Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request
Project ID AH1-054

"Upton-Whitings 34.5 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 Jersey Central Power & Light Company (JCP&L), a FirstEnergy company.

This Facilities Study was performed to satisfy the Phase 2 Facilities Study requirement of the PJM Tariff. The Facilities Study is intended to provide scope, cost and schedule estimates for the project as currently defined and approved for Phase 2 study. In the event project changes are made during DP2 that impact this report, updates will be provided as part of the Phase 3 report. Following execution of the project's final agreement, this report will not be updated to account for other changes made as part of the agreements modification clause and instead the scope change process will be followed.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer has proposed a solar Generating Facility located in Ocean County, New Jersey. The installed facilities for AH1-054 will have a total Maximum Facility Output (MFO) of 8.25 MW with 3.465 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the JCP&L transmission system by tapping the existing New Lisbon - Whitings 34.5 kV line, between Upton and Whitings, with two line switches and a tap switch. The POI is located at the tap, approximately 4.0 miles from Upton tap and 5.3 miles from Whitings 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 where TO-owned 34.5 kV attachment line conductor will terminate on the PD installed and owned pole located one span from the TO owned and maintained tap switch as shown in Attachment #1.

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 PCO.
- Generator lead line from the Generating Facility to the PCO.
- 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 AH1-054 project to JCP&L transmission system. These facilities shall be designed according to FirstEnergy Applicable Technical Requirements and Standards. Once built, JCP&L will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES (TOIF)

1.1 AH1-054 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 by JCP&L.
    - Distribution
        - Provide 120V power to (1) switch
    - Testing and Commissioning
        - Testing and commissioning services as required.

1.2 New Lisbon – Whitings 34.5 kV Tap Switch

Tap the New Lisbon - Whitings 34.5 kV K11 Line approximately 5.3 miles Southwest from FE Substation Whitings. Tap line to the PCO (north from exiting FE Line) at structure 318. Include up to 0.1 miles of conductor from new AH1-054 tap to PCO structure. Include (1) tap pole structure and (1) switch structure with SCADA line switch assembly.

- Existing Conditions
    - Per TAMI and GIS view, the existing line is constructed on single circuit, direct embedded, wood, monopole structures and existing conductor is 556 Kcmil 26/7 ACSR.
    - Per GIS View, there appear to be distribution under-build in this section of the New Lisbon – Whitings 34.5 KV K11 Line.
- Structures Installed

- (1) light duty steel, monopole, tap structure
- (1) 34.5kV MOAB switch, light duty steel, monopole, structures with SCADA control
- 0.1 miles of 556 kcmil 26/7 ACSR conductor and 7#8 Alumoweld shield wire

- Removals
  - (1) existing wood monopole structures (Existing Strs. 318)
- Siting and Licensing:
  - Municipal Approval is required.
- Scope of Work Assumptions:
  - Assume minimal social and ecological impacts.
  - Assume no local opposition to the project.
  - Outage can be obtained to perform line construction.
  - A ground survey will be required for design and as-built.
  - Assumed to match existing conductor, 556 Kcmil 26/7 ACSR, and assumed shielded by 7#8 Alumoweld.
  - New tap structure to be located at existing structure location 318.
  - Tree removal permit will be provided by the developer if required.
  - Monopole structures are assumed not to require concrete foundations. Should detailed design deem concrete foundations necessary, a geotechnical assessment will be conducted to determine siting, environmental impacts, and technical requirements.
  - An allowance has been included for the 120V power needed for the SCADA-controlled switches, subject to adjustment based on the final source determined during detailed design.
  - The Project Developer shall be responsible for acquiring all necessary land rights and rights of way required for the full length of the 34.5 kV generator lead line, including the portion on the TO side of the PCO (approximately one span from the POI). This report does not grant approval to the Project Developer to use the TO's existing right of way or line structures for any portions of the generator lead line or Interconnection Facilities.
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Access Roads
    - Construction pads are required
    - Assumed existing Access roads to be reused
  - Environmental
    - Road Bonds are required.
    - Environmental Filming (Documentation of Existing roads are required

- Environmental Construction walk down is required.
- Wetland Delineations and WDR are required
- Internal environmental engineering and external project management costs are included

- Forestry
  - Some Forestry clearing will be required.
- Real Estate
  - Rights & restrictions review on existing line
  - New ROW will not be required
  - Real estate costs have been included for:
    - Internal support including document review, project planning meetings, subcontractor oversight and assistance with transfer of assets if required.
    - External support for general project support, and minimal construction support and damage settlements/releases.
    - Direct damage payments not included in estimate
    - Kept GIS / R&R for installation of structures.
- Information Technology
  - Installation of Cellular Radio System to support SCADA switch installation.

2. STAND ALONE NETWORK UPGRADES

None

3. NETWORK UPGRADES

3.1 New Lisbon – Whitings 34.5 kV Line Switches

Install (2) line load break SCADA controlled network switches, one on each side of new AH1-054 tap on the New Lisbon - Whitings 34.5 kV K11 Line approximately 4.0 miles east from the Upton Substation. Include (2 total) new switch pole structures with the SCADA switch assemblies.

- General Description
  - Install (2) line load break SCADA controlled network switches, one on each side of new AH1-054 tap on the New Lisbon - Whitings 34.5 kV K11 Line approximately 4.0 miles east from the Upton Substation.
  - Include (2 total) new switch pole structures with the SCADA switch assemblies.
- Existing Conditions

  - Per TAMI and GIS view, the existing line is constructed on single circuit, direct embedded, wood, monopole structures and existing conductor is 556 Kcmil 26/7 ACSR, No existing shield wire information available.
  - Per GIS View, there appear to be distribution under-build in this section of the New Lisbon – Whitings 34.5 KV K11 Line.

- Structures Installed
  - (2) 34.5kV MOAB switch, light duty steel, monopole, structures with SCADA control.
  - 0.1 miles of 795 kcmil 26/7 ACSR conductor and 7#8 Alumoweld shield wire.
  - Transfer existing conductor and shield wire to (2) new switch structures.
- Removals
  - (2) existing wood monopole structures (Existing Strs. 317 and 319)
  - 0.1 miles of existing 556 Kcmil 26/7 ACSR and existing shield wire.
- Siting and Licensing:
  - Municipal Approval is required.
- Scope of Work Assumptions:
  - Assume minimal social and ecological impacts.
  - Assume no local opposition to the project.
  - Outage can be obtained to perform line construction.
  - A ground survey will be required for design and as-built.
  - Assumed to match existing conductor, 556 Kcmil 26/7 ACSR, and assumed shielded by 7#8 Alumoweld.
  - Assumed conductor and shield wire will need to be replaced between the (2) new switch locations.
  - 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.
  - New switch structures to be located at existing structure locations 317 & 319.
  - 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.
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Access Roads
    - Access roads will not be required.
  - Environmental

        - Road Bonds are required.
        - Environmental Filming (Documentation of Existing roads are required.
        - Environmental Construction walk down is required.
        - Wetland Delineations and WDR are required.
        - Internal environmental engineering and external project management costs are included.
    - Forestry
        - Some Forestry clearing will be required.
    - Real Estate
        - Rights & restrictions review on existing line
        - New ROW will not be required
        - Real estate costs have been included for:
            - Internal support including document review, project planning meetings, subcontractor oversight and assistance with transfer of assets if required.
            - External support for general project support, and minimal construction support and damage settlements/releases.
            - Direct damage payments not included in estimate
            - Kept GIS / R&R for installation of structures.
    - Information Technology
        - Estimated cost associated with installation of (2) Cellular Radio Systems to support SCADA switch installation.
    - Distribution
        - provide 120V power to (2) switches

3.2 New Lisbon Substation

Review and Update Relay Settings

- Below Grade Scope of Work:
    - None
- Above Grade Scope of Work:
    - None
- Relay & Control Scope of Work
    - Review and revise relay settings
- Scope of Work Assumptions:

- None
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Testing and Commissioning
    - Testing and commissioning services as required for revised relay settings.

3.3 Whitings Substation

Review and revise relay settings

- Below Grade Scope of Work:
  - None
- Above Grade Scope of Work:
  - None
- Relay & Control Scope of Work
  - Review and revise relay settings
- Scope of Work Assumptions:
  - None
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Testing and Commissioning
    - Testing and commissioning services as required for revised relay settings.

3.4 Upton Tap

Update nameplates as required.

- Below Grade Scope of Work:
  - None
- Above Grade Scope of Work:
  - Update drawings and nameplates for line name change
- Ancillary Scope of Work
  - Project Management

- Provide project management, coordination, administration, scheduling, material management and project development if required.

4. Other Scope of Work

4.1 Revenue Metering

Install 34.5kV revenue metering at Project Developer's facilities.

- Above Grade Scope of Work:
  - Revenue Metering install including CT/PTs, mounting bracket, and junction box for revenue metering.
- Scope of Work Assumptions:
  - Developer to provide revenue metering pole and access for FE/JCP&L to mount revenue metering assembly to pole.
- Ancillary Scope of Work
  - Project Management
    - Provide project management, coordination, administration, scheduling, material management and project development if required.
  - Revenue Metering
    - Install revenue metering within the generator facilities for AH1-054
    - FE to provide CTs/PTs and bracket for CTs/PTs.
    - FE to provide junction box on top of revenue meter.
  - Testing and Commissioning
    - Testing and commissioning services as required.

5. MILESTONE SCHEDULE FOR COMPLETION OF JCP&L WORK

Facilities outlined in this report are estimated to take 33 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
Detailed Engineering	3	27
Siting, Permitting & Real Estate	5	27

Equipment Delivery	29	29
Construction	30	32
Testing and Commissioning	31	33

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

6.1 Scope Assumptions:

- The Project Developer shall provide and install the mounting structures (or enclosures) and conduits necessary for JCP&L metering installation and shall mount the TO instrument transformers unless otherwise agreed to by JCP&L.
- The associated rights of way for the 34.5 kV line tap to the substation will be acquired by the Project Developer and transferred to JCP&L at no cost. The access road design must be approved by JCP&L to ensure it provides adequate access to support installation and maintenance of the revenue metering.
- Additional costs will be incurred by the Project Developer, if final alignment of the 34.5 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.

6.2 Cost Estimate Assumptions:

- The cost estimates provided for this project were developed as of February 27, 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, JCP&L 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.
- JCP&L reserves the right to charge the Project Developer operation and maintenance expenses to maintain the Project Developer attachment facilities, including metering facilities, owned by JCP&L. 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.
- JCP&L'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 JCP&L 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 AH1-054 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 Project Developer side of the PCO, 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 PERMITTING

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

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

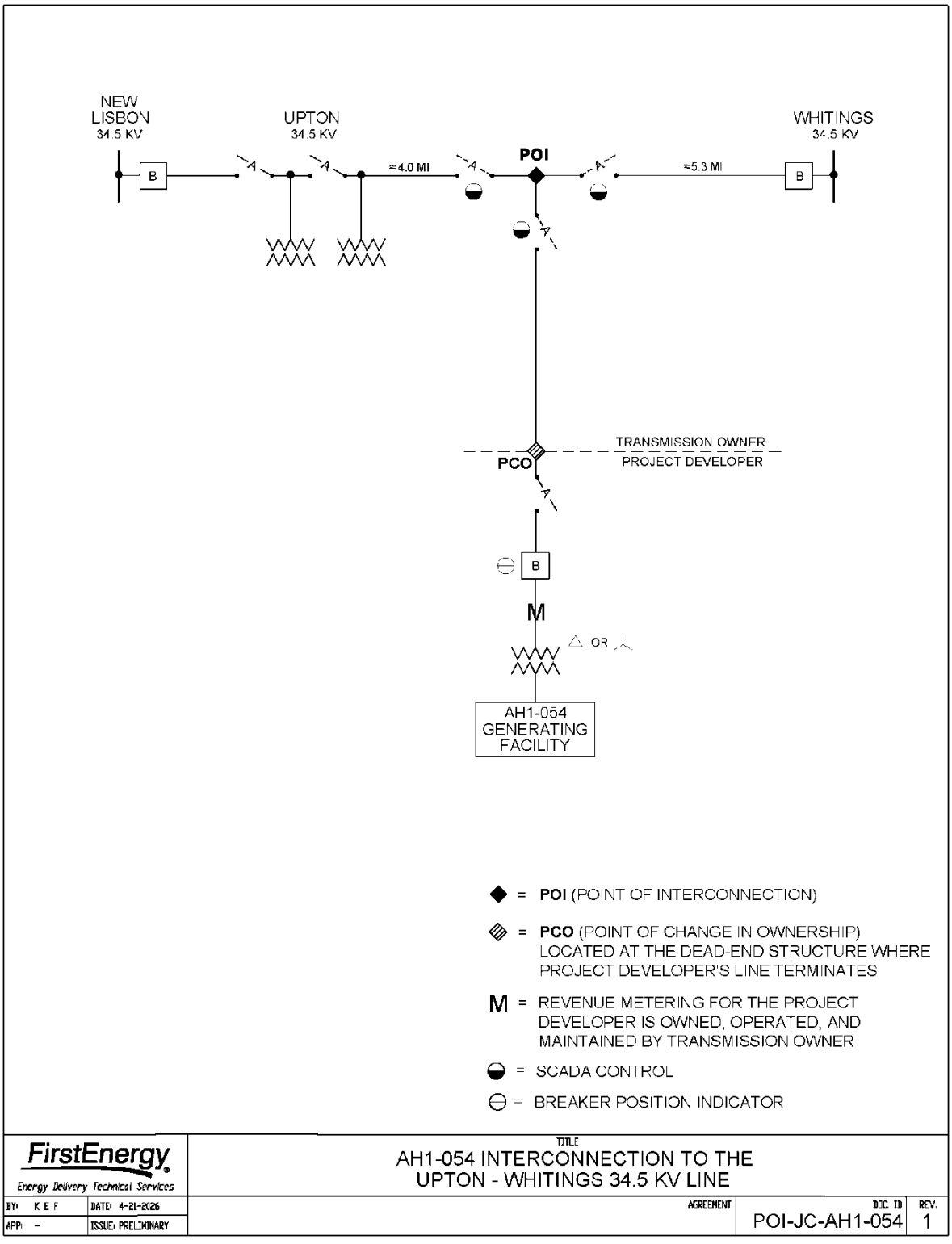
Confirmation of meeting all permitting requirements shall be provided to Transmission Owner, prior to start of construction. Following construction and energization, confirmation of permit closeout shall be provided to the satisfaction of Transmission Owner, prior to transfer of ownership. If any of these elements are not included in the final agreement between Transmission Owner and Project Developer, twelve (12)-to-eighteen (18) months should be added to the Project Schedule to secure necessary permits, and additional costs would apply.

- Project Developer will provide copies of all the relative environmental permits and other necessary approvals to Transmission Owner before Transmission Owner accepts the Interconnection Facilities.
- Project Developer is required to install an access road from the new interconnection substation to the nearest public road (must be approved by Transmission Owner) and obtain access rights for Transmission Owner. Project Developer is responsible 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: PROTECTION SCOPE

Short Circuit Values

34.5 kV

Positive Seq. Impedance = 1.09790 + j3.39862 Ohms

Zero Seq. Impedance = 2.30696 + j12.6747 Ohms

Single Line to Ground Fault Current = 2,990 Amps

Three Phase Fault Current = 5,577 Amps

Fault values are from the current system condition on the 34.5kV New Lisbon – Whitings K11 Line without the proposed generation project and extension of the 34.5kV New Lisbon – Whitings K11 Line to the POI. The faults provided are bolted, symmetrical values for normal system conditions. It should be similar short circuit values at the interconnection point with the extension of the 34.5kV New Lisbon – Whitings K11 Line but future changes in fault currents are possible and it is the Project Developer's responsibility to upgrade their equipment and/or protective equipment coordination when necessary.

General Connection Requirement

All proposed generation interconnection points and load-serving delivery points must comply with the technical requirements detailed in the FirstEnergy "Requirements For Transmission Connected Facilities" document.

Protection Requirements

Project Developer shall install a Delta High (utility) side or Ungrounded Wye High (utility) side transformers.

Project Developer shall install Fully Rated Circuit Breaker at the point of interconnection on the 34.5kV system.

Project Developer will be required to have primary and backup relays on independent CTs providing high speed protection for faults past the circuit breaker.

There should be two levels of anti-island protection. If the inverters meet the testing requirements of IEEE-1547.1 and are UL1741 certified, Anti-islanding Direct Transfer Trip will not be required and the inverters themselves have one level of anti-island protection.

The second level of anti-island protection, the intertie relay, could be a SEL-351-7 or similar and provide just the intertie functionality (over and under voltage, over and under frequency and ground overvoltage) but this functionality can be place inside the SEL-351-7s or similar that are used for the fault protection. This relay is to be located on high side of 34.5kV transformers. Install 3 Phase PTs [Potential Transformers] (WYE Gnd - WYE Gnd) on 34.5kV side of transformer.

Intertie relaying located on High side of 34.5kV transformers will need to trip Solar Generation offline during a fault event on 34.5kV Line and Solar Generation is feeding the fault. This can be achieved by either tripping a device on high side of Step-Up transformer or by tripping individual PV strings offline. This tripping can be done via Fiber or microwave communication if preferred.

All relays, relay schemes, and relay settings that include 34.5kV voltages or currents or trip any 34.5kV circuit breakers shall require the review and approval of FirstEnergy.

FirstEnergy will complete detailed relay coordination studies to identify off-site relay setting changes required due to this generation interconnection. This may result in additional individual relay replacements being required. These relay replacements will be done at the cost of the developer.

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