Phase 2 Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AG1-109

"Valley 138 kV"

December 2024

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff Part VII, and, if applicable, the Application and Studies Agreement between the Project Developer and PJM Interconnection, LLC (PJM or Transmission Provider (TP)). The Transmission Owner (TO) is AEP Indiana Michigan Transmission Company Inc. to be abbreviated in the remainder of this report as IMTCo.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed an uprate to a planned Storage Generating Facility located in Van Buren County, Michigan with a designated PJM Project ID of AG1-109.

The AG1-109 project is a 25 MW Capacity only uprate to the AF1-161 project. The AG1-109 project will connect to the American Electric Power (AEP) Valley 138 kV Station. The total installed facilities will have a capability of 50 MW with 50 MW of this output being recognized by PJM as Capacity.

2. POINTS OF INTERCONNECTION AND CHANGE IN OWNERSHIP

The Point of Interconnection (POI) is the point where the risers connect the generator lead circuit to the Valley 138 kV Station line termination point. The AG1-109 project is an uprate to the Project Developer's AF1-161 project and will share the same Point of Change in Ownership (PCO).

3. SCOPE OF PROJECT DEVELOPER INTERCONNECTION FACILITIES

The Project Developer will design, build, own, operate, and maintain the Project Developer Interconnection Facilities on the Project Developer's side of the Point of Change in Ownership (PCO). This includes, but is not limited to:

- Main Power Transformer(s) (MPT(s))
- Circuit breakers and associated equipment located between the high side of the MPT(s) and the Point of Change in Ownership
- Generator lead line conductors from the Generating Facility to the Point of Change in Ownership (shared with AF1-161)
- Relay and protective equipment and Telecommunications Equipment including Supervisory Control and Data Acquisition (SCADA) to comply with the TO's Applicable Technical Requirements and Standards

B. Transmission Owner Facilities Study Results

The following is a description of the Transmission Owner facilities required for physical interconnection of the proposed AF1-161/AG1-109 project to the AEP transmission system. These facilities shall be designed according to AEP standards. Once built, AEP will own, operate, and maintain these Facilities.

The Scope of Work and Estimates described below are contingent on the prior installation of the Interconnection Facilities required at the Valley 138 kV Station for the proposed AD2-020

generation project. That project has executed Interconnection and Construction Service Agreements but is currently in suspension.

1. INTERCONNECTION SUBSTATION (VALLEY)

IMTCO will connect the proposed generation lead circuit to the Valley 138 kV Station via existing circuit breaker “M”. Circuit Breaker “M” is currently connected to the Stinger 138 kV Circuit. The Stinger 138 kV Circuit will be re-terminated at the adjacent box bay being installed to the south for the proposed AD2-020 & AE2-325 projects and connect via a newly installed 138 kV circuit breaker “Q” in the east face of the new box bay. The upgrades at the existing Valley 138 kV Station to accommodate the proposed AF1-161 project are expected to be designed to accommodate 3000 A of continuous current. **Major equipment upgrades are expected to include:**

- One (1) new 3000 A 138 kV 40 kA circuit breaker (breaker “Q”) with breaker control relaying for the Stinger Circuit relocation.
- Two (2) new 3-phase 3000 A circuit breaker disconnect switches.
- Three (3) single phase CCVTs (Capacitor Coupled Voltage Transformers) and associated structures for the Stinger Circuit relocation.
- Three (3) single phase Arresters and associated structures for the Stinger Circuit relocation.
- One 16 ft. x 18 ft. Drop-in Control Module (DICM) expansion to the existing Valley 138 kV Station DICM control house.
- Dual fiber-based ICON MUX (Integrated Communications Optical Network Multiplexor) current differential relays for the protection scheme for the re-terminated Stinger Circuit.
- Expansion of a 132' section of the Valley 138 kV Station fence by 20' to the East, across from the east side of the middle box bay.
- Associated jumpers, insulators, grounding, fiber-optic relaying connectivity & equipment, cables, pull boxes and foundations.
- Protection and control settings review for the existing relays at the Valley 138 kV Station and adjustment as needed.
- IMTCo will review and revise (as necessary) the protective relay settings at the Valley 138 kV Station to account for the AG1-109 additional generation.

2. EXISTING TRANSMISSION LINE

IMTCo’s Scope of Work to accommodate the re-termination of the Stinger Circuit in the Valley 138 kV Station is expected to include:

- Remove the existing Stinger - Valley 138 kV Circuit connection to the Valley 138 kV Station by removing one (1) existing 65 ft. wood pole structure (#285) and one (1) span of line conductor with shield wire.
- Install one (1) new custom 80 ft. steel, single circuit, single pole dead end structure on a concrete foundation with an anchor bolt cage.
- Install one (1) span of ACSR (Aluminum Conductor Steel Reinforced) 1033.5 54/7 (Curlew) transmission line conductor with 7#8 Alumoweld shield wire for the new Stinger line exit.

3. TRANSMISSION OWNER INTERCONNECTION FACILITIES:

The IMTCo Interconnection Facilities for the proposed AF1-161 project are expected to include the following:

- Installation of one (1) new custom 80 ft. steel, single circuit, single pole dead end structure on a concrete foundation with an anchor bolt cage and
- Extension of one (1) span of ACSR 1033.5 54/7 (Curlew) transmission line conductor to the east with 7#8 Alumoweld shield wire for the generation lead circuit connecting to the Valley 138 kV station.
- The proposed generation lead circuit will be protected by the existing Circuit Breaker “M” relays using a dual direct fiber current differential protection scheme.
- Installation of a 138 kV revenue metering package, including one (1) DICM-installed metering panel with Primary and Backup meters, three (3) 1-phase current transformers (CTs), three (3) 1-phase voltage transformers (VTs), three (3) 1-phase surge arresters, and associated structures, foundations, grounding, and telecommunications connectivity at the Valley 138 kV Station for the proposed AF1-161 generation lead circuit.
- Extension of two (2) underground 48 count ADLT (all dielectric loose tube) fiber optic cables with ADSS (all dielectric self-supporting) entrances via diverse paths from the Valley 138 kV Station control house to fiber demarcation splice boxes to support direct fiber relaying between the Valley 138 kV Station and the Project Developer's collector station. The Project Developer will be responsible for the fiber extension from the splice boxes to the collector station.

4. UPGRADE TO NEIGHBORING STATIONS

No Upgrades will be required at Neighboring AEP Stations.

5. INSTALLATION OF FIBER CABLE CIRCUITS

No new fiber circuits to facilitate communication with existing AEP equipment will be required for this interconnection.

7. MILESTONE SCHEDULES FOR COMPLETION OF AEP WORK

7.1 STANDARD OPTION:

Activity	Number of Days (See Notes)
Project Engagement*	1
Engineering Start	70
Material Ordering	112
Construction (Grading & Below Grade)	569
Construction (Above Grade)	629
Outage Requests Made By	344
Outage (Structure Foundations)**	709
Outage (Cut-in & Testing)**	760
Ready For Back Feed (ITO In-Service Date)	790

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

The above schedule is based on typical AEP construction timelines, long lead material availability, and common outage constraints. The facilities outlined in this report, as constructed by AEP, are estimated to take 26 months to complete. Given this construction timeline, a typical period for agreement processing, the timeline for the phase three study, and the construction timeline for the AD2-020 project, AEP can support a backfeed date of **TBD**. The Project Developer is expected to have the interconnection facilities constructed and ready to accept backfeed by the business day prior to the final negotiated backfeed date.

The backfeed date is provided as TBD due to the suspension of the AD2-020 project. The scope for the AD2-020 project will be required prior to installation of the AF1-161/AG1-109 project. Until a construction timeline is known for the AD2-020 project, AEP will not be able to provide a backfeed date.

8. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

Note - Any materials purchased, or design decisions made by the Project Developer (relative to any facilities to be owned by AEP) prior to coordination with and approval by the executing AEP team (pursuant to an Engineering and Procurement or Generation Interconnection Agreement) are at the developer's risk and may not meet the specifications required for interconnection with the AEP transmission system.

8.1 SCOPE ASSUMPTIONS:

- Equipment specifications (Breaker ratings, conductor size, etc.) are a result of the desktop functional scoping process observed while conducting this facilities study. These specifications are subject to change based on the results of the detailed scoping efforts that will take place post-interconnection or engineering and procurement agreements.
- Protection and Control (P&C) coordination with the Project Developer will be needed throughout the project. The Project Developer will be required to install an AEP-compatible line relaying protection panel at the collector substation using AEP standards to ensure relay coordination and adequate line protection. The AEP design team will ensure that the firmware at the collector station terminal matches the approved firmware at the AEP terminal. Failure to accept the cost of a matching line relay protection panel may change scoping.
- Scopes 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 Project Developer.
- The Project Developer will have their construction and required checkout complete prior to the energization of the AG1-109 uprate to the AF1-161 project and any required testing outages.
- This scope is dependent on the completion of the AF1-161 project which is dependent on the completion of AD2-020 project construction.

8.2 SCHEDULE ASSUMPTIONS:

- All transmission outages are subject to PJM and AEP Operations outage scheduling requirements.
- Significant scope of work changes will impact the schedule.
- The above schedule reflects only the work required to interconnect the AG1-109 project. The schedules regarding network upgrades associated with this project, if any, are detailed in the documentation related to the specific network upgrade.
- Slippage by the Project Developer in executing the Generation Interconnection Agreement (GIA) does not equate to a "day for day" slippage in the scheduled back feed and in service dates. Depending on the time of year, planned outages, neighboring projects and maintenance of the grid, outage availability has the potential to shift by weeks or months depending on conditions at the time of the fully executed agreement.

8.3 ESTIMATE 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 Project Developer.

9. METERING REQUIREMENTS

All metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AG1-109 GIA, and in PJM Manuals M01 and M14D. The details of applicable metering requirements are provided in the "Connection Requirements for the AEP Transmission System" document, found at:
https://www.aep.com/requiredpostings/AEPTransmissionStudies

The primary and backup metering for the combined AG1-109/AF1-161 project will be installed on the Transmission Owner side of the Point of Change in Ownership and will be owned and maintained by the Transmission Owner.

Any additional generation proposed behind an originating project's PCO that differs in either fuel type or corporate entity from the originating project will require the installation of additional submetering for both the originating project and the uprate for the purpose of settlement. Submetering will require additional space within the originating project's facilities. The meters, routers, Ethernet to fiber converters, and telecom switch will be procured and owned by AEP. The revenue quality instrument transformers, fiber-optic cable connecting the submeters, and any other additional hardware for the required submetering will be procured, installed, owned, and maintained by the Project Developer.

10. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

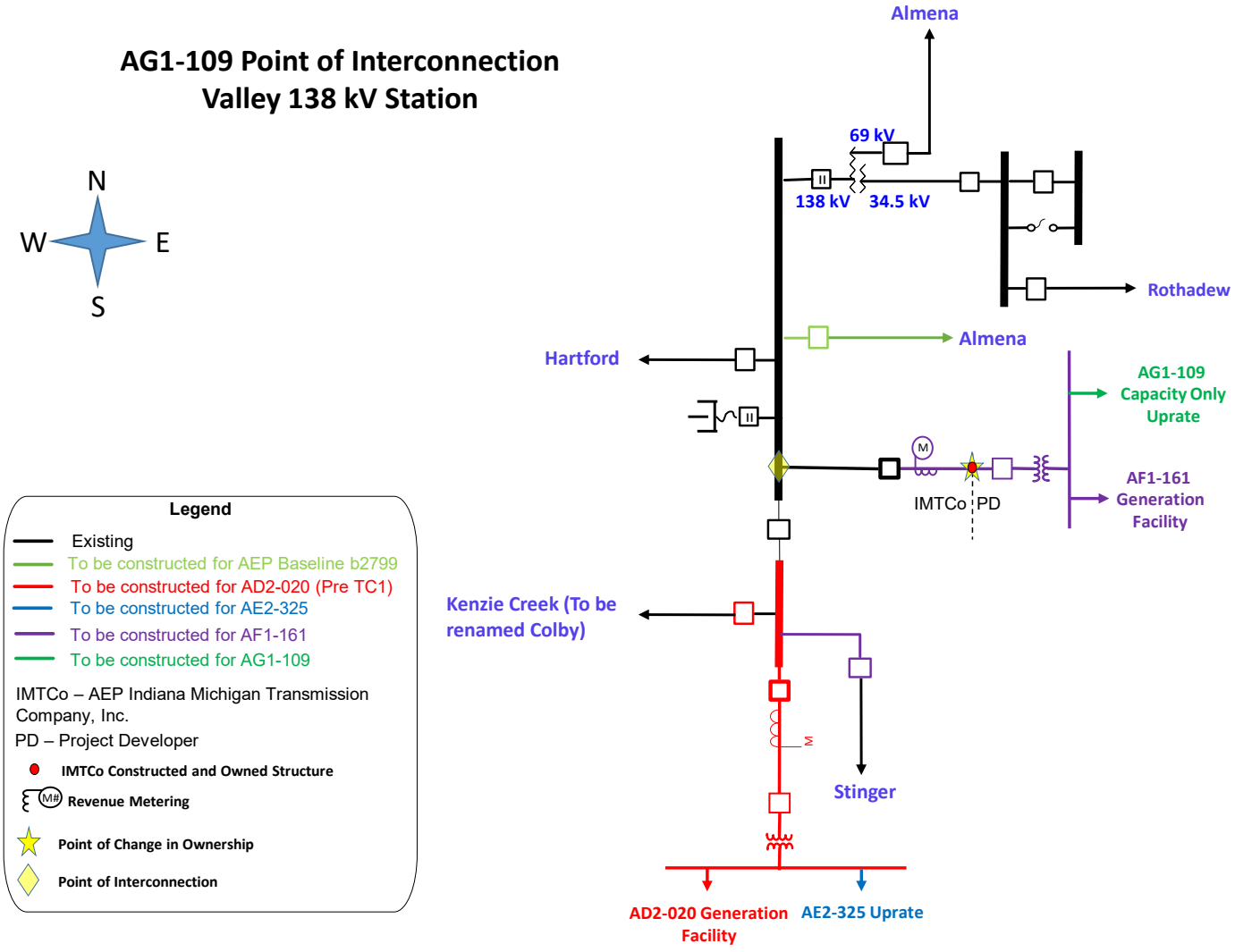
Land requirements for the Interconnection Substation needed for this interconnection project must meet the requirements in the https://www.aep.com/requiredpostings/AEPTransmissionStudies posted on AEP website.

11. ENVIRONMENTAL AND PERMITTING

The Project Developer is expected to obtain, at its cost, all necessary permits and provisions for the facilities to be constructed for this interconnection. AEP requires that the standards provided in the "Standards and Expectations for Siting, Real Estate, Right-Of-Way, and Environmental Permitting for Transmission Interconnection Projects", found at: https://www.aep.com/requiredpostings/AEPTransmissionStudies be adhered to for all facilities interconnecting with the AEP transmission system.

C APPENDICES

Attachment #1: Single line Diagram for the Physical Interconnection



Attachment #2: POI Map