Generation Interconnection

Facilities Study Report

For Queue Projects

AE2-306

30 MW (18 MW Capacity) Solar

& AF1-285

100 MW (56 MW Capacity) Solar & Storage

Gunn Road 345 kV

Hardin County, Ohio

November 2021

Facilities Study Summary

1.1 Project Description

EverPower Solar, LLC proposes to install PJM Projects AE2-306 and AF1-285, a combined 130 MW (74 MW Capacity) solar and storage generating facility in Hardin County, Ohio (Figure 2). The point of interconnection for the generating facility will be a direct connection to the Gunn Road 345 kV Station (Figure 1).

1.2 Amendments/Changes to the Impact Study Report

The Interconnection Customer requested that the AE2-306 and AF1-285 queue positions receive a combined Facilities Study report and Agreements. If the two queue positions are placed in-service at the same time, AF2-185 will incur no additional interconnection costs. If AF1-285 is placed in-service at a significantly different time than AE2-306, a separate review and possible update of relay settings would be required, and cost approximately $55,000.

No mitigations were found to be required due to instability, however it was observed that AF1-285 and AE2-306 plant is deficient in lagging power factor requirement by 5.67 MVAr. This may need to be addressed through reactive compensation.

1.3 Interconnection Customer Schedule

PJM and AEP understand that the Interconnection Customer has established the following schedule dates:

Receive back feed power from AEP: 09/01/2023

Generation Commercial Operation Date: 11/01/2023

1.4 AEP's Scope of Work to Facilitate Interconnection

- To accommodate the interconnection at AEP's existing Gunn Road 345 kV Station, the station will be expanded by adding one (1) 345 kV circuit breaker.

- Installation of associated protection and control equipment, line risers, switches, jumpers, SCADA, and 345 kV revenue metering will be required at the Gunn Road 345 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

- AEP will extend one span of 345 kV transmission line for the generation lead going to the AE2-306 and AF1-285 site. AEP will build and own the first transmission line structure outside of the Gunn Road 345 kV Station to which the AEP and AE2-306 and AF1-285 transmission line conductors will attach.

- It is understood that the Interconnection Customer is responsible for all of the connection costs associated with interconnecting PJM projects AE2-306 and AF1-285 to the AEP transmission system. The cost of the customer's generating facility and the costs for the line connecting the generating facility to AEP's transmission system (beyond the first span exiting the POI station) are not included in this report; these are assumed to be the Customer's responsibility.

- The customer will be responsible for the cost of constructing a fiber-optic connection from their telecom equipment to the Gunn Road 345 kV control house.

1.5 Description of Transmission Owner Facilities Included in the Facilities Study

1.5.1 Direct Connection Work

- AEP will install one (1) additional 345 kV circuit breaker and one (1) line connection for the IPP at the Gunn Road 345 kV Station. The Gunn Road 345 kV bus will be configured as a two (2) string breaker and a half station in a ring bus arrangement. (Figure 1)

- AEP will install associated line protection and control equipment, line risers, switches, jumpers and SCADA at the Gunn Road 345 kV Station.

1.5.2 Non-Direct Connection Work

- AEP will review the protection and control settings at the Gunn Road 345 kV Station and update as needed.

1.5.3 Attachment Facilities Work

- AEP will Install 345 kV revenue metering at the Gunn Road 345 kV Station.

- AEP will extend one span of 345 kV transmission line for the generation lead going to the AE2-306 and AF1-285 site. AEP will build and own the first transmission line structure outside of the Gunn Road 345 kV Station to which the AEP and AE2-306 and AF1-285 transmission line conductors will attach.

- Two (2) fiber connections are required. AEP will extend the fiber-optic cables from the points of transition into the Gunn Road 345 kV control house. The customer will be responsible for the fiber work on the IPP side of the points of transition.

1.5.4 Network Upgrade Work

No AEP facility upgrades will be needed.

1.6 Total Cost of Transmission Owner Facilities Included in the Facilities Study:

Attachment Facilities	$1,438,108
Direct Connection Facilities	$1,332,274
Non-Direct Connection Facilities	$0
Network Upgrade Facilities	$0
Total Cost	$2,770,382

The estimates do not include the impact that delays in obtaining ROW, permits, or other approvals may have.

1.7 Summary of Schedule Milestones for Completion of Transmission Owner Work Included in Facilities Study:

Standard Process

Task	Dates
Engineering Start	Q4, 2021
Material Ordered	Q4, 2021
Construction Start (Grading & Below Grade)	Q3, 2022
Construction Start (Above Grade)	Q3, 2022
Outage Requests Made By	Q4, 2021
Outage (Structure Foundations)	Q3, 2022
Outage (Interconnection & Testing)	Q4, 2022
Ready For Back Feed	September 1, 2023
In-Service Date	November 1, 2023

Assumptions (Standard Process)

- **ISA and ICSA executed by 07/31/2021.**
- **System conditions must allow scheduled outages to occur.**

- **The customer will perform site development and road construction in accordance with AEP specifications as required for this interconnection.**
- **The customer will provide any additional required easements to enable access to all facilities and structures.**
- **The customer will have their construction and required checkout completed prior to the start of the interconnection and testing outage.**
- **Other assumptions specific to the queue position(s) addressed in this study:**
- **During detailed scoping, existing station design must be reviewed for standards compliance due to station being built under OTB by previous developer.**
- **During detailed scoping, AEP will determine whether first pole is on AEP property. If pole is on AEP property, ROW scope will be removed from project.**
- **345kV Line outage coordination.**
- **Transmission line must connect east of the station to avoid any civil station changes or archeological disturbance.**
- **Soil borings will be used for supplemental structures at dead ends due to the magnitude of the load.**

Transmission Outage Plan

No transmission outage plan has been specified at this time

Note that all 345 kV outages are subject to PJM and AEP Operations BES outage scheduling requirements.

2 Transmission Owner Facilities Study Results

2.1 Transmission Lines – New

- AEP will extend one span of 345 kV transmission line for the generation lead going to the AE2-306 and AF1-285 site from the Gunn Road 345 kV Station. AEP will build and own the first transmission line structure outside of the Gunn Road 345 kV Station, to which AEP's transmission line conductor will attach.

2.2 Transmission Line – Upgrades

- No transmission line upgrades will be required for this project.

2.3 Station Facilities – New

- No new station facilities will be required for this project.

2.4 Station Facilities – Upgrades

- AEP will expand the existing Gunn Road 345 kV Station to facilitate the connection of the generation lead going to PJM project AE2-306 and AF1-285. To accomplish this, one (1) additional circuit breaker will be installed. Installation of associated protection and control equipment, line risers, switches, jumpers, SCADA, and 345 kV revenue metering will also be required (Figure 1).

- Protective relay settings for the remainder of the Gunn Road 345 kV Station will be reviewed and updated to account for the addition of the AE2-306 and AF1-285 generation source.

2.5 Metering & Communications

Standard 345 kV metering will be installed at the Gunn Road 345 kV Station. A standard station communication scheme will be used. All metering equipment shall meet the requirements as specified by AEP in the "AEP Metering and Telemetering Requirements for AEP Transmission Customers" document (SS-490011). Communication requirements are published in the "AEP SCADA RTU Requirements at Transmission Interconnection Facilities" (SS-500000).

2.6 Environmental, Real Estate, and Permitting issues

The Interconnection customer is expected to obtain, at its cost, all necessary permits and provisions for the IPP station connecting to the Gunn Road 345 kV Station.

2.7 System Modeling & Operating Requirements

- None

2.8 Summary of Results of Study

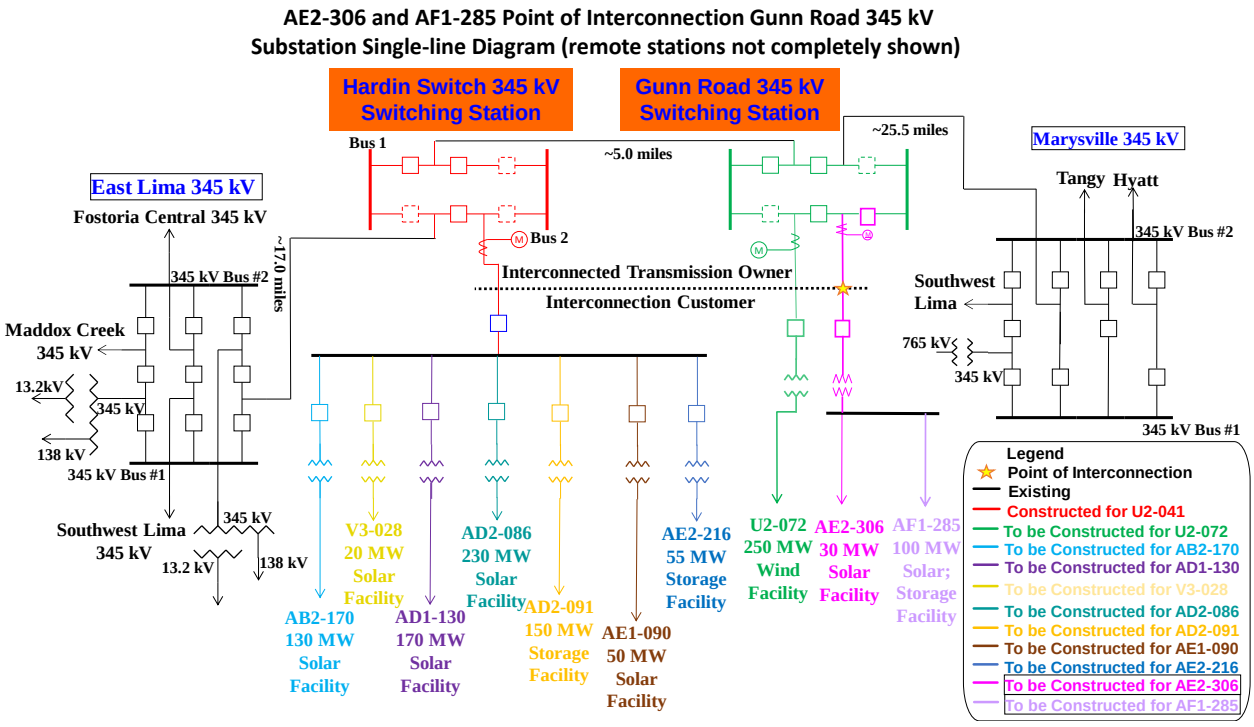
Cost Estimates for AEP

Task Name	Task Number	Engineering	Material	Construction	Other	TOTAL
Install one (1) new 345 kV Circuit Breaker at Gunn Road and associated equipment	N7470	$192,014.67	$460,050.67	$464,946.67	$215,262.00	$1,332,274.00
Install Single Structure and associated conductor span for Gen Tie at Gunn Road Station	N7469	$94,367.00	$187,128.00	$248,383.00	$128,823.00	$658,701.00
Install 345 kV Revenue Metering at Gunn Road Station	N7469	$166,264.67	$163,070.67	$114,399.67	$104,372.00	$548,107.00
Fiber connection to Gunn Road Station	N7469	$19,237.00	$32,392.00	$138,483.00	$41,188.00	$231,300.00
TOTAL		**$471,883.33**	**$842,641.33**	**$966,212.33**	**$489,645.00**	**$2,770,382.00**

2.9 Information Required for Interconnection Service Agreement

Description	DCF Facility	NUF Facility	ATF Facility	TOTAL
Direct Material	$0	$460,050.67	$382,590.67	**$842,641.33**
Direct Labor	$0	$656,961.33	$781,134.33	**$1,438,095.67**
Indirect Material	$0	$88,657.44	$91,376.51	**$180,033.95**
Indirect Labor	$0	$126,604.56	$183,006.49	**$309,611.05**
TOTAL	**$0**	**$1,332,274.00**	**$1,438,108.00**	**$2,770,382.00**

Figure 1: Point of Interconnection One-Line Diagram



The Point of Interconnection ("POI") is at the first (dead-end) structure outside the Gunn Road 345 kV station fence. AEP owns the span from the Gunn Road 345 kV station to the dead-end, including the jumpers and structure at the dead-end. The Interconnection Customer owns the span connecting to the POI, and the 345 kV generator lead line and remaining structures back to the AE2-306 generation collector station.

Figure 2: Point of Interconnection Map