Generation Interconnection
Facilities Study Report
For
Queue Project AD1-128
College Corner - Desoto 138 kV
Randolph County, Indiana
150 MW Energy / 57 MW Capacity

March 2022

1 Facilities Study Summary

1.1 Project Description

The Interconnection Customer, Riverstart Solar Park Energy, LLC, proposes to install PJM project AD1-128, a 150 MW (57 MW Capacity) Solar generating facility in Randolph County, Indiana (Figure 2). The Point of Interconnection (POI) for the generating facility will be a new station cut into the Modoc - Desoto section of the College Corner - Desoto 138 kV circuit.

1.2 Amendments/Changes to the Impact Study Report

- AEP has determined that the network upgrade identified in the System Impact Study Report, **N6123**, a Sag Study of the AEP owned section of conductor on the College Corner - Collinsville (Duke) 138 kV tie-line will not be needed. The ratings of the existing conductor meet the requirements for this project.
- The System Impact Study Report for this project identifies the point of interconnection with the following: "The primary point of interconnection will be a connection to AEP's Modoc - Delaware 138 kV section of the College Corner - Delaware 138 kV circuit". This is no longer accurate due to system topology changes introduced by AEP supplemental project **S1610**. The appropriate point of connection is identified in this Facilities Study Report as a new switching station cut into the Modoc - Desoto section of the College Corner - Desoto 138 kV circuit.

1.3 Interconnection Customer Schedule

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

Receive back feed power from AEP: June 2023

Generation Commercial Operation Date: September 2023

Acknowledgment of the Interconnection Customer's requested back feed and commercial operation dates does not imply AEP's commitment to or guarantee of these dates.

1.4 AEP's Scope of Work to Facilitate Interconnection

- The Modoc - Desoto section of the College Corner - Desoto 138 kV circuit will be tapped by constructing a new three (3) circuit breaker 138 kV station, Wapahani, physically configured and operated as a ring bus (Figure 1).
- Associated protection and control equipment, line risers, switches, jumpers, SCADA, and 138 kV revenue metering will also be installed at the proposed Wapahani 138 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.
- AEP will remove double-circuit-tower structures 94 and 95 in the College Corner - Desoto/Richmond - Selma Parker 138 kV transmission Right of Way, between the Modoc and Desoto Stations.

- AEP will install two new two-pole dead end structures in the existing College Corner - Desoto/Richmond - Selma Parker 138 kV Right of Way to replace double circuit tower structures 94 and 95. One side of each two-pole dead end structure will connect the Richmond - Selma Parker 138 kV circuit. The other side will be used for connecting the Wapahani 138 kV Switching Station to the Modoc - Desoto section of the College Corner - Desoto 138 kV circuit.
- AEP will install two new strain dead end structures and extend one span of transmission line from each structure to the proposed Wapahani 138 kV Station. Another span from each structure will connect to each of the new pole dead ends connected to the Modoc - Desoto section of the College Corner - Desoto 138 kV circuit, resulting in an in-and-out arrangement.
- AEP will extend one (1) span of 138 kV transmission line for the generation lead going to the AD1-128 site. AEP will build and own the first transmission line dead end structure outside of the proposed Wapahani 138 kV Station fence to which the AEP and AD1-128 transmission line conductors will attach.
- Two (2) diverse fiber-optic paths to the AD1-128 collector station are required. AEP will extend two (2) fiber-optic cables from the proposed Wapahani 138 kV Station control house to the POI. The Interconnection Customer will be responsible for the fiber work on the IPP side of the POI.
- AEP will review and revise (as needed) the Modoc 138 kV remote end station protective relay settings.
- AEP will review and revise (as needed) the Desoto 138 kV remote end station protective relay settings.
- It is understood that the Interconnection Customer is responsible for all of the connection costs associated with interconnecting the PJM project AD1-128 to the AEP transmission system. The cost of the Interconnection Customer's generating facility is not included in this report. Those costs are assumed to be the Interconnection Customer's responsibility.

1.5 Description of Transmission Owner Facilities Included in the Facilities Study

1.5.1 Direct Connection Work

- The Modoc - Desoto section of the College Corner - Desoto 138 kV circuit will be tapped by constructing a new three (3) circuit breaker 138 kV station, Wapahani, physically configured and operated as a ring bus (Figure 1).
- AEP will install associated line protection and control equipment, line risers, switches, jumpers, and SCADA at the proposed Wapahani 138 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

1.5.2 Non-Direct Connection Work

- AEP will remove double-circuit-tower structures 94 and 95 in the College Corner - Desoto/Richmond - Selma Parker 138 kV transmission Right of Way, between the Modoc and Desoto Stations.
- AEP will install two new two-pole dead end structures in the existing College Corner - Desoto/Richmond - Selma Parker 138 kV Right of Way to replace double circuit tower structures 94 and 95. One side of each two-pole dead end structure will connect the Richmond - Selma Parker 138 kV circuit. The other side will be used for connecting the Wapahani 138 kV Switching Station to the Modoc - Desoto section of the College Corner - Desoto 138 kV circuit.

- AEP will install two new strain dead end structures and extend one span of transmission line from each structure to the proposed Wapahani 138 kV Station. Another span from each structure will connect to each of the new pole dead ends connected to the Modoc - Desoto section of the College Corner - Desoto 138 kV circuit, resulting in an in-and-out arrangement.
- AEP will review the protection and control settings at the Modoc 138 kV station and adjust as needed.
- AEP will review the protection and control settings at the Desoto 138 kV station and adjust as needed.

1.5.3 Attachment Facilities Work

- Two (2) diverse fiber-optic paths to the AD1-128 collector station are required. AEP will extend two (2) fiber-optic cables from the proposed Wapahani 138 kV Station control house to the POI. The Interconnection Customer will be responsible for the fiber work on the IPP side of the POI.
- AEP will install 138 kV revenue metering at the proposed Wapahani 138 kV station.
- AEP will extend one (1) span of 138 kV transmission line for the generation lead going to the AD1-128 site. AEP will build and own the first dead end transmission line structure outside of the proposed Wapahani 138 kV Station fence to which the AEP and AD1-128 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	$1,114,465
Direct Connection Facilities	$5,367,486
Non-Direct Connection Facilities	$926,708
Network Upgrade Facilities	$
Total Cost	$7,408,659

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:

Typical Schedule for Scope Indicated (Actual schedule to be determined at PJM Project kick off meeting)

Activity	Dates (See Notes)
Engineering Start	Day 1*
Material Ordering	Starts Day 145
Construction (Grading & Below Grade)	Starts Day 365
Construction (Above Grade)	Starts Day 395
Outage Requests Made By	Day 110
Outage (Structure Foundations)**	Starts Day 375
Outage (Cut-in & Testing)**	Starts Day 570
Ready For Back Feed (Interconnected Transmission Owner In-Service Date)	Day 585

***Day 1 will be determined at the PJM kick off meeting.**
****Scheduled Outages are contingent upon outage availability. Longer duration outages are not available during peak load periods.**

Notes Regarding the Schedule

- **All transmission outages are subject to PJM and AEP Operations outage scheduling requirements.**
- **Significant scope of work changes will impact the schedule.**

Scope Assumptions

- **Estimates provided are based on a table top process without the benefit of the results of site specific engineering studies (e.g., soil borings, environmental survey, ground grid, etc.), unless otherwise provided by the Interconnection Customer.**
- **The Interconnection Customer will obtain, at its cost, all necessary provisions for the AEP direct connection facilities.**
- **The Interconnection Customer will provide a site acceptable to AEP (for transfer in Fee Simple) and any required easements for the Wapahani 138 kV Station and line work to enable access to all facilities and structures.**
- **All transmission outages are subject to PJM and AEP Operations outage scheduling requirements.**
- **AD1-128 outages can be coordinated with those required for s2273, if the project schedules overlap.**
- **System conditions must allow scheduled outages to occur.**
- **The Interconnection Customer will have their construction and required checkout completed prior to the start of the interconnection to the proposed Wapahani 138 kV Station and any required testing outages.**
- **Scopes and estimates are based on the site plan provided by the IC on 1/6/2021.**
- **The AD1-128 proposed Wapahani 138 kV Station will be located in close proximity to the existing Modoc - Desoto section of the College Corner - Desoto 138 kV circuit Right of Way.**

- **The Interconnection Customer will perform site development and road construction in accordance with AEP specifications as required for this interconnection.**
- **AD1-128 will come in service after AEP supplemental project s2273.4. Should AD1-128 be in service prior to s2273.4, the scope and schedule contained in this document may change significantly.**

2 Transmission Owner Facilities Study Results

2.1 Transmission Lines - New

- AEP will extend one (1) span of 138 kV transmission line for the generation lead going to the AD1-128 site. AEP will build and own the first transmission line dead end structure outside of the proposed Wapahani 138 kV Station fence to which the AEP and AD1-128 transmission line conductors will attach.
- AEP will remove double-circuit-tower structures 94 and 95 in the College Corner - Desoto/Richmond - Selma Parker 138 kV transmission Right of Way, between the Modoc and Desoto Stations.
- AEP will install two new two-pole dead end structures in the existing College Corner - Desoto/Richmond - Selma Parker 138 kV Right of Way to replace double circuit tower structures 94 and 95. One side of each two-pole dead end structure will connect the Richmond - Selma Parker 138 kV circuit. The other side will be used for connecting the Wapahani 138 kV Switching Station to the Modoc - Desoto section of the College Corner - Desoto 138 kV circuit.
- AEP will install two new strain dead end structures and extend one span of transmission line from each structure to the proposed Wapahani 138 kV Station. Another span from each structure will connect to each of the new pole dead ends connected to the Modoc - Desoto section of the College Corner - Desoto 138 kV circuit, resulting in an in-and-out arrangement.

2.2 Transmission Line - Upgrades

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

2.3 Station Facilities - New

- A new 138 kV station, Wapahani Station, will be established consisting of a 3-breaker ring bus loop fed by tapping AEP's Modoc - Desoto section of the College Corner - Desoto 138 kV circuit.
- Associated protection and control equipment, line risers, switches, jumpers, SCADA, and 138 kV revenue metering will also be installed at the proposed Wapahani 138 kV Station. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

2.4 Station Facilities - Upgrades

- AEP will review the protective relay settings at the Modoc 138 kV station and adjust as needed.
- AEP will review the protective relay settings at the Desoto 138 kV station and adjust as needed.

2.5 Metering & Communications

Standard 138 kV metering will be installed at the proposed Wapahani 138 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).

Two (2) diverse fiber-optic paths to the AD1-128 collector station are required. AEP will extend two (2) fiber-optic cables from the proposed Wapahani 138 kV Station control house to the POI. The Interconnection Customer will be responsible for the fiber work on the IPP side of the POI.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement must be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. The metering work described above and the cost estimates indicated below do not include any potential work or cost to address metering requirements of the local service provider. It is the responsibility of the developer to contact the local service provider to obtain a local service agreement. This is required prior to energization.

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 proposed Wapahani 138 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:

- Modeling parameters are required as outlined in the 'Connection Requirements for the AEP Transmission System.' These requirements can be accessed at: https://aep.com/requiredpostings/AEPTransmissionStudies

2.8 Summary of Results of Study (Refer to Section 1.4)

Task	Network Upgrade Number	Engineering	Material	Construction	Other	TOTAL
Construct Wapahani 138 kV Station	**n8031.1**	$616,698.67	$2,018,569.67	$2,380,898.66	$351,319.00	$5,367,486.00
Install 138 kV Revenue Metering	**N/A**	$62,905.00	$135,477.00	$107,435.00	$14,214.00	$320,031.00
Install One (1) Dead End Structure, One (1) Span of Conductor from the Wapahani 138 kV Station to the Point of Interconnection	**N/A**	$80,120.00	$225,702.00	$203,535.00	$108,170.00	$617,527.00
Install Four (4) New Dead End Structures, Four (4) Spans of Conductor, Connect Wapahani 138 kV Station to Existing Transmission Circuit, Update Remote End Protective Relay Settings	**n8031.2**	$99,699.33	$152,920.33	$488,882.34	$185,206.00	$926,708
Install Two Diverse (2) Fiber-Optic Paths from the Wapahani 138 kV Station to the Point of Interconnection	**N/A**	$17,848.67	$28,956.67	$109,426.66	$20,675.00	$176,907.00
TOTAL	**TBD**	$877,271.67	$2,561,625.67	$3,290,177.66	$679,584.00	**$7,408,659.00**

2.9 Information Required for Interconnection Service Agreement

Description	DCF Facility	NUF Facility	ATF Facility	TOTAL
Direct Material	$2,018,569.67	$152,920.33	$390,135.67	$2,561,625.67
Direct Labor	$2,997,597.33	$588,581.67	$581,270.33	$4,167,449.33
Indirect Material	$141,375.25	$38,195.13	$58,060.18	$237,630.56
Indirect Labor	$209,943.75	$147,010.87	$84,998.82	$441,953.44
TOTAL	$5,367,486.00	$926,708.00	$1,114,465.00	**$7,408,659.00**

Figure 1: Point of Interconnection One-Line Diagram

The Point of Interconnection is the first structure in the generation lead circuit outside of the proposed Wapahani 138 kV Station fence. The Interconnected Transmission Owner (AEP) will own the span from the proposed Wapahani 138 kV Station to the first AEP constructed and owned dead end structure, including the jumpers. The Interconnection Customer, Riverstart Solar Park Energy, LLC, will own the other span connecting to the Point of Interconnection structure, along with the remainder of the 138 kV generator lead, transmission line, and associated structures back to the AD1-128 generation Collector Substation.

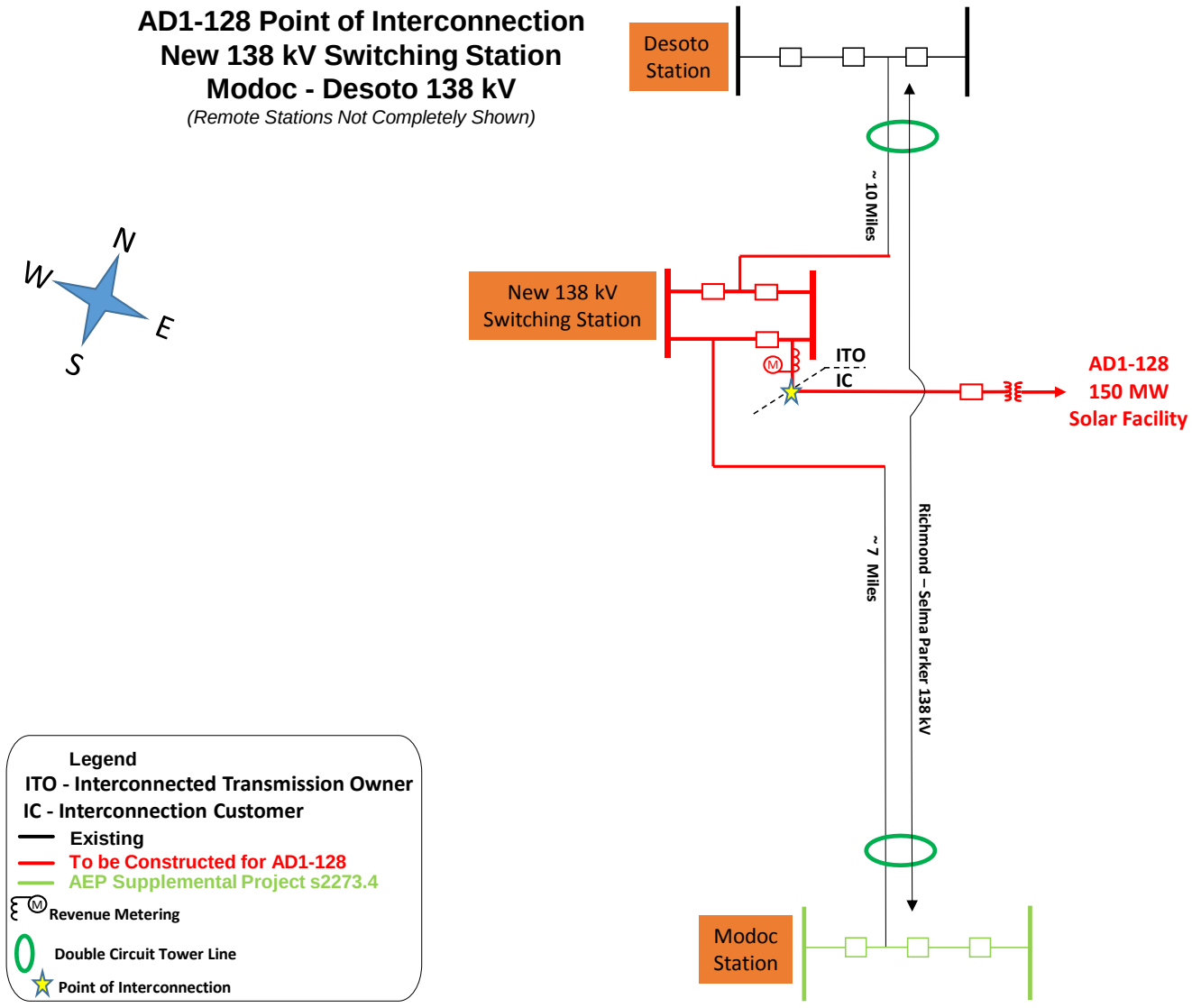

Figure 2: Point of Interconnection Map