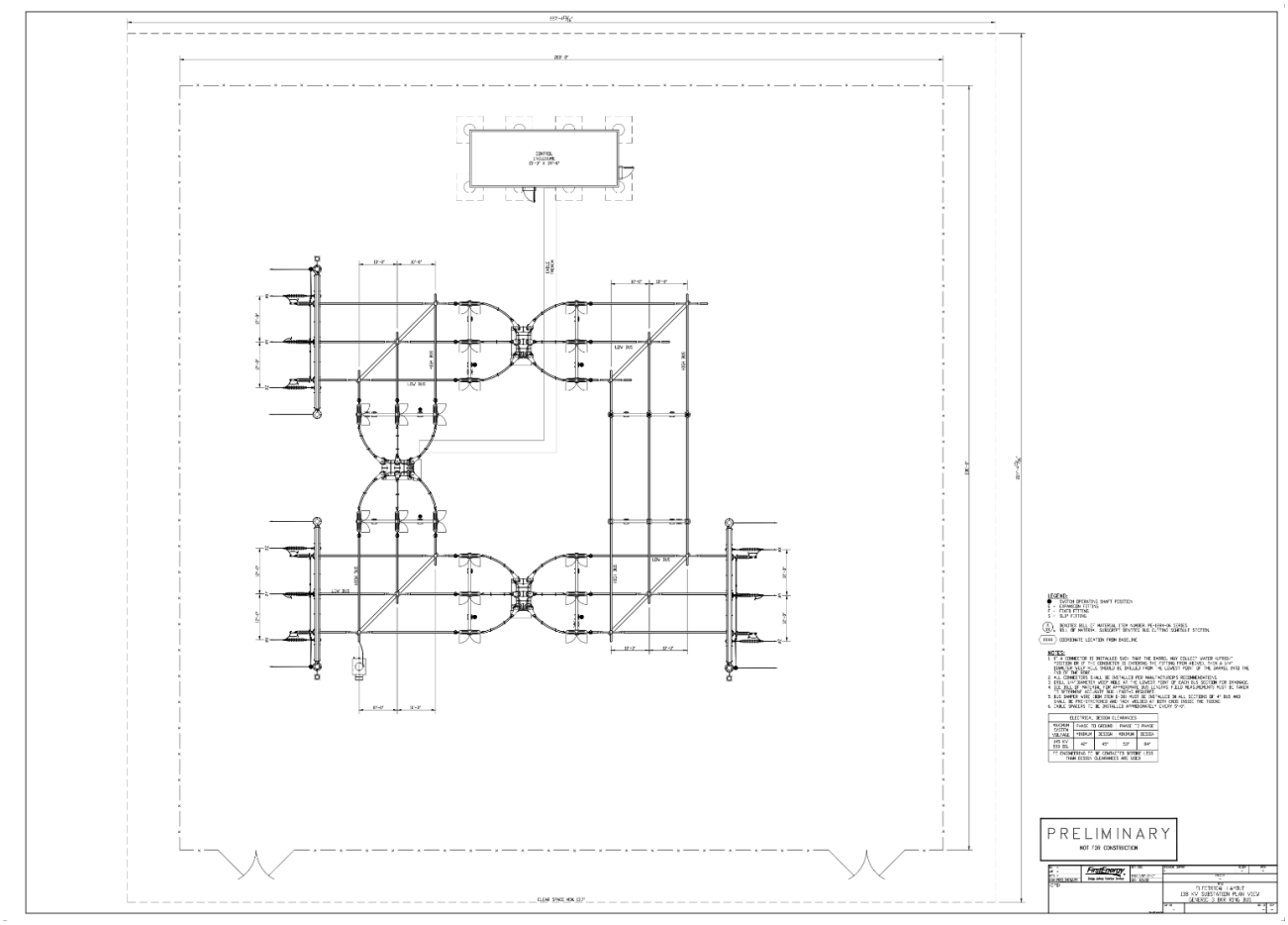
  https://www.firstenergycorp.com/help/safety/real-estate-power-lines/transmission-right-of-way.html#ROWform

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
Cable Trench (lf)	125
Battery Charger (ea)	1
Digital Fault Recorder (DFR) (ea)	1
Remote Terminal Unit (RTU) (ea)	4
Insulator - Line - Polymer (ea)	6
Insulator - Line - Porcelain/Glass (ea)	252
Engineered Steel Poles (ea)	3
Steel Support Structure (ea)	24
Hard Bus - 1.5 inch (ft)	240
Hard Bus - 4 inch (ft)	820
Battery Monitor (ea)	1
Package Control Enclosure - Prefabricated (ea)	1
Relay - Individual (ea)	12
Relay Panel (ea)	9
Circuit Breaker - 115 kV (ea)	3
Anchor Bolt - Substation (ea)	228
Insulator - Substation - 138 kV (ea)	18
Surge Arrester - 138 kV (ea)	9
Capacitor Coupled Voltage Transformer (CCVT) - 115 kV (ea)	9
Current Transformer - Slip Over (CT) - 115 kV (ea)	3
Potential Transformer (PT) - 138 kV (ea)	3
Station Service Voltage Transformer (SSVT) - 138 kV (ea)	1
Security - Camera (ea)	26
Security - Physical Access Control (Badge Reader) (ea)	2
Battery - 125V (ea)	1
AC/DC Panelboard (ea)	2
Disconnect Switch - Substation - 115 kV (ea)	9
Switch - Motor Operator - Substation (ea)	9
Cable - Control/Communication (lf)	38090
Conductor - AAC (ft)	1240
Conductor - ACSR (ft)	5227.2
Conduit - Rigid (lf)	1743
Wire - Fiber - ADSS (ft)	50197.818
Wire - Fiber - Underground (ft)	3991.5
Wire - Shield - OHGW (lf)	2904
Wire - Shield - OPGW (lf)	400

ATTACHMENT #4: PROTECTION REQUIREMENTS

Project Developer Protection Requirements

- 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 single fully rated circuit breaker, or a single line terminal comprised of up to two fully rated circuit breakers, is required at the generator-end of the interconnection line.

- 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. 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 Project Developer. 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.

FE Protection Requirements

To coordinate with proposed generating station, 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 Hooversville Substation:
    - Review/revise relay settings as needed.
    - The following upgrades to protection as needed on the Rachel Hill 115kV line terminal, now to the proposed interconnection station:
        - Upgrade the firmware of one (1) SEL-421 relay for primary line protection over dedicated fiber
        - Install one (1) SEL-411L relay for backup line protection over dedicated fiber
    - Fiber equipment and upgrades, as needed to support the line protection
    - Remove backup line relaying, wave trap, line tuner, and associated equipment on Rachel Hill 115kV line terminal.
    - Install One (1) SEL-2411 to the existing/new protection telecommunication scheme to implement the Anti-Islanding signal transmit to the new station

- At Rachel Hill Substation:
    - Review/revise relay settings as needed.
    - The following upgrades to protection as needed on the Hooversville 115kV line terminal, now to the proposed interconnection station:
        - Upgrade the firmware of One (1) SEL-421 relay for primary line protection over dedicated fiber
        - Install One (1) SEL-411L relay for backup line protection over dedicated fiber
    - Fiber equipment and upgrades, as needed to support the line protection
    - Remove backup line relaying, wave trap, line tuner, and associated equipment on Hooversville 115kV line terminal.
      Install One (1) SEL-2411 to the existing/new protection telecommunication scheme to implement the Anti-Islanding signal transmit to Scalp Level.

- At Scalp Level Substation:
    - Review/revise relay settings as needed.
    - Fiber equipment and upgrades, as needed to support the line protection

- Install One (1) SEL-2411 to implement the Anti-Islanding signal receive from the Rachel Hill Substation.
- Install One (1) SEL-2411 to implement the Anti-Islanding signal transmit to the new station.
- A handoff scheme shall be implemented at Scalp Level, where the breaker status received from Rachel Hill shall be combined with 115 kV line airswitch statuses at Scalp level, and this combined status shall be transmitted to the new station.

- At New AH1-460 Interconnection Ring Bus Station:
  - <u>For the Project Developer (Solar) 115 kV line:</u>
    - One (1) set of three (3) CCVTs
    - Two (2) SEL-411L relays for primary and backup line protection over dedicated fiber
    - Additional auxiliaries as needed to support the line protection
  - <u>For the Hooversville 115 kV line:</u>
    - One (1) set of three (3) CCVTs
    - One (1) SEL-421 relay for primary line protection over dedicated fiber
    - One (1) SEL-411L relay for backup line protection over dedicated fiber
    - Additional auxiliaries as needed to support the line protection
    - Install One (1) SEL-2411 to the new protection telecommunication scheme to implement the Anti-Islanding signal receive from the Hooversville substation.
  - <u>For the Rachel Hill 115 kV line:</u>
    - One (1) set of three (3) CCVTs
    - One (1) SEL-421 relay for primary line protection over dedicated fiber
    - One (1) SEL-411L relay for backup line protection over dedicated fiber
    - Install One (1) SEL-2411 with the new protection telecommunication scheme to implement the Anti-Islanding signal receive from the Scalp Level.
    - Additional auxiliaries as needed to support the line protection
  - <u>For each 115 kV breaker positions (3 total):</u>
    - One (1) 115 kV circuit breaker with two (2) sets of CTs per bushing
    - One (1) SEL-451 relay for breaker failure, and control as needed
    - Additional lockouts and auxiliaries as needed
  - <u>For general relaying support:</u>
    - One (1) lot of SEL-3350 or similar data concentrator RTACs for relay remote access
    - One (1) lot of Arbiter 1094b or similar GPS Clocks for timing
    - One (1) lot of Qualitrol TWS systems for traveling wave monitoring, for networked lines >100kV
    - One (1) lot of SEL-3555 or similar data concentrator RTACs for use as PMU data concentration
    - One (1) lot of TR3000 or similar digital fault recorders

Short Circuit Data

The short circuit levels at the location of the new 115 kV interconnection station are the following:

Short Circuit values at 115 kV

Three phase faults = 12.344 kA

Single line to ground fault = 9.561 kA

Transmission System Impedances at 115 kV, 100 MVA base

Positive sequence: Z1 = (0.00737 + j0.04000) (per unit)

Zero sequence: Z0 = (0.01962 + j0.07372) (per unit)

The fault current and system impedance values are for the proposed tap location on the existing 115 kV line, for the normal system configuration connecting to Hooversville-Rachel Hill substations. The fault currents provided are bolted, symmetrical values for present, normal transmission system conditions, and do not include the future AH1-460 Generation or GSU Transformer. 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 and Concern Table

Category	Source	Risk	Comment
Surficial Soil Survey	USDA Soil Survey	Low	Hazelton channery sandy loam
Geologic Formation/Group	PA/USGS Geologic Survey	Moderate	Anticipated shallow bedrock, coal
Karst	USGS/ TAMI 2	Low	Bedrock mapped with minor limestone, TAMI indicates no karst features
Landslide Susceptibility	GIS/Google Earth/FEMA Risk Map	Low to Moderate	Site is slightly to moderately sloped
Coal Mining and Oil and Gas Wells	PA Geologic Survey/TAMI 2	High	Surrounding site area contains underground mined areas
Environmental Hazard	US Wetland Maps/FEMA	Low	Low risk of flooding
Past Development	TAMI/GIS MAP/Historic Aerials	Low	Undeveloped except for existing T-Line

Geologic Hazards

This review was conducted to determine potential geologic hazards and risk at the proposed generator Project Developer location (AH1-460). The reviewed location is in Paint Township, Somerset County, Pennsylvania. This includes a proposed substation located along the Hooversville – Rachel Hill 115 kV transmission line. The substation would be located to the east of the transmission line between structures 80 and 81. The existing transmission line is operated by Penelec and was installed in 2013. The proposed substation would consist of (3) breaker 115kV ring bus with SCADA control. This location was reviewed for surficial soils survey, geologic formation/group, karst, landslide susceptibility, coal mining and oil and gas well 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 Hazelton channery loam (HaB, HbB, and HbD). The soils are generally silty or clayey sands with moderate to high percentages of gravel/cobbles/boulders in the soil matrix. The soil series is well drained and currently mapped with a Hydrologic Soil Group (HSG) A classification, indicating the soils have a high infiltration rate. The depth to the water table is listed as greater than 80 inches below the ground surface. The depth to bedrock is relatively shallow and listed to be between 58 to 60 inches below the ground surface. The surficial soil is listed to be 1 to 2 feet thick of highly organic plant material (topsoil, leaf litter, etc.).

Geologic Formation/Group

The site is located in the Allegheny Mountain Section of the Appalachian Plateaus Physiographic province. The Appalachian Plateaus Physiographic province features relatively flat-lying sedimentary rocks deeply cut by rivers, creating rugged, dissected landscapes with high ridges and deep valleys, known for coal and natural gas reserves. The Geologic Map of Pennsylvania maps the site to be located within the Glenshaw Formation (Pcg). The Glenshaw Formation is a Late Pennsylvanian sedimentary unit in the Appalachian Basin that represents cycles of alluvial (river), deltaic, and shallow marine environments, characterized by sandstone, shale, coal, and marine limestone beds.

Karst
The site is mapped to be within the Glenshaw Formation, which is primarily shale bedrock but does contain occasional limestone beds. The Transmission Asset Mapping Interface (TAMI 2) was reviewed and the site is not mapped within an area prone to karst features. Based on the bedrock geology and karst mapping, there appears to be a low risk of karst related concerns for the site. A determination of karst risk should be discussed in the sites geotechnical report to better understand the risk. Based on available mapping there is low to moderate risk of karst.

Landslide Susceptibility
The Allegheny Mountain Section is listed as a generally low, but includes local areas of high to moderate risk of landslide susceptibility by the Pennsylvania Geological Survey titled "Landslides in Pennsylvania". FEMA national risk index for the area in which the site is located as a relatively low risk to landslides. Transmission Asset Mapping Interface (TAMI) was utilized to generate elevation profiles for the potential site area. The ground surface is relatively level from the substation location to the north to the transmission line, but the ground slopes gently upward from the substation location southward, approximately 10 feet over an approximate 500 foot length. The site also slopes downward from west to east from the transmission line to beyond the proposed substation limits, approximately 100 feet over a 1,000 foot length. No excessively steep slopes are shown on the TAMI profile, but the profile should be considered an approximation. Given the mapped risks by FEMA and the Pennsylvania Geological Survey, there appears to be a low to moderate risk of landslide susceptibility.

Resource Mapping
There is significant coal resources and mining activity in this region. Available historic mining maps indicate that underground mining by Potochar & Potochar Coal Company and Dalton Run Coal occurred directly below the proposed substation site. There is potential for uncontrolled fills, mine subsidence induced by loading and dramatic fluctuation in subsurface water. Several unconventional and conventional natural gas wells are located within Somerset County. Available mapping indicates that no gas or oil wells have been located in the site vicinity.

Environmental Hazards
Based on FEMA and U.S. Fish and Wildlife Service maps there are no wetlands or features that would cause an increased risk of flooding to the immediate site location. An environmental study should still be conducted to confirm this prior to construction.

Past Development
The past development assessment of the site was based on aerial photography. Based on aerial photography dating back to 1958 this site has largely remained undisturbed and wooded. Other than mining roads in the area, no major developments appear to have occurred at the site directly. The aerial photographs do no show the limits or extents of the underground mining activity.

Recommendations, Geotechnical Opinion, and Estimating
List of Observations/ Hooversville – Scalp Level 115 kV

1. The site is mapped to be within the Hazelton channery sandy loam. Very gravelly sands
2. This site is part of the Glenshaw Formation and contains both thin limestone and coal
3. Low potential for karst
4. Low to moderate risk for landslide occurrence
5. Low environmental impact risk
6. Mining activity present in the immediate area

The geotechnical conditions of this site seem to conclude that it is relatively high-risk location to develop a substation due to the coal mining that has occurred on the site. Based on the desktop geologic study and a determination of the site being at high risk to develop. Additional due diligence will be required to determine the extent of the coal mining and additional costs might be expected to determine the extent and any potential interference with the prospective substation site. This would include additional borings for mining. If mining is encountered higher foundation costs would be expected to mitigate the mining. The above risk assessment does not confirm if the mining below grade is present below the site but it should be noted that the mining could potentially extend below the site and the estimate should assume that mining has occurred.