Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AF2-350

“Kensington 138 kV”

December 2024

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 ComEd.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed a solar Generating Facility located in, Kankakee County, Illinois with a designated PJM Project ID of AF2-350. The installed facilities will have a total Maximum Facility Output (MFO) of 100 MW with 60 MW of this output being recognized by PJM as Capacity.

2. POINT OF INTERCONNECTION (POI)

The Generating Facility will interconnect with the ComEd transmission system via a direct connection into the TSS 199 Kensington Road 138 kV substation.

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

3. POINT OF CHANGE IN OWNERSHIP

The Point in Change of Ownership will be located at the first dead-end structure inside the 138 kV Project Developer substation 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:

- Main Power Transformer (s) (MPT), Generation step-up (GSU) transformer(s) or final transformation, as applicable.
- 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
    - Two physically diverse paths of Single Mode Fiber with a minimum 48-count, will need to be run between TSS199 Kensington and Grand Marsh Solar.

B. Transmission Owner Facilities Study Results

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AF2-350 project to ComEd's transmission system. These facilities shall be designed according to ComEd Applicable Technical Requirements and Standards. Once built, ComEd will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

- A 138 kV dead-end structure and foundation within the fence of the Interconnection Substation, to terminate the Project Developer's generator lead line.
- Line conductor from the dead-end structure to the bus position in the switchyard of the interconnection substation.
- A 138 kV line motor operated disconnect (MOD)
- Set of revenue-metering equipment. Two physically diverse paths of Single Mode Fiber with a minimum 48-count, will need to be run between TSS199 Kensington and Grand Marsh Solar.

2. STAND ALONE NETWORK UPGRADES

- NA

3. NETWORK UPGRADES

Transmission Line Upgrades

The L19907 138 kV line will be cut and rerouted to TSS 199 Kensington.

- The new conductor type will be 556.5 kcmil (24/7) T-2 Parakeet ACSR. The new shield wire will be 7#6 Alumoweld.
- Approximately 0.04 new circuit miles of conductor and shield wire will be installed.
- No new transmission structures will be required outside of the new TSS 199 L19907 h-frame for the 138kV L19907 cutover work.

The L19906 138 kV line will be cut and rerouted to a different area of TSS 199 Kensington.

- ComEd will be performing the design, procurement, and construction of the new structures required to reroute L19906.
- The new conductor type will be 556.5 kcmil (24/7) T-2 Parakeet ACSR. The new shield wire

will be 7#6 Alumoweld.

- Approximately 0.15 new circuit miles of conductor and shield wire will be installed.
- The following structure replacements and installations are required for the 138kV L19906 cutover work.

Structure #	Existing Structure Type	Comments
4001	110'-H5 WPE	Remove Structure
NEW L19906 T1	N/A	Install new single-circuit 0–15-degree dead end steel pole
NEW L19906 T2, NEW L19906 T3	N/A	Install new single-circuit 90-degree heavy angle dead end steel pole

Privately owned 138 kV L19902 will be cut and rerouted to a different area of TSS 199 Kensington.

- The new conductor type will be 556.5 kcmil (24/7) T-2 Parakeet ACSR. The new shield wire will be 7#6 Alumoweld.
- Approximately 0.02 new circuit miles of conductor and shield wire will be installed.
- No new transmission structures will be required outside of the new TSS 199 L19902 h-frame for the 138kV L19902 cutover work. The following structure removals are required for the 138kV L19902 cutover work.

Structure #	Existing Structure Type	Comments
N/A (L19902 Turning Str. Prior to existing TSS 199 H-Frame)	90-Deg Dead End	Remove Structure

Privately owned 138 kV L19901 will be cut and rerouted to a different area of TSS 199 Kensington.

- ComEd will be performing the design, procurement, and construction of the new structures required to reroute L19901.
- The new conductor type will be 556.5 kcmil (24/7) T-2 Parakeet ACSR. The new shield wire will be 7#6 Alumoweld.
- Approximately 0.05 new circuit miles of conductor and shield wire will be installed.
- The following structure replacements and installations are required for the 138kV L19901 cutover work.

Structure #	Existing Structure Type	Comments
NEW L19901 T1, NEW L19901 T2	N/A	Install new single-circuit 90-degree heavy angle dead end steel pole

N/A (L19901 Turning Str. Prior to existing TSS 199 H-Frame)	90-Deg Dead End	Remove Structure

TSS 199 Kensington Upgrade

- The existing substation, TSS 199 Kensington 138 kV, will be expanded approximately 245' West, 50' East, 50' South and upgraded to interconnect the project with the ComEd transmission system.
- Install four new 138 kV circuit breakers with a minimum nameplate capability 3126/3366/4023/4806 A (747/805/962/1149 MVA) SN/SLTE/SSTE/SLD continuous, and interrupting capability of 63 kA at -40°F. Circuit breakers to be equipped with a motor operated disconnect switch (MOD) on both sides of the breakers. All equipment associated with the breaker termination should meet or exceed the thermal capability of the breaker including CB disconnects, leads, CTs, metering, relays, etc.
- At TSS199 Kensington, install 50BF/79 SEL-451-5 relay and associated LOR per GDD 1931 on all new 138kV CBs. All 138kV Bus Ties must have sync check thru the relay for Manual close, SCADA close, and automatic reclosing. Install additional SEL351A for auto-reclosing of the adjacent line for BT5-8 and BT5-6 only.
- Install 12 total motor operated disconnect switches having a minimum thermal capability of 1892/2022/2072/2250 A (376/483/495/538 MVA) SN/SSTE/SLTE/SLD.
- At TSS199 Kensington, install 138kV Bus 7 bus protection scheme using dual SEL487 per GDD1920. Utilize full 2000:5 CT ratio for both systems of bus relaying.
- Retain existing 138kV Bus 2 protection scheme. Remove 138kV Bus 1 Protection scheme.
- Install 138kV Bus 7 bus protection scheme.
- SPOG 2-47 will be revised and Transmission Planning to provide guidelines ahead of the Engineering design. Work required to update Anti-Islanding Scheme at ESS K323 CSL Behring, TSS70 Bradley, TSS86 Davis Creek and at TSS199 Kensington
- For L19904, install standard ComEd 138kV Project Developer interface relaying.
- Project Developer to provide limiting Transmission Facility ratings for their portion of 345KV L19904, in accordance with NERC FAC-008, FERC Order 881 and PJM Operational requirements for normal and emergency ratings from -55F to 130F in 5F increments.
- For L19901, L19902, L19906 and L19907, re-use existing line relays.
- Install 3 phase 1200:1 CCVTs on all 138kV buses.
- L19906 will require new 2000 Amp minimum wavetrap, B Phase CCVT with carrier equip, Line Tuner Unit (LTU), Coaxial Cables to existing DTT and DCB PLC equipment in building. Wavetrap needs to be mounted line side of yard.
- L19907 will require new 2000 Amp minimum wavetrap, B Phase CCVT with carrier equip, Line Tuner Unit (LTU), Coaxial Cables to existing DTT and DCB PLC equipment in building. Wavetrap needs to be mounted line side of yard.
- Relocate fiber optic cables for L19901 to TSS938 and L19902 to TSS949. UCOMM Engineering must be involved in determining the design requirements up to the ComEd

demarcation point.

- Replace existing SEL-3530 RTAC with SEL-3350 RTAC.
- Add new IP relays to existing dual switch architecture.
- Replace SEL-2407 GPS Clock with SEL-2488
- Install SEL-3350 RTAC for Project Developer data.
    - Install one pair of serial fiber connections for each Project Developer RTU data exchange.
    - Move serial connections to and from Project Developer's (including Pilot Hill) from existing RTAC.
- Connect ComEd-owned revenue meter to IP switch architecture.
- Install 138 kV standard interconnection metering and telemetry to ComEd TSO including CB status, MW, MVAR, MWh and voltage values.

4. OTHER SCOPE OF WORK

STA 4 Quad Cities

- Install SEL-3350 RTAC
    - Serial Port 15 used for Remote Access
    - Serial Port 16 used for SCADA Data
- Install RST-2228 dual aux switch architecture for new relays.

5. MILESTONE SCHEDULE FOR COMPLETION OF COMED WORK

Facilities outlined in this report are estimated to take 36 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule may be impacted by the timeline for procurement and installation of long lead items, the ability to obtain outages to construct and test the proposed facilities.

Description	Start month	Finish month
Detailed Design	1	18
Permitting	18	24
Construction	24	36

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

- This study is based on the System Impact Study Report for PJM Generation Interconnection New Service Request Project AF2-350. The steady-state voltage study for stability analysis will be performed by PJM. The PJM study could identify upgrades to the ComEd system that would become part of this project's scope of work.
- Work on L19906 and L19907 assumes completion of P.D. 0P200035, "K-323 CSL BEHRING – PROVIDE 138KV FEEDS AND BUILD ESS"
- This study assumes that any additional right-of-way and/or easement work required will be at the expense of the Project Developer.
- This cost estimates assume that work will be performed during normal weekdays and with no overtime. Transmission line outages for construction have not been identified, but generally are available from September to May. These outages are controlled by PJM.
- Costs are based on 2024 rates and do not reflect a potential increase in Labor or Material costs after 2024.
- ComEd cost estimate is valid for six (6) months after Facilities Study release by PJM.
- The Project Developer will be responsible to request and bear the cost for relocation of existing transmission or distribution lines (including structures and other facilities) that may be required for transmission line crossings, the transport of any large equipment, such as turbines, rotors, turbine structures, cranes, etc. Formal submittal of this request to ComEd's TSO for ultimate review by PJM can be made 7 months prior to back feed request date.
- Foundation design assumes typical soil conditions at locations and will be subject to change after soil boring tests.
- All upgrades to facilities included in this document will be required to meet latest ComEd standards.
- Upgrades are subject to change based on detailed design development.
- ComEd will complete pre-design and post construction survey for the transmission and substation upgrades, as required. This includes, but is not limited to, the LIDAR survey and video imaging for transmission lines. Costs associated with this are at the expense of the Project Developer. Pre-design survey must be completed prior to detailed engineering.
- This Facilities Study is time dependent. If the project is not into construction within one year of the issuance, the study will be void and the project re-studied, requiring the completion of a new Facilities Study.
- It is assumed that all associated network upgrades, as listed in the Phase 1 study, are complete prior to this queue being placed in service.

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 AF2-350 GIA, and in PJM Manuals M01 and M14D. The details

of applicable revenue metering requirements are given in the ComEd Interconnection Guidelines posted on PJM website.

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

- REVENUE METERING FOR PJM AND COMED
  - The revenue meter measures the wholesale energy output (Hourly compensated net MWH and Hourly compensated net MVARH) of the Generating Facility.
  - The metering equipment, including revenue meter and CT/PT shall be installed, at Project Developer's expense, at the interconnection substation on ComEd side of the Point of Change in Ownership.
  - ComEd shall own, operate, maintain, inspect, and test all the metering equipment as set forth in 'Testing of Metering Equipment' section of the PJM Tariff, at the Project Developer's expense.
- REAL-TIME METERING FOR PJM
  - The Project Developer shall install, own, operate, maintain, inspect, and test real-time metering equipment to measure and transmit directly to PJM the real time MW, MVAR, voltage and status of electrical equipment such as circuit breakers and Motor Operated Disconnect switches, in conformance with the requirements listed in PJM Manuals M-01 and M-14D, at the Project Developer's expense.
- RETAIL METERING FOR COMED
  - The AMI Meter measures the energy consumption by the Project Developer at transmission level and hence shall be designed to measure low MW flow.
  - The metering equipment including AMI Meter and CT/PT shall be installed at the interconnection substation on ComEd side of the POI, at the Project Developer's expense.
  - ComEd shall own, operate, maintain, inspect, and test all the metering equipment as set forth in the 'ComEd Interconnection Guidelines'.

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

- The Project Developer is responsible for reimbursement for the expansion of TSS 199 Kingston Road which is 245' West, 50' East, 50' South
- The site should be accessible from at least two sides to bring in future transmission lines. This means that there should be no river, another transmission line, hills, forest, or wetland on at least two sides of the site.
- There should be no legal agreements or other impediment to interconnect additional generator lead lines to this site from other generators in the future.
- The site should not encroach into ComEd transmission or distribution corridors.
- If the Project Developer owns the land surrounding the substation site, the Project Developer must provide open easement to ComEd to bring in future transmission lines into the substation.
- The Project Developer is responsible to build an access road meeting ComEd requirements to the substation site from the nearest public road.

- The Project Developer is responsible to acquire land to install tie-lines integrating the substation with the ComEd transmission system.
- The Project Developer is responsible to acquire land for the stormwater detention facility meeting all applicable ComEd Environmental requirements and all applicable municipal, county, and state requirements for stormwater management.

Upon completion of the construction and installation of the interconnection substation, the tie-line, access road, stormwater detention facility and related improvements and facilities, and the satisfactory completion of testing of the interconnection substation acceptable to ComEd, the Project Developer shall transfer all the Property Rights and Permits to ComEd, at no cost or expense to ComEd, pursuant to documentation that is acceptable to ComEd, including (without limitation) the Property Transfer Documents in fee simple.
All real property conveyed in fee to ComEd must be remediated to and all real property to which real property rights are transferred to ComEd (as determined in ComEd's discretion) must be remediated to IEPA's Tiered Approach to Corrective Action Objectives (TACO) Tier 1 residential remediation standards.

9. ENVIRONMENTAL AND PERMITING

- Project Developer will be responsible to obtain all environmental approvals and permitting required for the construction of L19904.
- ComEd will be responsible for all environmental approvals and permitting required for L19902, L19906, and L19907 work. This includes any endangered species studies and monitoring, as required. Costs associated with this permitting are at the expense of the Project Developer.
- The Project Developer will be responsible for site restoration required for substation and transmission upgrades. This includes, but is not limited to road restoration/improvements, wetland restoration, and farm field restoration/crop damage. Costs associated with this are at the expense of the Project Developer.
- The Project Developer will be responsible for the cost to purchase real estate or obtain the necessary right-of-way easement for all upgrades associated with this project. These associated upgrades are not included in the costs listed in this study.
- Project Developer will be responsible for remediation costs for locations found to have environmental contaminations and remediation. This may require contaminated soil disposal as well as lead paint removal for existing structure work.
- It is assumed that all necessary permits will be obtained in a timely manner to allow engineering and construction to proceed according to the Milestone Schedule.
- It is assumed that conveyance of property and rights will be obtained to support the PJM Transmission Outage Schedule.
- It is assumed that the required Environmental Study will yield no impediments to the development of the site.
- ComEd will complete geotechnical soil borings, resistivity study, and analysis for substation and transmission upgrades. Costs associated with this are at the expense of the Project Developer.

C. APPENDICES

Attachment #1: One-Line Diagram

Attachment 1: