Transmission Interconnection Facilities Study Report

For

PJM Transmission Interconnection Request Queue Position AD1-061

"McConnellsburg-Mercersburg 34.5 kV"

May 2021

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Preface

The intent of the Facility Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances, an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement.

The Facility Study estimates attempt to identify the estimated time required to obtain property rights and permits for construction of the required facilities. The project IC is responsible for the right-of-way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

A. Transmission Owner Facilities Study Summary

1. Description of Project

Elk Hill Solar 1, LLC, (hereinafter referred to as "IC") has proposed a solar generating facility located in Franklin County, Pennsylvania. The installed facilities for AD1-061 and AF2-184 will have a total capability of 20 MW with 13.4 MW of this output being recognized by PJM as capacity. AF2-184 is a capacity only uprate and did not require a separate facilities study. The generation facility will interconnect with West Penn Power (WPP) a First Energy Company (FE), hereinafter referred to as "Transmission Owner" (TO), by tapping the McConnellsburg – Mercersburg 34.5 kV line at a point located approximately 8.7 miles from McConnellsburg substation and 2.1 miles from Mercersburg substation.

2. Amendments to the System Impact Study or System Impact Study Results

The scope of work to replace the relays at Mercersburg has been removed as these relays are scheduled to be replaced as part of the AB1-127/AB1-128 interconnection.

3. Interconnection Customer's Milestone Schedule

IC's requested Commercial Operation Date (COD) for the generation facility is **October 1, 2021**. Transmission Owner's proposed schedule does not match the Developer's requested Milestone Schedule. A Project Kickoff meeting must occur by **January 4, 2021** to meet Transmission Owner's Assumed Milestone Schedule listed below.

IC's Requested Milestone Schedule:

11/01/2021	Initial Back-feed Date
11/15/2021	Project Commercial Operation Date

Transmission Owner's Assumed Milestone Schedule:

03/04/2022	Initial Back-feed Date
04/04/2022	Project Commercial Operation Date

4. Customer's Scope of Work

IC is responsible for all design and construction related to activities on their side of the Point of Interconnection (POI).

Point of Interconnection (POI): the point where IC's 34.5 kV generator Lead Line terminates on the 34.5 kV structure (pole) at the Transmission Owner' newly created 34.5 kV tap point (Ref: Attachement #3).

The 34.5 kV interconnection tap is proposed to be located at the following GPS coordinates:

39.848539, -77.920723

IC is required to own, install, and maintain a fully-rated, fault-interrupting circuit breaker on the 34.5 kV generator lead line that connects to the POI as well as the necessary revenue metering equipment. The revenue metering current and voltage transformers shall be installed on the generation side of the fault-interrupting device, and within the local zone of fault protection for the facility. The protective relaying and metering design must comply with First Energy's applicable standards as well as with PJM requirements.

Developer will also purchase and install the minimum required FirstEnergy generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays. Note that the single line diagram shown in Attachment #2 does not meet the First Energy protection requirements. There should be two independent protection schemes on separate current transformers. At least one set of current transformers should be on the Utility side of the circuit breaker. The Developer will also purchase and install supervisory control and data acquisition (SCADA) equipment to provide information in a compatible format to the FirstEnergy Transmission System Control Center. Developer will provide for establishment of dedicated communication circuits for SCADA report to the FirstEnergy Transmission System Control Center.

The easements and associated rights of way for the 34.5 kV line tap will be acquired by the IC and transferred to the TO at no cost. Site preparation for the line tap including clearing, grading and an access road, as necessary, is assumed to be by the IC. Route selection, line design, and right-of-way acquisition for the IC's facilities are not included in this report and are the responsibility of the IC.

Assumptions / Notes:

- IC will coordinate design and alignment of proposed 34.5 kV generator lead line with the Transmission Owner for review of any clearance, right-of-way or right-of-way encroachment issues with TO owned facilities.
- IC will coordinate design and construction of proposed 34.5 kV lead line. For these areas, the IC shall provide TO with proposed drawings prior to construction and as-built drawings, confirmed by as-built survey data post-construction.
- Additional costs will be incurred by the IC if final alignment of the 34.5 kV generator lead line causes encroachments, changes, or modifications to any existing or relocated TO facilities.
- IC is responsible to make all arrangements for electric distribution service (if required) for its generation station. No costs or schedule included herein.
- The photovoltaic facilities will be constructed on parcels of land separated by Buchanan Trail Road. The Developer will construct a new section of 34.5kV line to make the connection between the facilities. This line will cross easements for West Penn Power distribution circuits, which will require review and approval by West Penn Power.
- The inverters will be UL1741 certified and provide anti-islanding protection. Additional costs will be incurred if the TO is responsible for providing this protection.

5. Description of Facilities Included in the Facilities Study

Attachment Facilities

Transmission Owner will tap the McConnellsburg – Mercersburg 34.5 kV Line and install a single span of 34.5 kV line (approximately 260 feet) along with a manually operated tap switch for the Elk Hill Solar 1, LLC solar facility (AD1-061).

Direct Connection

None

Non-Direct Connection

McConnellsburg to Mercersburg 34.5 kV line

The McConnellsburg to Mercersburg 34.5 kV line will be tapped to accommodate the AD1-061 interconnect project. This tap will take place at a location that is approximately 8.7 miles from the McConnellsburg substation and 2.1 miles from the Mercersburg Substation.

McConnellsburg Substation

Existing line relays will be replaced with dual SEL421s and a multi-meter will be added.

Mercersburg Substation

Review relay settings and revise if necessary. The line relays at Mercersburg are scheduled to be replaced as part of the AB1-127/AB1-128 interconnection project. If the relays are not replaced as part of a previous interconnection, then this scope of work and associated costs will be added.

6. Total Cost of Transmission Owner Facilities Included in the Facilities Study

Description	Total Cost (without Tax)
Attachment Facilities (AF) Costs:	**$ 38,000**
Total Direct Connection (DC) Costs:	**$ 0**
Total Non-Direct Connection (NDC) Upgrade Costs:	**$ 476,700**
New System Upgrades	**$ 0**
TOTAL Costs (ALL Categories)	**$ 514,700**

7. Summary of the Schedule for Completion of Work for the Facilities Study

Attachment Facility	*Duration*
Engineering, Procurement, and Construction	14 months

B. Transmission Owner Facilities Study Results

This section describes facilities identified to be installed (attachment facilities), replaced, and/or upgraded (upgrade facilities) by First Energy to accommodate the project. During detailed design and analysis other components may be identified for installation or replacement due to this interconnection.

1. Transmission Lines –New

None

2. Transmission Lines – Upgrade

McConnellsburg-Mercersburg 34.5kV line

- The existing line is constructed on single circuit wood monopoles with 3-phase distribution underbuild and communications wire.
- The existing conductor on the line is 556.5 kcmil AAC with 4/0 AWG AAAC underbuild.
    - The existing shieldwire is unknown. It is assumed the shieldwire is 7#8 Alumoweld wire and will be confirmed in detailed design.

- Install single circuit wood monopoles per FirstEnergy's Subtransmission 36kV standards and operate at 34.5kV:
    - Assume structure PA-406 will be replaced with a single circuit wood monopole 3-way tap structure.
    - Install (2) 36kV line switches.
        - The (2) 36kV line switches will be rated at 1200A with vacuum bottle interrupters. It is assumed that one switch will be mounted on pole PA-406 and the other on pole PA 408.
        - Switches will be manually-operated switches.
    - Install a single span of 34.5 kV line (approximately 260 feet) along with a manually operated tap switch. The tap will be made using 336.4 kcmil 19-Strand AAC "Tulip" on the tap line to point of interconnection at the tap switch structure and shielded with 7#8 Alumoweld wire.
- Siting/Licensing
    - Assume no local opposition to the project.
    - Assume minimal social and ecological impacts.
- Assumptions
    - New LiDAR survey data will be required.
    - It is assumed that the existing conductor and shieldwire is in good condition and will be transferred to the new structures on the main line.
    - Existing underbuild and communications wire will be transferred to the new structures.

3. New Substation/Switchyard Facilities

None

4. Substation/Switchyard Facility Upgrades

McConnellsburg Substation

- R&C
    - Replace line relays with dual SEL421s
    - Add SATEC PM174 multi-meter

Mercersburg Substation

- R&C
    - Review relay settings and revise if necessary.

Assumptions (Substation):

1. DC Service is adequate for new relaying
2. RTU has adequate flexibility for points changes
3. Control house has adequate space for additional relay panel
4. Existing 34.5 kV line rating is not changing, substation conductor is adequate
5. New relays can be installed either in an existing panel or a new panel if the control building has sufficient space.
6. Relays at the Mercersburg end of this line section have been replaced prior to the COD of this interconnection.

5. Telecommunications Facilities – Upgrades

None

6. Metering & Communications

PJM Requirements
The IC will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14Dand PJM Tariff Sections 24.1 and 24.2.

FirstEnergy Requirements
IC shall install, own, operate, test and maintain the necessary revenue metering equipment. IC shall provide Transmission Owner with dial-up communication to the revenue meter.

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's Revenue Metering Requirements may be found in the *Requirements for Transmission Connected Facilities* document located at the following links:

www.firstenergycorp.com/feconnect

www.pjm.com/planning/design-engineering/to-tech-standards.aspx

These requirements are in addition to any metering required by PJM.

Transmission Owner will obtain real-time, site-specific, generation data from PJM, via the required communication link from IC to PJM. Transmission Owner will work with PJM and IC to ensure the generation data provided to PJM meets Transmission Owner's requirements.

7. Environmental, Real Estate and Permitting

- Environmental permitting, Real Estate acquisition, and Pennsylvania Public Utility Commission (PAPUC) notifications vary, some up to twelve (12) months after preliminary engineering is completed to secure the required approvals.
- Assumed IC 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.
- IC will provide copies of all of the relative environmental permits and other necessary approvals to Transmission Owner before Transmission Owner accepts the interconnection facilities.

- IC is responsible for all property acquisition (including easements/ROW's) for transmission, distribution and communication facilities needed for the generator interconnection.
- IC will develop, and secure regulatory approval for, all necessary Erosion and Sediment Control (E&SC) plans and National Pollutant Discharge Elimination System (NPDES) permits.
- The only vegetation clearing work on the project is associated with the generator 34.5 kV Lead Line and is the responsibility of the Developer.
- IC will obtain all necessary permits.
- IC will conduct all necessary wetlands and waterways studies and permits.
- IC will conduct all necessary historical and archaeological studies.
- Given the proposed location of the Developer's generation facilities (both sides of the 34.5 kV line corridor), the Developer should take into consideration how they plan to cross the line corridor. It will require permission of FirstEnergy for design, clearances and route of any facilities (low voltage lines, access roads, etc.) which will need to cross the line right-of-way.
- If the IC 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

8. Summary of Results of Study

Description	Total Cost (w/o Tax)	Tax (if applicable)	Total Cost (w/Tax)
Attachment Facilities			
Install a 600A gang operated switch on a new pole to tap the McConnellsburg – Mercersburg 34.5kV line.	$ 31,200	$ 5,300	$ 36,500
Provide 34.5 kV Meter Package at Elk Hill Solar 1, LLC solar facility connection.	$ 6,800	$1,200	$ 8,000
Total Attachment Facilities (AF) Costs	**$ 38,000**	**$ 6,500**	**$ 44,500**
Direct Connect Facilities			
None	-	-	-
Total Direct Connect (DC) Costs	**$ 0**	**$ 0**	**$ 0**
Non-Direct Connect Facilities			
Tap the McConnellsburg – Mercersburg 34.5 kV Line, install two manual 1200A gang operated line switches on the existing McConnellsburg-Mercersburg 34.5kV Line, for the Elk Hill Solar 1, LLC solar facility (AD1-061). **@ McConnellsburg-Mercersburg 34.5kV Line Tap**. This also includes Project Management, Environmental, Forestry, Real Estate and Right of Way.	$ 132,400	$ 22,500	$ 154,900

Estimated SCADA work at McConnellsburg & Mercersburg substations to support relay replacements and updated relay settings.	$ 58,500	$ 9,900	$ 68,400
Install new relaying on the Mercersburg 34.5kV line for the Elk Hill Solar 1, LLC interconnection (AD1-061). **@ McConnellsburg**	$ 273,700	$ 46,300	$ 320,000
Review and revise relay settings @ **Mercersburg**	$ 12,100	$ 2,200	$ 14,300
Total Non-Direct Connect (NDC) Costs	**$ 476,700**	**$ 80,900**	**$ 557,600**
Total AF + DC + NDC Costs	**$ 514,700**	**$ 87,400**	**$ 602,100**

Generation projects meeting IRS "Safe Harbor" provisions generally do not incur "CIAC" (Contribution in Aid to Construction), a tax collected by the utility for the state or federal government. First Energy does not expect to collect CIAC for this project. If for any reason, "CIAC" would be required for this project, it would be the responsibility of the party owning the generator to pay this cost.

First Energy reserves the right to charge the Interconnection Customer operation and maintenance expenses to maintain the Interconnection Customer attachment facilities, including metering facilities, owned by First Energy.

9. Schedules and Assumptions

A proposed **fourteen (14) month Direct Connection** schedule is estimated to complete the engineering, construction and the associated activities, from the date of a fully executed Interconnection Construction Service Agreement and Construction Kick-Off Meeting. This schedule assumes that all issues covered by the "Environmental, Real Estate and Permitting Issues" section of this document are resolved, and outages (typically not granted from June through September) will occur as planned. Construction cannot begin until after all applicable permits and/or easements have been obtained.

14 month Schedule (assume January 2021 start)

Activity	Start Month	End Month
Preliminary Engineering	1	3
Detailed Engineering	3	8
Equipment Delivery	9	11
Above Grade Construction	11	13
Testing & Commissioning	14	14

10. Information Required for Interconnection Service Agreement

Work Description	Direct		Indirect		Total Cost
	Labor	**Material**	**Labor**	**Material**	
Install a 600A gang operated switch on a new pole to tap the McConnellsburg – Mercersburg 34.5kV line.	$ 3,900	$ 17,300	$ 1,200	$ 8,800	$ 31,200
Provide 34.5 kV Meter Package at Elk Hill Solar 1, LLC solar facility connection.	$ 5,200	$ 0	$ 1,600	$ 0	$ 6,800
Total Attachment Facilities Cost	**$ 9,100**	**$ 17,300**	**$ 2,800**	**$ 8,800**	**$ 38,000**
None	-	-	-	-	-
Total Direct Connection Cost	**$ 0**	**$ 0**	**$ 0**	**$ 0**	**$ 0**
Tap the McConnellsburg – Mercersburg 34.5 kV Line, install two manual 1200A gang operated line switches on the existing McConnellsburg-Mercersburg 34.5kV Line, for the Elk Hill Solar 1, LLC solar facility (AD1-061). **@ McConnellsburg-Mercersburg 34.5kV Line Tap**. This will require the replacement of two poles. This also includes Project Management, Environmental, Forestry, Real Estate and Right of Way.	$ 51,200	$ 43,100	$ 16,200	$ 21,900	$ 132,400
Estimated SCADA work at McConnellsburg & Mercersburg substations to support relay replacements and updated relay settings.	$ 44,400	$ 0	$ 14,100	$ 0	$ 58,500
Install new relaying on the Mercersburg 34.5kV line for the Elk Hill Solar 1, LLC interconnection (AD1-061). **@ McConnellsburg**	$ 190,900	$ 20,900	$ 60,500	$ 1,400	$ 273,700

Review and revise relay settings @ **Mercersburg**	$ 9,200	$ 0	$ 2,900	$ 0	$ 12,100
Total Non-Direct Connection Network Upgrades	**$ 295,700**	**$ 64,000**	**$ 93,700**	**$ 23,300**	**$ 476,700**
Total Project Costs	**$ 304,800**	**$ 81,300**	**$ 96,500**	**$ 32,100**	**$ 514,700**

Attachment #1: Protection Study

PROTECTION SCOPE

Short Circuit Analysis

Short Circuit Values (Existing Conditions)

At Point of Interconnection of AD1-061, (PERCENT ON 100 MVA BASE) current system conditions w/out new Elk Hill Solar 1, LLC Generation

SHORT CIRCUIT DATA (Symmetrical Values Only)		3 PHASE	L-GR
34.5kV			
Z1 =	(4.32 + j 21.88) %	7.5 kA	5.4 kA
Z0 =	(6.56 + j 48.39) %		

The faults provided are bolted, symmetrical values for normal system conditions with a flat 1.0 p.u. voltage profile. Future increases in fault currents are possible and it is the customer's responsibility to upgrade their equipment and/or protective equipment coordination when necessary.

General Connection Requirements

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

The customer 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. IEEE-1547 requirements must be met.

McConnellsburg SS

- Remove old electromechanical relays - KD-10, BE1-51TC, ITH, IRP-8 and RC.
- Install the following step distance line protection equipment:

2 SEL 421 Relay
1 SATEC Digital Multimeter

AD1-061 Elk Hill Solar 1, LLC PROTECTION REQUIREMENTS

It is the responsibility of the Interconnect Owner to assure protection, coordination and equipment adequacy within their facility for conditions including but not limited to:

- Single phasing of supply
- System faults
- Equipment failures
- Deviations from nominal voltage or frequency
- Lightning and switching surges
- Harmonic voltages
- Negative sequence voltages
- Separation from FE supply
- Synchronizing generation
- Synchronizing facilities between independent transmission system and FE
- **Transmission System**

The Interconnect Owner is responsible for installing intertie relaying which is to provide one level of protection of the FirstEnergy system from the impacts of generation during abnormal situations such as continuing to keep a line fault energized. The intertie relay must be able to provide the tripping from overfrequency, underfrequency, phase and ground overvoltage, phase undervoltage, directional overcurrent, and directional power. The intertie relay shall either directly or through a dedicated, self resetting, high speed auxiliary relay (94), inhibit automatic reclosing and trip the breaker at the point of interconnection.

The Interconnect Owner is to design their protective system to clear any faults within their zones of protection with one or more of their local circuit breakers. Each zone of protection covering the 34.5kV portion of the interconnection system, including the transformer(s), is to be protected by two independent relay schemes that each provide high speed fault clearing. The terminal breaker at the interconnect end of the direct connection line is to be included in at least one of the 34.5kV over-lapping zones of protection. The CTs used for the zones of protection covering the 34.5kV portion of the system shall use C800 or C400 relay accuracy CTs and the CTs should not saturate for the maximum through-fault current that can be experienced by the relay system for the tap ratio in use. The transformer windings can be wye grounded low side and have a delta connected winding on the high (source) side for this interconnection. The **Elk Hill Solar 1, LLC** Substation shall not close into the interconnection tie line if it is dead, so that all synchronizing is performed at the **Elk Hill Solar 1, LLC** Substation.

More detailed relay requirements will be provided in the protection specifications.

DC Power

The relaying system shall have a reliable source of DC power independent from the AC system or immune to AC system disturbance or loss (for example - DC battery and charger) to assure proper operation of the protection scheme.

Approvals

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 interconnection. This may result in additional individual relay replacements being required. The cost of these relay replacements will be borne by the IC.

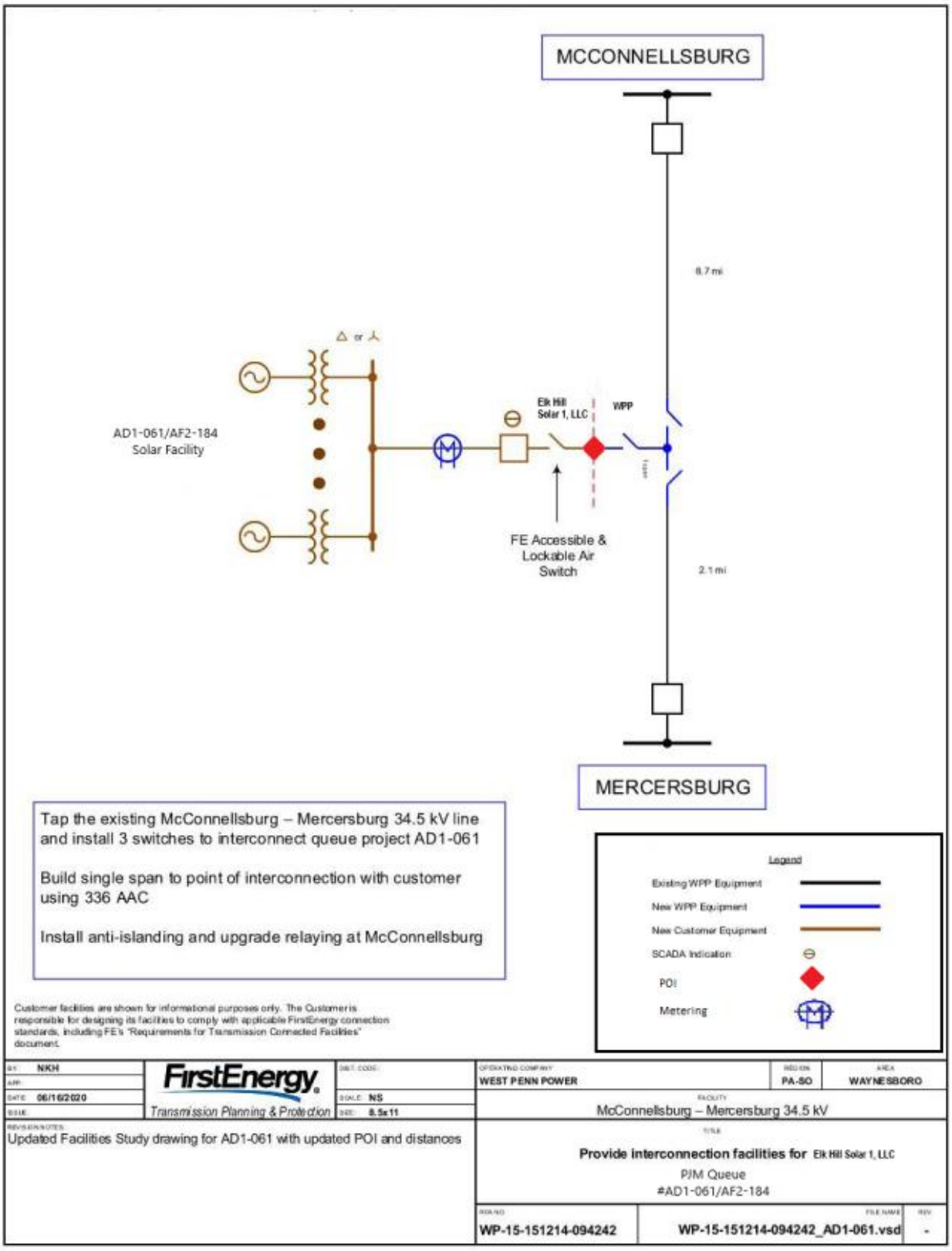
FE System Modifications

Settings Changes

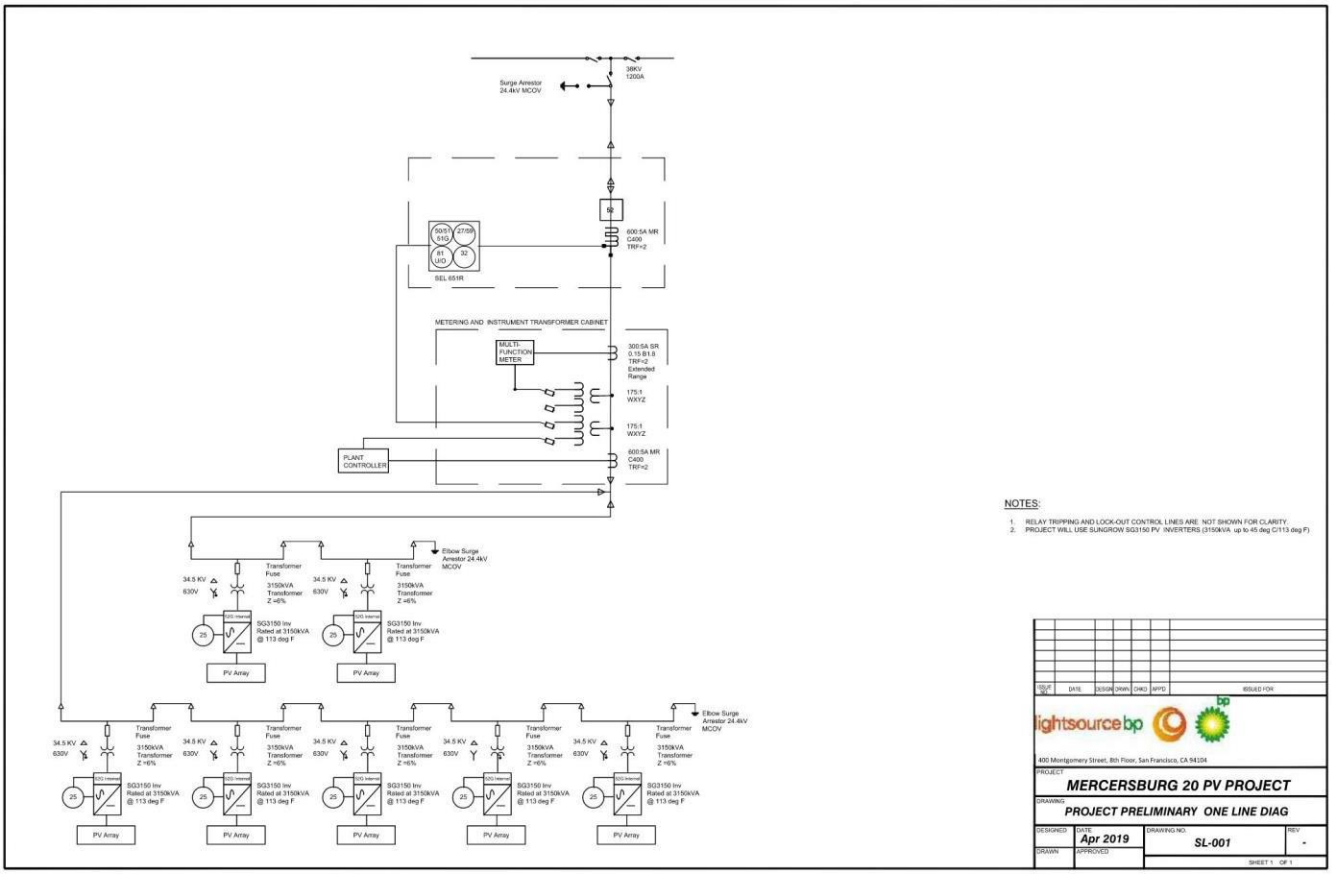
- Settings changes are possible at remote substations.

Attachment #2: One-Line Diagrams

First Energy One-Line



IC One-Line



* Note: Diagram does not represent a physical layout. Not to be used for construction.

Attachment #3: IC Site Plan and Substation Attachment Facilities

IC Site Plan

Attachment #4: Generation Connection Requirements

Generation Connection Requirements

The proposed interconnection facilities must be designed in accordance with the Transmission Owner's *Requirements for Transmission Connected Facilities* documents located at either of the following links:

www.firstenergycorp.com/feconnect

www.pjm.com/planning/design-engineering/to-tech-standards.aspx

The following is an excerpt taken from Transmission Owner's *Requirements for Transmission Connected Facilities* document:

For all generation facilities, other than wind-powered and other non-synchronous generating facilities, the minimum requirement shall be the provision of a reactive power capability sufficient to maintain a composite power delivery at continuous rated power output at a power factor as defined in the table below. This requirement will be measured at either the POI or generator terminals as specified in the table below. These reactive requirements apply to both the initial installation as well as to any incremental change in unit MW capability. FE will coordinate with the Connecting Party to identify the optimal generator step-up transformer tap to make such a capability available when demanded.

For all wind-powered or other non-synchronous generating facilities the minimum requirement shall be the provision of a reactive power capability sufficient to maintain a composite power delivery at a power factor as defined in the table. This requirement will be measured at either the POI or generator's terminals as specified in the table below. These reactive requirements apply to both the initial installation as well as to any incremental change in unit MW capability. FE will coordinate with the Connecting Party to identify the optimal generator step-up transformer tap to make such a capability available when needed.

For projects that entered PJM's New Service Queue after November 1, 2016, the power factor requirement will be as follows:

Generation Type	New / Increase	Size	Power Factor Requirement	Measurement Location
Synchronous	New	> 20 MW	0.95 leading to 0.90 lagging	Generator's Terminals
Synchronous	New	<= 20 MW	0.95 leading to 0.90 lagging	Point of Interconnection

Wind or Non-Synchronous	New	All	0.95 leading to 0.95 lagging	High Side of the Facility Substation Transformers
Synchronous	Increase	> 20 MW	1.0 (unity) to 0.90 lagging	Generator's Terminals
Synchronous	Increase	<= 20 MW	1.0 (unity) to 0.90 lagging	Point of Interconnection
Wind or Non-Synchronous	Increase	All	0.95 leading to 0.95 lagging	High Side of the Facility Substation Transformers

The above table is applicable to AD1-061.

Any different reactive power requirements that FE and/or PJM determines to be appropriate for wind-powered or other non-synchronous generation facilities will be stated in the applicable interconnection agreement(s).

Induction generators and other generators with no inherent VAR (reactive power) control capability, or those that have a restricted VAR capability less than the defined requirements, must provide dynamic supplementary reactive support located at the generation facility with electrical characteristics equivalent to that provided by a similar-sized synchronous generator.

Design Requirements

IC is responsible for specifying appropriate equipment and facilities such that the parallel generation is compatible with Transmission Owner's Transmission System. IC is also responsible for meeting any applicable federal, state, and local codes.

Design Criteria

Facilities owned and operated by Transmission Owner shall comply with the applicable Transmission Owner technical requirements and standards posted on the PJM website per the PJM Tariff, and the following criteria. Where there are different requirements for the same criterion, the more restrictive shall apply. IC must abide by any PJM, RFC or NERC criteria imposed that is more restrictive than those of Transmission Owner.

General Design Requirements

- System phasing (counter clockwise) X-Y-Z
- System frequency: 60 hertz
- Elevation, AMSL: Less than 1000 meters
- Isokeraunic level: 40
- Maximum ambient temperature: 40 degrees C
- Minimum ambient temperature: -40 degrees C

• Maximum conductor operating temperature:	Contact Transmission Owner
• Wind Loading (round shapes):	Per ASCE 7-98, per Fig. 6-1 depending on location
• Ice loading – Substations (no wind):	25 mm
• Seismic zone:	Per ASCE 7-98, per Fig. 9.4.1.1(a) and (b). Equipment qualification per IEEE 693-97

Voltage and Current Ratings

• Nominal phase-to-phase:	34.5 kV
• Maximum phase-to-phase:	38 kV
• Basic impulse level (BIL):	200 kV
• Maximum continuous current carrying capacity:	2000 A
• Design fault current:	40 kA
• Single Contingency (breaker failure) clearing time:	60 cycles