Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AG2-524

“Lasalle Station - Mazon 138 kV”

Introduction

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

This Facility Study was performed to satisfy the Phase 2 Facility Study requirement of the PJM Tariff. The Facility Study is intended to provide scope, cost and schedule estimates for the project as currently defined and approved for Phase 2 study. In the event project changes are made during 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/storage Generating Facility located in Grundy County, Illinois with a designated PJM Project ID of AG2-524. The installed facilities will have a total Maximum Facility Output (MFO) of 110 MW with 110 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 newly constructed 138kV breaker and a half substation, TSS 906 Indian Trail Rd., tapping the STA. 1 Lasalle – TSS 77 Mazon 138kV line, L0108, approximately 9.7 miles from STA. 1 Lasalle and 19.9 miles from TSS 77 Mazon.

The construction of the new interconnection substation will result in the splitting of the existing STA. 1 Lasalle – TSS 77 Mazon 138kV line, L0108 into two lines on the transmission system. The new L90604 will connect TSS 906 Indian Trail Rd. to TSS 77 Mazon and L0108 will connect TSS 906 Indian Trail Rd. to STA 1 LaSalle.

The proposed generation interconnection is shown on the single line 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 TSS 906 Indian Trail Rd. 138kV interconnection 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:

- Circuit breakers and associated equipment are located between the high side of the MPT(s) and the Point of Change in Ownership.
    - Project Developer to send a Transfer Trip to TSS 906 Indian Trail Rd. for TR. 138kV CB Breaker Failure. Ability to isolate 87L and DTT functions is required. Example scheme/settings can be provided by ComEd.
    - New Gas Circuit breaker control for loss of SF6 gas condition should be as follows (see Engineering practice EP-5206-E):
        1. For an open circuit breaker, when SF6 gas drops to the critical level, the close circuit of breaker shall be opened and motor operated disconnects on both sides of CB shall be opened.
        2. For a closed SF6 gas circuit breaker, when SF6 gas drops to the critical level, the circuit breaker shall be opened and motor operated disconnects on both sides of CB shall be opened and the close of the circuit breaker shall be opened.
    - Support steel structures and foundations will be designed to support associated electrical equipment.
- Generator lead line from the Generating Facility to the Point of Change in Ownership (138kV L90601).
    - Project Developer to install standard ComEd 138kV GIC interface relaying for the remote end station consisting of a dual SEL-411L-1 current differential scheme. A setting template will be provided to the Project Developer for the scheme to work with the relay at TSS 906 Indian Trail Rd.
    - The GIC interface relaying will be the only point of interface with ComEd relaying. Current contributions from all Project Developer breakers to be combined and wired to 411L for 87L scheme.
    - Create CD-90601 to capture changes.

- Project Developer will design, build, own, operate and maintain two new fiber paths from AG2-524 Hog Run Solar to TSS 906 Indian Trail Rd.
    - System 1 Relays will use the "System 1" Fiber cable for a Current Differential Relay scheme, which will also provide Direct Transfer Trip (DTT). This fiber cable will be owned and maintained by the Project Developer and should have minimum of 48 Fibers. The demarcation for the Fibers in this cable will be in a Fiber Distribution Panel (FDP) inside of TSS 906 Indian Trail Road. ComEd will own and maintain the FDP.

- System 2 Relays will use the "System 2" Fiber cable for a Current Differential Relay Scheme, which will also provide Direct Transfer Trip (DTT). This fiber cable will be owned and maintained by the Project Developer and should have minimum of 48 Fibers. The demarcation for the Fibers in this cable will be in a Fiber Distribution Panel (FDP) inside of TSS 906 Indian Trail Road. ComEd will own and maintain the FDP.
- Project Developer will own and maintain both Fiber cables from ComEd's TSS 906 FDP all the way to their AG2-524.

138kV L90601	Function	TSS 906 Indian Trail Rd.	AG2-524 Hog Run Solar (IPP)
System 1: 411L - Direct Fiber	87L-1, LTT, BFTT	T R	T R
System 2: 411L - Direct Fiber	87L-2, LTT, BFTT	T R	T R

In general, GIC to follow section 6.1 (Design E for 138kV) of the latest version of ComEd Interconnection Guidelines for Generators at Transmission Level (Rev 2: Effective 12/16/2021).

1. New gas circuit breakers to auto trip and isolate for critical gas level.
2. New Tie Line terminal relay types to be the same as ComEd terminal relays. This includes relay firmware versions.
3. ComEd Protection and Control Engineering must review all Project Developer relay protection design drawings and relay settings.
4. Project Developer equipment impedance and/or test data must be provided to ComEd Protection and Control Engineering to model in a short circuit program. Examples include lines, transformers (include percent impedance and load loss), wind turbines, and inverters.
5. Project Developer to include over/under frequency and voltage protection at wind/solar farm collector bus. Suggested settings will be provided by ComEd. Under-frequency settings are to comply with MAIN Guide 1B.
6. Dual bus protection for secondary bus.
7. Dual TRFM protection and site protection must be compliant with NERC & PJM requirements.
8. Metering is required to be installed per ComEd & PJM standards.
9. SCADA interface to ComEd will be required.
10. Witness testing by ComEd or a DA will be required and must be pre-scheduled at least 90

days in advance.

For any new equipment connected to the BES (Bulk Electric System rated at 100kV or above) the associated primary/System 1 and secondary/System 2 protective schemes to have a minimum redundant:

1. Connected CTs (where available).
2. PT secondary (where available).
3. DC control circuits.
4. Auxiliary trip relays.
5. Circuit breaker trip coils (where available).
6. Communication circuitry.

All changes to topology, including generation, must be modeled during the Phase 1 study for PRC-027 compliance. A protection system coordination study is required for new BES buses or when there is a 15% (or greater) change in fault current for an existing BES bus. Setting changes may be required per the outcome of this coordination study. At the minimum, review and reset the existing relay terminal shown below (as needed).

- STA12 138KV L1205

B. Transmission Owner Facilities Study Results

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AG2-524 project to the ComEd 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:

- One (1) 138kV 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.
- One (1) 138kV line motor operated disconnect (MOD) having a minimum thermal capability of 3126/3366/4023/4806 A (747/805/962/1149 MVA) SN/SNLTE/SSTE/SLD.
- Three (3) 138kV station class surge arresters.
- Support steel structures and foundations will be designed to support line motor operated disconnect (MOD) and the 345kV station class surge arresters.

- AMI Metering and Revenue Metering.

2. STAND ALONE NETWORK UPGRADES

TSS 906 Indian Trail Rd. 138kV Interconnection Substation (AG2-524)

A new breaker and a half substation, TSS 906 Indian Trail Rd. 138kV, will be constructed along the L0108 138kV transmission line to interconnect the project with the ComEd transmission system. ComEd DSS G2 whitepaper to be followed for interconnection substation design.

- Two (2) 138kV dead-end structures and foundations within the fence of the Interconnection Substation, to terminate new 138kV L90604 and L0108.
- Six (6) 138kV station class surge arresters.
- Three (3) 138kV 2.0-cycle IPO SF6 circuit breakers with a minimum nameplate capacity of 3126/3366/4023/4806 A (747/805/962/1149 MVA) SN/SNLTE/SSTE/SLD continuous, and interrupting capability of 63kA at -40°F.
- Eight (8) 138kV line motor operated disconnects (MOD) having a minimum thermal capability of 3126/3366/4023/4806 A (747/805/962/1149 MVA) SN/SNLTE/SSTE/SLD.
    - One (1) on each side of the 138kV circuit breakers.
    - One (1) for each 138kV transmission line.
- Nine (9) 138kV CCVT's, 3000:1, used for System 1 and System 2 relay protection.
    - Three (3) CCVT's for each 138kV bus.
    - Two (2) CCVT's to include carrier accessories for the B-phase power line carrier taps for 138kV L90604 and L0108.
- Support steel structures and foundations will be designed to support all other associated electrical equipment.
- Two (2) appropriately sized wavetraps, line-tuners and other carrier equipment required on new connections for 138kV L90604 and L0108.
    - Suggest upgrading DCB and DTT transceiver equipment, at all terminals, to UPLC-III and 61850 model RFL GARD.
    - Confirm relay schemes and frequency coordination are compatible for Power Line Carrier Solution.
    - Create CD-90604 to capture changes.
    - Create CD-0108 to capture changes.

138kV L90604, B-phase	TSS 77 Mazon	TSS 906 Indian Trail Rd.

Dir. Comp.	T R	T R
LTT, BFTT	R	T

138kV L0108, B-phase	TSS 906 Indian Trail Rd.	STA. 1 Lasalle	STA. 1 Lasalle Pump Station
PLC, B-phase	T R	T R	
PLC, B-phase	R	T	R

- One (1) control building per ComEd specifications to accommodate System 1 and System 2 125VDC batteries, battery chargers, AC/DC panels, protective relaying, communication, SCADA, metering equipment, etc.
- Install normal and emergency sources to provide three-phase 208/120VAC auxiliary power through local service request process. The normal and emergency sources shall be supplied from diverse 12kV or 34kV sources and approved by local utilities planning group.
- One (1) SCADA Cabinet:
    - One (1) SEL-2731 SCADA WAN Switch (2731#KR58)
    - One (1) SEL-3355 RTU RTAC (3555#QP5W)
        - Install one pair of serial fiber connections for each Project Developer RTU data exchange to be coordinated with ComEd SCADA Engineering:
            - Breaker statuses
            - MW, MVAR, MWh and voltage values
- One (1) SEL-3355 ENG RTAC (3555#QP5W)
    - with mouse, keyboard, and monitor on the engineering desk
- One (1) SEL-3355 PDC RTAC (3555#QP5W)
- Two (2) SEL-3355 HMI RTAC (3555#QP5W)
    - with mouse, keyboard, and monitor on the operator desk
- One (1) Omicron Station Scout RBX1
- One (1) Local/Remote Switch, wired to I/O DPAC 1 IN101

- One (1) SEL-3350 Blueframe with DMA
- Connect ComEd-owned revenue meter to IP switch architecture.

- Two (2) Station Bus Cabinets, each with:
    - One (1) SEL-2488 GPS Clock
    - One (1) SEL-3350 Blueframe with Flow Controller
    - SEL-2741 Station Bus Switches
        - Relay Engineering to determine the topology and number of switches
- One (1) SEL-2440 I/O DPAC, 48 Digital Inputs
- One (1) RSG-910C Access Switch

- One (1) Desk Hoffman Box with:
    - DC to AC Inverter
    - One (1) 2x2 Ethernet RJ45 Patch Box with connections to:
        - Station Bus A via RSG-910C
        - Station Bus B via RSG-910C
        - SCADA WAN via SEL-2731
        - Cooperate Access via UCOMM patch panel

- One (1) Operator Desk with:
    - Two (2) 27” Monitors (HMI 1 and HMI 2 RTACs)
    - Two (2) Keyboard and Mouse
    - One (1) Ergotron LX Dual Mount Stacking Arm

- One (1) Engineer Desk with:
    - Two (2) 27” Monitors (ENG RTAC and Spare)
    - Two (2) Keyboard and Mouse
    - One (1) Ergotron LX Dual Mount Stacking Arm

- One (1) UCOMM Rack (if designated Low Impact by Transmission Planning)
    - One (1) Nokia 7705 SAR-H MPLS Router
    - One (2) Check Point 1570R Firewall
    - One (1) SEL-2730U Corporate Access Switch
- Substation Engineer of Choice (EOC) to perform the battery calculations and auxiliary power design.

3. NETWORK UPGRADES

The 138kV L0108 line from STA 1 LaSalle will be cut and looped into the new TSS 906 Indian Trail Rd. 138kV interconnection substation – also creating new 138kV L90604 from TSS 77 Mazon.

- ComEd will be performing the design, procurement, and construction of the new structures required to reroute L0108.
- The new conductor type will be T-2 Parakeet 2@556.5 kcmil (24/7) ACSR. The new shield wire will be 7#6 Alumoweld.

- Approximately 0.3 new circuit miles of conductor and shield wire will be installed assuming the new TSS 906 Indian Trail Rd takeoff structures are set back no more than 500 feet from L0108. Conductor lengths and structure quantities are subject to change based on final substation location.
- The following structure replacements and installations are required for the 138kV L0108 cutover work.

Structure #	**Existing Structure Type**	**Comments**
223	LS1725	Replace structure with double circuit, vertical configuration, 100' tall, 15-degree dead end steel pole.
NEW 222	N/A	Install new single-circuit, vertical configuration 80' tall, 90-degree dead end steel pole.
NEW 221	N/A	Install new single-circuit, vertical configuration 80' tall, 15-degree dead end steel pole.
222	LS1725	Replace structure with double circuit, vertical configuration, 100' tall, 90-degree dead end steel pole.
NEW 90604 223	N/A	Install new single-circuit, vertical configuration 80' tall, 15-degree dead end steel pole.

TSS 77 Mazon:

- For 138kV L90604 (Old L0108): Modify existing SEL-421, SEL-311C DCB/DTT scheme for using comm equipment compatible with the remote end at TSS 906 Indian Trail Rd.
- Ensure appropriately sized wavetraps, line-tuners and other carrier equipment required on new connections for 138kV L90604.

STA. 1 Lasalle/Lasalle Pump Station:

- For 138kV L0108: Modify existing SEL-421, SEL-311C DCB/DTT scheme for using comm equipment compatible with the remote end at TSS 906 Indian Trail Rd.
- Ensure appropriately sized wavetraps, line-tuners and other carrier equipment required on new connections for 138kV L0108.

4. OTHER SCOPE OF WORK

N/A.

5. MILESTONE SCHEDULE FOR COMPLETION OF COMED WORK

Facilities outlined in this report are estimated to take 48 months to be constructed, 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	22
Procurement + Permitting	16	36
Construction	36	48

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

- This study is based on the PJM AG2-524 Phase I Study Report.
- 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.
- This cost estimates assume that work will be performed during normal weekdays and with no overtime.
- Costs are based on 2026 rates and do not reflect a potential increase in Labor or Material costs after 2026.
- All upgrades to facilities included in this document will be required to meet latest ComEd standards.
- 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 PD. Pre-design survey must be completed prior to detailed engineering.
- 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 PD.

- Upgrades are subject to change based on detailed design development.
- It is assumed that ComEd facilities included in this document will not require a sound study or flood mitigation.
- The Project Developer has agreed to pay for the work necessary in preparing a cost estimate, impact study review, and review of relay requirements.
- This 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 Facility Study.
- ComEd cost estimate is valid for six (6) months after the Facilities Study release by PJM.
- Transmission line outages for construction have not been identified but generally are available from September to May. These outages are controlled by PJM.
- It is assumed that all associated network upgrades, as listed in the Phase 1 study, are complete prior to this New Service Request Project being placed in service.
- Foundation design assumes typical soil conditions at locations and will be subject to change after soil boring tests.

7. REVENUE METERING REQUIREMENTS

All revenue metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AG2-524 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 and AMI metering will be installed on the ComEd side of the Point of Change in Ownership and will be installed, owned and maintained by ComEd.

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'.

BATTERY CHARGE METER FOR COMED

- FERC Order 841 designates inflow to charge battery storage facility as wholesale power. To separately measure the power inflow to charge the battery and bill it at wholesale rate, the Project Developer needs to install the following equipment.
  - Battery Charge Meter including Current Transformer/Potential Transformer (CT/PT) at the output terminal of the battery storage facility to measure power inflow from transmission system to charge the battery storage facility.
  - Fiber cable to provide communication link to transmit Battery Charge Meter data to the ComEd SCADA system.

8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

Land requirements for the Interconnection Substation needed for this interconnection project must meet the requirements in the 'ComEd Interconnection Guidelines' and 'Guidelines on Land Requirements for Interconnection Substation' posted on PJM website.

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.

Pursuant to PJM's site control requirements, the Project Developer is responsible for the acquisition of any land rights required for construction of a new substation. As such, the estimated total cost and schedule contemplated by this Facilities Study Report does not include the estimated cost and time necessary for the acquisition of any such land rights.

9. APPLICABLE TECHNICAL REQUIREMENTS AND STANDARDS

- ComEd Interconnection Guidelines (For Generators at Transmission Level), Rev. 2, Dated 12/16/2021
- ComEd Guidelines on Land Requirements for Interconnection Substations, Rev. 2, Dated January 2026

10. ENVIRONMENTAL AND PERMITING

- Project Developer will be responsible for all environmental approvals and permitting required. This includes any endangered species studies and monitoring, as required. Costs associated with this permitting are at the expense of the Project Developer.
- 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 contamination 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: Single line Diagram for the Physical Interconnection

Attachment #1:

High Level Planning Diagram Depicting Interconnection Facilities and Points of Ownership/Demarcation

