Generation Interconnection

Facilities Study Report

For

Queue Project AD1-119

Payne 69 kV

Paulding County, Ohio

49.9 MW Energy / 18.96 MW Capacity

June 2021

1 Facilities Study Summary

1.1 Project Description

The Interconnection Customer (IC) proposes to install PJM project AD1-119, a 49.9 MW (18.96 MW Capacity) Solar generating facility in Paulding County, Ohio (Figure 2). The point of interconnection for the generating facility will be a direct connection to the Payne 69 kV station.

1.2 Amendments/Changes to the Impact Study Report

The following reinforcements were identified in the system impact study report and will no longer be required due to the impact study retool and system changes:

- To resolve the N Delphos – E Side 138 kV line overloads:
  A sag study will be required on the 15.6 mile section of the ACSR 397.5 ~ 30/7~ Lark conductor section 3 to mitigate the overload.
  Schedule: An approximate construction time would be 24 to 36 months after signing an interconnection agreement.
  Estimated Cost Summary: $62.4K for sag study or $ 23.4 M for complete rebuild.
  Ratings after mitigation is complete: S/N 167 MVA S/E: 251 MVA
  This work is presently scheduled to be completed under PJM Supplemental project s1563 with an estimated completion date of 12/18/2020.

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: 09/30/2022
Generation Commercial Operation Date: 10/31/2022

1.4 AEP's Scope of Work to Facilitate Interconnection

- To accommodate the interconnection at AEP's Payne 69 kV, the station will be expanded by extending the existing 69 kV bus and adding one (1) 69 kV circuit breaker.
- Installation of associated protection and control equipment, line risers, switches, jumpers, SCADA, and 69 kV revenue metering will be required at the Payne 69 kV. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

- AEP will extend one span of 69 kV transmission line for the generation lead going to the AD1-119 site. Unless this span extends directly from within the AEP station at the POI to the IC collector station structure, AEP will build and own the first transmission line structure outside of the Payne 69 kV station fence to which the AEP and AD1-119 transmission line conductors will attach.

1.5 Description of Transmission Owner Facilities Included in the Facilities Study

1.5.1 Direct Connection Work

- AEP will install associated line protection and control equipment, line risers, switches, jumpers, and SCADA at the Payne 69 kV station.
- AEP will expand the Payne station boundary fence, ground grid, and gravel 70 feet to the North and 50 Feet to the East.
- AEP may need to expand the Payne 69 kV control house to accommodate the required communications and relaying equipment
- AEP may need to move structures on the Haviland - South Hicksville 69 kV line to accommodate the Payne 69 kV expansion. The precise structure numbers to be relocated are being evaluated.
- Relocation of existing structures to feed modified bus work at Payne Station may be subject to condemnation timelines, which could affect the ISD

1.5.2 Non-Direct Connection Work

- AEP will review the protection and control settings at the Payne 69 kV station and adjust as needed.
- AEP will perform a protection and controls checkout including end-to-end testing

1.5.3 Attachment Facilities Work

- AEP will install one (1) additional 69 kV circuit breakers and one line connection for the IPP at the Payne 69 kV station.
- Two fiber connections are required. AEP will extend the fiber-optic cables from the points of transition into the Payne 69 kV control house. The customer will be responsible for the fiber work on the IPP side of the points of transition.
- AEP will install 69 kV revenue metering at the Payne 69 kV station.
- AEP will extend one span of 69 kV transmission line for the generation-leads going to the AD1-119 site. Unless this span extends directly from within the AEP station at the POI to the IC collector station structure, AEP will build and own the first transmission line structure outside of the Payne 69 kV station fence to which the AEP and AD1-119 transmission line conductors will attach.

1.5.4 Network Upgrade Work

Due to system overloads found during the PJM studies, the following network reinforcements are required:

- None

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

Attachment Facilities	$1,345,456
Direct Connection Facilities	$0
Non-Direct Connection Facilities	$388,907
Network Upgrade Facilities	$0
Total Cost	$1,734,363

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	Q3 2021
Material Ordered	Q3 2021
Construction Start (Grading & Below Grade)	Q2 2022
Construction Start (Above Grade)	Q2 2022
Outage Requests Made By	TBD
Outage (Structure Foundations)	TBD
Outage (Cut-in & Testing)	TBD
Ready For Back Feed (TO In-Service Date)	09/30/2022
In-Service Date	10/31/2022

Assumptions

- **ISA and ICSA executed by 7/30/2021**
- **Estimates provided are based on a table top process without the benefit of the results site specific engineering studies (e.g., soil borings, environmental survey, ground grid, etc.), unless otherwise provided by the interconnection customer.**
- **System conditions must allow scheduled outages to occur.**
- **The customer will obtain, at its cost, all necessary provisions for the AEP direct connection facilities.**

- **The customer will perform site development and road construction in accordance with AEP specifications as required for this interconnection.**
- **The customer will provide any required additional easements for the 69 kV station and line work to enable access to all facilities and structures.**
- **The customer will have their construction and required checkout complete prior to the start of the interconnection to the Payne 69 kV station and any required testing outages.**
- **Remote end work at Haviland and South Hicksville are estimates at this time and will be refined during detailed scoping.**

Transmission Outage Plan

- A 90 day outage will be required at Payne to support the Station work. At this time that is estimated to begin in in April 2022.
- Outages will be required for any foundation installation and for connection

Note that all 69 kV outages are subject to PJM and AEP Operations scheduling requirements.

2 Transmission Owner Facilities Study Results

2.1 Transmission Lines - New

- AEP will extend one span of 69 kV transmission line for the generation lead going to the AD1-119 site. Unless this span extends directly from within the AEP station at the POI to the IC collector station structure, AEP will build and own the first transmission line structure outside of the Payne 69 kV station fence to which the AEP and AD1-119 transmission line conductors 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 need to expand the existing Payne 69 kV station to facilitate the connection of the generation lead going to the PJM project AD1-119. To accomplish this, one (1) additional circuit breaker(s) will be installed.
- Installation of associated protection and control equipment, line risers, switches, jumpers, SCADA, and 69 kV revenue metering will be required at the proposed 69 kV station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.
- Protective relay settings at AEP's Haviland and South Hicksville remote end stations will be review and updated (as needed) to coordinate with the Payne 69 kV station.
- Due to the new generation source being added, nearby protective relay-settings for the remainder of the Payne 69 kV station will have to be reviewed and updated (as needed) to account for the addition of the AD1-119 generation source.

2.5 Metering & Communications

Standard 69 kV metering will be installed at the Payne 69 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).
AEP will update the telecom equipment at the Payne 69 kV station for SCADA/EMS functionality. Fiber-optic cable will be extended from the control house to the AEP/AD1-119 point of interconnection

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 Payne 69 kV station.

2.7 System Modeling and Operating Requirements

In addition to the IPP modeling requirements imposed by PJM as part of the Generation Interconnection process, the following system modeling parameters are required to be supplied by the Interconnection Customer to AEP:

- None

2.8 Summary of Results of Study

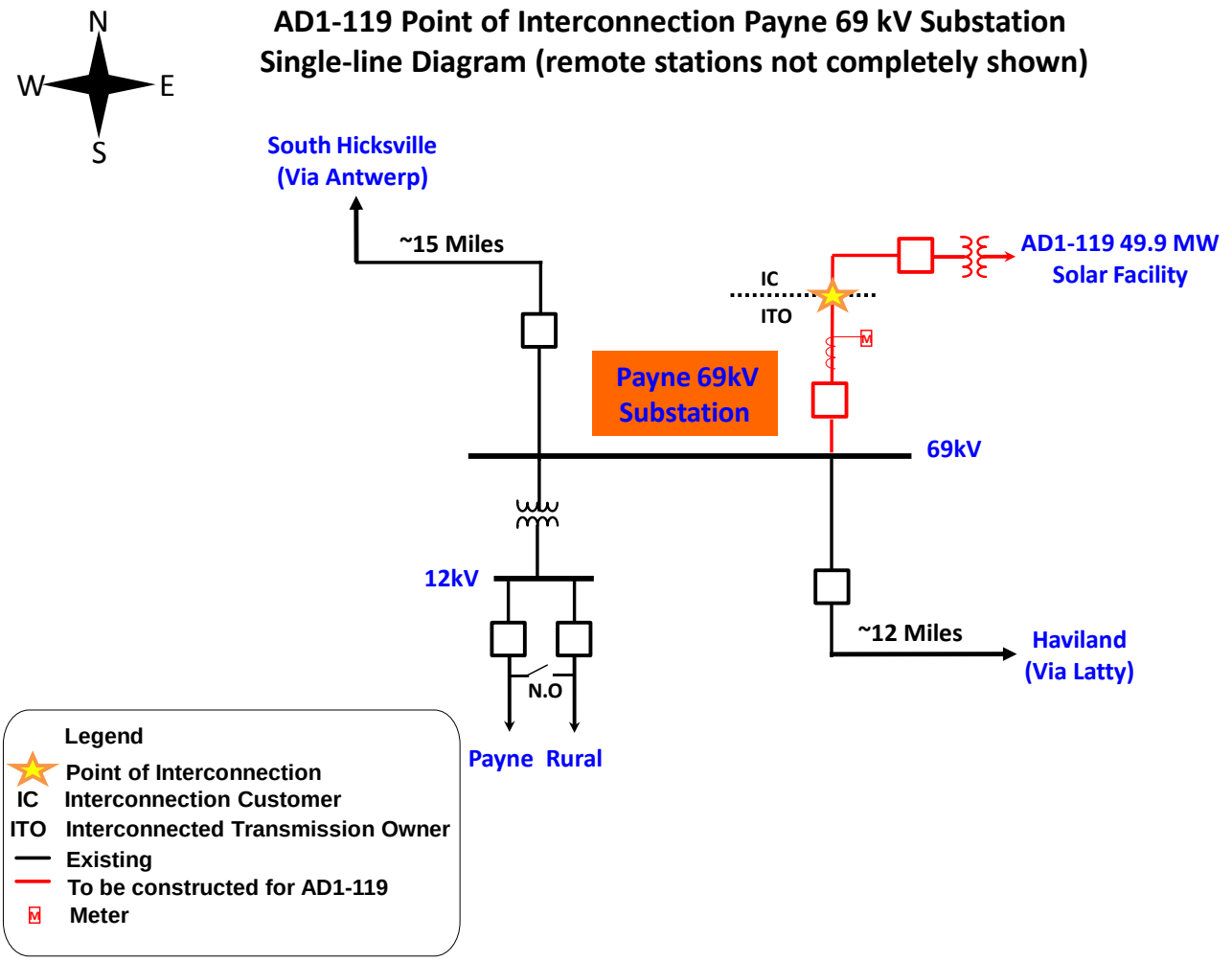
Task	Network Upgrade Number	Engineering	Material	Construction	Other	TOTAL
Modify and expand the existing Payne 69 kV Station including one 69 kV circuit breaker installation	n7282	$100,968.67	$198,363.67	$243,162.67	$104,770	$647,265
Upgrade line protection and controls at the Payne 69 kV Station	n7283	$71,142	$47,464	$100,123	$54,353	$273,082
69 kV Revenue Metering	n7284	$72,141.67	$84,814.67	$101,823.67	$58,366	$317,146
Relay and remote end work at Haviland 69 kV Station	n7285	$40,000	$55,000	$40,000	$65,000	$200,000
Relay and remote end work at South Hicksville 69 kV Station	n7286	$20,000	$45,000	$30,000	$5,000	$100,000
Installation of gen tie line connecting Payne station to the IPP generator	n7287	$37,999.67	$21,311.67	$15,504.67	$33,147	$107,963
Dual Fiber Telecom from	n7288	$15,426.33	$11,576.33	$39,647.33	$22,257	$88,907

Payne to the IPP station						
TOTAL		$297,678.33	$363,530.33	$500,261.33	$272,893	$1,734,363

2.9 Information Required for Interconnection Service Agreement

Description	DCF Facility	NUF Facility	ATF Facility	TOTAL
Direct Material	$0	$111,576.33	$351,954	$463,530.33
Direct Labor	$0	$185,073.67	$742,866	$927,939.67
Indirect Material	$0	$33,865.78	$76,291.33	$110,157.12
Indirect Labor	$0	$58,391.22	$174,344.67	$232,735.88
TOTAL	$0	$388,907	$1,345,456	$1,734,363

Figure 1: Point of Interconnection One-Line Diagram



The Point of Interconnection ("POI") is at the first (dead-end) structure north of the Payne 69 kV station fence. AEP owns the span from the Payne 69 kV station to the Dead-end, including the jumpers and structure at the Dead-end. Timber Road Solar Park, LLC owns the span connecting to the POI, and the 69 kV generator lead line and remaining structures back to the AD1-119 generation collector station.

Figure 2: Point of Interconnection Map