Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AH1-338

McGirr Rd – Ritchie Road 138kV

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 Generating Facility located in, Lee County, IL with a designated PJM Project ID of AH1-338. The installed facilities will have a total Maximum Facility Output (MFO) of 180 MW with 23.4 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 substation, TSS 962 Elva Rd, cutting the TSS 169 McGirr Road – ESSH447 Ritchie Road 138kV line, L.16914, approximately 2.54 miles from TSS 169 McGirr Road and 2.72 miles from ESSH447 Ritchie Road.

The construction of the new interconnection substation will result in the splitting of the existing TSS 169 McGirr Road – ESSH447 Ritchie Road 138kV line, L.16914 into two lines on the transmission system. The new L.96202 will connect TSS 962 Elva Road to ESSH447 Ritchie Road and L.16914 will connect TSS 962 Elva Road to TSS 169 McGirr Road.

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 962 Elva Road 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:

4.1. The PD is responsible for construction of the additional 180MW Solar generation. The PD is also responsible for one (1) 138kV circuit breakers, and a 138kV generation lead line with associated structures terminating at TSS 962 Elva Road.

4.2. At AH1-338, in general, IPP relaying, etc. to follow section 6.2 (Design E) of latest version of EED interconnection guidelines (for Generator at Transmission Level) Rev. 2 Effective 12/16/2021, with the following project specific notes (where applicable):

- New gas circuit breakers to auto trip and isolate for critical gas level
- New Tie Line terminal relay types to be the same as ComEd terminal relays. This includes relay firmware versions
- ComEd Protection and Control Engineering must review all Project Developer relay protection design drawings and relay settings.
- Project Developer equipment impedance and/or test data must be provided to ComEd Protection and Control Engineering to model in a short circuit program.
- Project Developer to include over/under frequency and voltage protection at solar farm collector bus. Under-frequency settings are to comply with MAIN Guide 1B.
- Dual bus protection for secondary buses.
- Dual TRFM protection and site protection must be compliant with NERC & PJM requirements.
- Metering is required to be installed per ComEd & PJM standards.
- SCADA interface to ComEd will be required.
- Witness testing by ComEd or a DA will be required and must be pre-scheduled at least 90 days in advance.

4.3. IPP Project Developer to provide transformer test reports for 138kV - 34.5kV step up transformers, for ComEd short circuit modeling. Test reports must include %Z impedance and load loss.

4.4. 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 at a minimum redundant:

- Connected CTs (where available)
- PT secondary (where available)
- DC control circuits
- Auxiliary trip relays
- Circuit breaker trip coils (where available)
- Communication circuitry

Foundations and structures to support all/new equipment

4.5 The PD will be responsible to purchase real estate or obtain the necessary right-of-way

easement to install the 138kV transmission line to TSS 962 Elva Road substation.

a. New Gas Circuit breaker control for loss of SF6 gas condition should be as follows (see Engineering practice EP-5206E and relay specifications):
    i. For a normally-open bus-tie SF6 gas bus-tie 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.
    ii. For a normally-closed bus-tie 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 circuit of the circuit breaker shall be opened.
    iii. For a transformer circuit breaker, when SF6 gas drops to the critical level, the circuit breaker shall be opened, the close circuit of the breaker shall be opened, and motor operator disconnects on the bus side of CB shall be opened.

b. 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 the fault current for an existing BES bus. Settings changes may be required per the outcome of this coordination study.

c. The PD is to provide two, physically diverse, Single Mode Fiber paths between TSS 962 Elva Road Substation Control Building and AH1-338 Collector Substation that are physically diverse from each other. One path will be for Primary Relays, and the other path will be for Secondary Relays, and there should be a minimum of 48 fibers in each cable. IPP fiber demarcation will be FDP within the Substation control building.

d. For 138kV L96201 (GIC LINE): GIC Project Developer to install and own standard ComEd 138kV GIC interface relaying for the remote end station consisting of a dual SEL-411L-1 current differential scheme. A ComEd settings template will be provided to the Project Developer for the scheme to work with the relays at TSS962:
    i. GIC Project Developer to send a Transfer Trip to TSS962 for TR1 138kV CB Breaker Failure and line faults. The ability to isolate 87L and DTT functions is required. Example scheme/settings can be provided by ComEd.
    ii. 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 the SEL-411L relays for 87L scheme.

e. PD will be responsible for Line L.96201 Single Mode Fiber from IPP's Substation to ComEd's Substation TSS 962 Elva Road. This will be used for Primary Relay scheme using Direct-on-Fiber connections per the Relay Notes. The minimum Fiber count is 48 Fibers and construction will be in adherence with ComEd Transmission Line standards. The PD will own and maintain this Fiber cable up to the fiber distribution panel in TSS 962 Elva Road.

138kV L96201 System	**Function**	**TSS962 Elva Rd**	**AH1-338 Prairie Brome Solar**
1 – Direct Fiber	SEL 411L (87L-1, LTT, BFTT)	T R	T R

2 – Direct Fiber	SEL 411L (87L-2, LTT, BFTT)	T R	T R

** Transmission Planning guidance and confirmation is required for anti-islanding transfer trip if at TSS962, any of the below conditions occur (logic via 52b breaker aux contacts): Both 138kV BT1-2 and BT1-3 breakers are open

f. PD will be responsible for Line L.96201 Single Mode Fiber from IPP's Substation ComEd's Substation TSS 962 Elva Road. This will be used for Secondary Relay scheme using Direct-on-Fiber connections per the Relay Notes. This Fiber must be built in a physically diverse path from the Fiber path used for the Primary Relay scheme. The minimum Fiber count is 48 Fibers. The PD will own and maintain this Fiber cable up to the fiber distribution panel in TSS 962 Elva Road.

g. The demarcation of ownership for these Fiber cables will be in the Fiber Distribution Panel (FDP) in the ComEd Substation TSS 962 Elva Road. The Project Developer will own and maintain both Fiber cables from ComEd's TSS 962 Elva Road FDP all the way to their generator substation.

h. The PD will be responsible to request and bear the cost of any outages required on existing transmission or distribution lines that may be required for the transport of any large equipment, i.e. turbines, rotors, turbine structures, etc.

i. Option to Build

- If the PD selects the Option to Build, the PD shall construct TSS 962 Elva Road.
- The PD shall construct TSS 962 Elva Road and transfer ownership to ComEd prior to commercial operation of AH1-338. The PD shall transfer ownership of the real estate in fee to ComEd.
- Substation requirements are described below in section B.
- Substation battery calculations are required for TSS 962 Elva Road.

B. Transmission Owner Facilities Study Results

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AH1-338 project to Commonwealth Edison transmission system. These facilities shall be designed according to Commonwealth Edison Applicable Technical Requirements and Standards. Once built, Commonwealth Edison will own, operate, and maintain these Facilities.

1. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

The TO Interconnection Facilities will include, but not be limited to, the following.

- A 138kV dead-end structure and foundation within the fence of the Interconnection subsrtation, to terminate the project developers generator lead line.
- Line conductor from the dead-end structure to the bus position in the switchyard of the interconnection substation

2. STAND ALONE NETWORK UPGRADES

INTERCONNECT SUBSTATION (NEW) (DIRECT CONNECTION)

TSS 962 Elva Road Interconnection Substation

A new breaker and a half substation, TSS 962 Elva Road 138kV, will be constructed along the L.16914 138kV transmission line to interconnect the project AH1-338 with the Commonwealth Edison transmission system.

The greenfield new substation will include

- Three (3) new gas SF6 138kV circuit breakers BT 1-2, BT 2-3, and BT 1-3, with accommodation for future breakers BT 4-5, BT 5-6, and BT 1-6 rated for 3000A
- Two (2) new 138kV motor-operated disconnect switches, rated for 3000A, to be installed at each new breaker
- Two (2) line disconnect switches, rated for 3000A, to be installed at PD line
- Nine (9) new 138kV 1200:1 CCVTs to be installed at Busses 1, 2, and 3
- One (1) new 138kV 1200:1 CCVT with carrier accessories to be installed on L.16914
- One (1) new 138kV Line trap to be installed on L.16914
- Six (6) Surge Arrestors
- Foundations and structures to support all/new equipment

Two (2) new 12kV-208/120V AC auxiliary transformer to be installed. This will be fed via a nearby 12kV distribution lines to be determined during detailed design; new 12kV UG cable will be run to allow access to TSS 962 Elva Road. The distribution line connection will require construction of new 12kV overhead lines and poles from an existing distribution line to TSS 962 Elva Road. Connection

details and length will be determined during detailed engineering and may exceed the assumptions in this study. If a lower cost option is found during engineering, the cost estimate would be reduced. It is assumed that no new ROW for the new distribution line will be required, but this will be determined during detailed engineering. If a second distribution source is not available, one (1) propane 120/208V back-up generator to be installed as the emergency station service AC source.

New masonry control building to be installed to accommodate new relaying and relaying for future breaker-and-a-half bus expansion. Control enclosure shall meet latest ComEd standards. If NERC Low Impact, install BSC/IT UCOMM router and firewall. If Medium Impact, use serial communication. The new control building will contain:

- One (1) 125VDC battery system
- DC distribution panels
- Relay panels
- Auxiliary AC power panels
- Building HVAC system
- Fire/security system
- SCADA
- Metering equipment.

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
        - Line analog 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
- If a new ComEd-owned revenue meter is required by Metering Group, connect 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 station is 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
- Connect metering group-provided revenue meter to station IP architecture.
- Confirm latest device model numbers and GDD with the assigned SCADA engineer.

<u>Relay Installs at TSS 962 Elva Road</u>

The station will employ a 61850 "Generation 2" design using GOOSE tripping (all ComEd schemes) and Sampled Values (System 2/secondary 138kV bus and line relays only). During detailed engineering, consult Relay Engineer for the latest standards.

1. For all new outdoor 138kV GCBs (3 total):
    i. Install a breaker control cabinet located adjacent to the breaker. Cabinet to contain SEL- 451-5 relay for 50BF/79/25 and SEL-451-6 for 50BF/SV with MB connection between relays. Use 3,000:5 CT ratio C800 class CTs, 1.5 minimum Thermal Rating factor.
    ii. SEL-451-5 to be connected to the CTs/PTs on both sides of the breaker. SEL-451-6 will serve as merging unit and will publish Sample Values current/voltages onto the process bus network for the S2 138kV bus & line relays to utilize.
    iii. Hardwire critical gas trips to breaker MODs.
    iv. Hardwire Bus Pots to SEL-451 for synch closing.
    v. Auto-reclosing will be enabled on all Overhead lines.
    vi. CB Will have pre-installed SEL-2411 relay for CB Monitoring.

2. For the new 138kV L96201 being installed to feed the Prairie Brome Solar Project Developer,
    a. Install dual SEL-411L current differential relays per GDD8040.

b. the transmission line and communication fiber will be installed and owned by the Project Developer.

3. For 138kV L16914 (to TSS169),
   a. Install dual SEL-411L DCB scheme per GDD8040
   b. Install dual 61850-capable UPLC for DCB & DTT
   c. Enable PMU function in relay

4. For 138kV L96202 (old L16914, to ESS H447 Ritchie Road),
   a. Install dual SEL-411L current differential scheme per GDD8040
   b. Install dual 61850-capable UPLC for DCUB & DTT
   c. Enable PMU function in relay

5. Comm Engineering to use 61850 supported solutions for Power Line Carrier communication equipment for DCB schemes between the SEL-411L relays and both the UPLC-II (for Directional Comparison Unblocking schemes) and GARDPRO (for Direct Transfer Trip schemes)
   a. All relays will be connected to dual SDN switches utilizing a PRP network for the Station Bus Fiber.
   b. All internal fiber panels will utilize the Elk Grove Village Panduit design.
   c. Incoming Outdoor fibers will go to an OCEF or main station FDP.
   d. Any outdoor fiber carrying protective trips will use armored fiber and take diverse paths to the CB and diverse Local FDPs.
   e. Trips going to the OCEF require multiple cables from the OCEF to the switch.

Yard cable trench to be installed from control building to breakers and line terminal structures. Cable Trough to have a drainage system, be road rated, and installed below the trough per ComEd standards. A lift station may be needed.

New substation to require installation of new fence and (2) sliding vehicular gates that are positioned no less than one half of the yard diagonal apart, as well as site development and grading. Preliminary security classification for the proposed substation indicates that fencing will be 7’ with 1’ barbed wire; fencing must adhere to all ComEd specifications and requirements. Security requirements including fencing may change. New station grounding, lightning protection, and lighting to be evaluated by studies, designed, and installed.

The developer ground grid shall not be tied to the TSS 962 Elva Road ground grid. New property will need to be purchased.

The access road to the main public road should be a minimum of 28 feet and have an asphalt or concrete approach. The radius transition to the main road to be in accordance with the requirements of the government having jurisdiction of the public road.

- Minimum width of road is 20’-0”
- Minimum turning radius (horizontal curve) of road to be 40’-0” to the center of the road.
- Maximum slope of road is to be 4.5%

Stormwater detention and any other required stormwater management features to be constructed outside of the substation fence. These must satisfy all local, county, state, and federal requirements for stormwater management.

Security system will need to be installed to meet ComEd standards.

If any utilities are routed under the substation these will need to be re-routed outside of the substation.

- **138 kV L96202**
  - Build a two new fiber paths (distance unknown) from ESS H447 Ritchie to TSS 962 Elva Road.
    - Each fiber should be single mode, with a minimum count of 48, which will be owned and maintained by the ComED.
    - Utilize this fiber path for both System 1 and 2 relaying.
  - Create CD-96202 to capture changes.

	Function	**TSS 962 Elva**	**ESS H447 Ritchie**
System 1 Direct Fiber	Current Diff/DTT	T R	T R
System 2 Direct Fiber	Current Diff/DTT	T R	T R

- **138 kV L16914**
  - Install carrier equipment and appropriately sized wave trap at TSS 962 Elva Road on new connections for 138 kV L16914.
    - Upgrade DCB and DTT transceiver equipment at all terminals, to UPLC-III and 61850 model RFL GARD.
  - Confirm relay schemes and frequency coordination are compatible with Power Line Carrier Solution at TSS 169 McGirr Rd and TSS 186 Steward.
  - Create CD-16914 to reflect changes.

138 kV L16914, C-phase

System	Funct	Freq	TSS 186 Steward	TSS 962 Elva Rd	TSS 169 McGirr
PLC, C-phase	DCR	120.0 kHz	T R	T R	T R
PLC, C-phase	DCR	165 kHz	T R	T R	T R
PLC, C-phase	DTT	160 kHz	T(echo)	R	R
PLC, C-phase	DTT	158 kHz	R	T	

- **138 kV L96201**
    - Build 2 new fiber paths (distance unknown) from AH1-338 Prairie Brome Solar Farm to TSS 962 Elva Road.
        - Each fiber should be single mode, with a minimum count of 48, which will be owned and maintained by the Project Developer. Both cables should be physically diverse from the other.
        - Utilize these 2 fiber paths for both System 1 and System 2 relaying.
    - Create CD-96201 to capture changes.

	Function	**AH1-338 Prairie Brome Solar Farm**	**TSS 962 Elva Road**
System 1 Direct Fiber	Current Diff/DTT	T R	T R
System 2 Direct Fiber	Current Diff/DTT	T R	T R

3. NETWORK UPGRADES

The Network Upgrades will include, but not be limited to, the following.

Transmission Line Tie-in for new interconnection substation:

Cut existing L.16914 138kV transmission line between existing structures 3709 and 3710 to loop into the new TSS 962 Elva Rd Substation. L.16914 will be cut into two new lines, L.16914 and L.96202

a. ComEd will be performing the design, procurement, and construction of the new structures required to cut over to the new TSS 962 Elva Rd Substation.
b. Install two (2) new vertical single circuit 138kV deadend structures 3709D and 3709E on drilled shaft foundations.
    i. Both structures will be approximately 75ft in height. They will be similar to LS1803 but with 12ft phase spacing.
c. Approximately 0.1 new circuit miles of conductor and shield wire will be installed.
    i. New conductor and shield wire for the 138kV lines for TSS 962 will be 1113 kcmil (45/7) Bluejay ACSR and 7#6 Alumoweld, respectively.
    ii. Existing conductor and shield wire on 138kV L.16914 is 1113 kcmil (45/7) Bluejay ACSR and 3#6 Alumoweld, respectively, and will be transferred to new cut-in structures 3709D and 3709E.
d. Existing structures 3709 and 3710 will remain. The existing conductor line posts on existing structures 3709 and 3710 will be replaced with new conductor line posts.

Structure Number	Existing Structure Type	Proposed Modifications
3709	TP-138	Replace Conductor Line Posts
3709D	N/A	Install new structure similar to LS1803 with 12ft Phase spacing
3709E	N/A	Install new structure similar to LS1803 with 12ft Phase spacing
3710	TP-138	Replace Conductor Line Posts

Upgrades to neighboring facilities:

1. Per Transmission Planning, an anti-islanding (load rejection) scheme is required. Transmission Planning to provide guidelines in advance of Engineering Design phase.

TSS169 McGirr Road

1. For 138kV L16914,
    i. Replace existing dual SEL-421 relays with dual non-SBM SEL-411L relays, per GDD1940, using existing DCB scheme.
    ii. Replace existing SEL-251C and SEL-279 relays with a single 50BF/79/25 SEL-451.
2. At TSS169 McGirr Road, for 138kV L10714 and L16901:
    i. Review and reset relay settings.
    ii. Retain existing relays.
3. Update Fault data in CAPE and check for PRC-027 requirements compliance.
4. Review and reset relay settings at remote terminals:
    i. 138kV L16914 – TSS186 Steward
    ii. 138kV L16901 – TSS100 Shady Oaks
    iii. 138kV L10714 – TSS107 Dixon
5. 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.
6. The Communication equipment must be compatible with the 61850-capable Communication equipment at the new TSS962 Elva Rd.
7. Modify mimic boards as required, install new panel if needed.
8. Upgrade existing SEL-3530 RTAC to SEL-3350.
9. Upgrade existing SEL-2407 GPS Clock to SEL-2488.
10. Connect new relays to existing dual IP switch architecture.
11. Substation battery calculations are required.

ESS H447 Ritchie Rd

1. Update station prints with the new line number, L16914.

2. For 138kV L92101 (old L16914), replace existing dual SEL-421 relays with dual non-SBM 87L/SEL-411L relays per GDD1940, using dual diverse fibers. Connect new relays to existing SCADA system utilizing ports from replaced relays.
3. For adjacent Line 1 (at ESS H447 and at remote terminal ESS H440 Rochelle-Caron Rd),
    i. Review and reset relay settings
    ii. Retain existing relays
4. Update Fault data in CAPE and check for PRC-027 requirements compliance.

TSS186 Steward

6. For 138kV L16914, replace existing dual SEL-421 relays with dual non-SBM SEL-411L relays, per GDD1940, using existing DCB scheme. Note: The Communication equipment must be compatible with the 61850-capable Communication equipment at the new TSS962 Elva Rd.
7. Review and reset relay settings for the adjacent lines (at TSS186 and the remote terminal):
    i. 138kV L18618 – TSS186 & ESS H445
    ii. 138kV 18623 – TSS186 & TSS94
8. Update Fault data in CAPE and check for PRC-027 requirements compliance.
9. Connect new relays to existing dual IP switch architecture.

Fiber cable circuits

Project Developer to provide two, physically diverse, Single Mode Fiber paths between TSS 962 Elva Interconnection Substation and AH1-338.

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 the TSS 962 Substation. 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 a minimum of 48 Fibers. The demarcation for the Fibers in this cable will be in a Fiber Distribution Panel (FDP) inside of the TSS 962 Substation. ComEd will own and maintain the FDP.

The Project Developer will own and maintain both Fiber cables from ComEd’s TSS 962 FDP all of the way to their AH1-338.

Spare Fibers may be used for telephony, SCADA, Metering, Fire Protection, or other data purposes.

PM to engage UCOMM Fiber Engineering early in the process.

4. OTHER SCOPE OF WORK

ComEd to provide oversight to the Project Developer at the Project Developer’s cost or the engineering and construction of the interconnect substation.

Metering will be required to be installed at the interconnection substation. Metering to be provided for revenue and AMI purposes.

5. MILESTONE SCHEDULE FOR COMPLETION OF COMED WORK

Facilities outlined in this report are estimated to take 50 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule is 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	16
Permitting	16	36
Construction	36	50

6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

- This study is based on the Phase 2 System Impact Report for PJM Generation Interconnection New Service Request Project AH1-338. The steady-state voltage study for stability analysis will be performed by PJM during the Facility Phase. The PJM study could identify upgrades to the ComEd system that would become part of this project's scope of work. It is assumed that all associated network upgrades, as listed in the above Phase 2 System Impact, are complete prior to this Queue Position being placed in service.
- 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 **2026** rates and do not reflect a potential increase in Labor or Material costs after **2026**.
- 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 New Service Request Project being placed in service.
- Both (1) all real property conveyed in fee to ComEd must be remediated to and (2) 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.
- This study assumes that 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.
- This Phase 3 System Impact report (FSR) assumes that generator output and plant auxiliary power consumption can both be metered with revenue accuracy as described. The final revenue metering configuration and equipment will be confirmed, and may be revised, during detailed engineering following execution of the Interconnection Construction Services Agreement (ICSA).
- PD owned line L.96201 is assumed to be exiting the station to the North. Final determination of line exit will be determine during detailed design.
- Final station location and transmission plan and profiles will be determined during detailed design due to any changes in final site location.
- NERC / CIP Security measures to be reviewed with NERC CIP team to ensure compliance. Areas of concern include:
    - CB & SW connections in the yard. Lock box access
    - ERC in station control building
    - Connection to the BPO SCADA Network. Determine if this connection will be IP or serial
    - Transmission scope assumes the substation is outside of the existing transmission line right-of-way.

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 AH1-338 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.

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'.

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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 'ComEd Guidelines on Land Requirements for Interconnection Substations' 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.

The total assumed fiber route is approximately 6 miles and traverses approximately 21 land parcels. The estimated total cost for acquiring required easements is 32,314.01 dollars. The fiber route identified in this study is preliminary and may change. The acquisition of easements necessary for the assumed fiber route is contingent upon landowner consent, and easement rights for fiber installation cannot be assured. Easement acquisition costs may vary by landowner.

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.

The PD 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.

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

- ComEd will be responsible to obtain 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.
- 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.
- The 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.

Both (1) all real property conveyed in fee to ComEd must be remediated to and (2) 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

C. APPENDICES

High Level Project Diagram Depicting Interconnection Facilities for Physical Interconnection and Points of Ownership/Demarcation

Attachment #1:

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

