Generator Interconnection
System Impact Study Report

For

PJM Generation Interconnection Request
Queue Position #AB2-141

George Washington 138 kV

March 2018

General

Moundsville Power II, LLC (MP) proposes to install PJM Project #AB2-141, a 394 MW (388.6 MW Capacity) natural gas generating facility. The proposed facility will consist of two Combustion Turbines (CTs) connected to the American Electric Power (AEP) transmission system. The point of interconnection requested is a direct connection to the newly configured George Washington 138 kV GIS substation (See Figures 1). The location of the natural gas generating facility is in Moundsville, WV (see Figure 2).

The requested Backfeed date is March 1, 2018.
The requested in-service date is April 1, 2019.

The objective of this System Impact Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP Transmission System. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required to maintain the reliability of the AEP Transmission System. Stability analysis is included as part of this study.

Attachment Facilities

Direct Connection into the newly configured George Washington 138 kV GIS Substation:

To accommodate direct connection to the newly configured George Washington 138 kV GIS substation, an additional 138 kV circuit breaker will be required. Installation of associated protection and control equipment, SCADA, and 138 kV revenue metering will also be required.

Direct Connection to the newly configured George Washington 138 kV GIS substation Work and Cost:

- Install one new 138 kV circuit breaker (see Figure 1). Installation of associated protection and control equipment, SCADA, and 138 kV revenue metering will also be required.
- **Estimated Station Cost: $2,000,000**

Non-Direct Connection Cost Estimate

The total preliminary cost estimate for Non-Direct Connection work is given in the following tables below:
For AEP building Direct Connection cost estimates:

Description	Estimated Cost
138 kV Revenue Metering	**$250,000**
Install line protection and controls at the newly configured George Washington 138 kV GIS substation.	**$250,000**
Total	**$500,000**

Table 1

It is understood that Moundsville Power is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP. The cost of Moundsville Power's generating plant and the costs for the line connecting the generating plant to Moundsville Power's switching station are not included in this report; these are assumed to be Moundsville Power's responsibility.

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 may 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. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Local and Network Impacts

The impact of the proposed generating facility on the AEP System was assessed for adherence with applicable reliability criteria. AEP planning criteria require that the transmission system meet performance parameters prescribed in the AEP FERC Form 715[1] and Connection Requirements for AEP Transmission System[2]. Therefore, these criteria were used to assess the impact of the proposed facility on the AEP System. The Queue Project AB2-141 was evaluated as a 388.6 MW (Capacity 388.6 MW) injection into the George Washington 138 kV substation in the AEP area. Project AB2-141 was

1 https://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/GuideLines/AEP_East_FERC_715_2016_Final_Part_4.pdf

2 https://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/Requirements/AEP_Interconnection_Requirements_rev1.pdf

evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB2-141 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2020

Generator Deliverability
(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency
(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

Contribution to Previously Identified Overloads
(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Short Circuit
(Summary of impacted circuit breakers)

Although the AB2-141 queue request was not identified as creating any new breaker duty violations, or contributing more than 3% to any previously identified violations, it should be noted that an earlier project in the AB2 queue over-dutied a number of breakers at the nearby Kammer station. Depending on the future status of that request, and means taken to mitigate those violations, the AB2-141 queue request could become responsible for some breaker upgrades.

Stability Analysis

No mitigations were found to be required.

Voltage Variations

None

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.
Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

None

Additional Limitations of Concern

None

New System Reinforcements
(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

AB2-141 may need the following baseline upgrades in-service in order to be deliverable to the PJM and AEP systems as these upgrades were modeled in the AB2-141 Impact Study 2020 case:

Baseline Upgrades B2753.1 – B2753.10

Baseline Upgrade B2605

If AB2-141 comes into service prior to any of these upgrades, an interim study may be required for AB2-141.

Light Load Analysis

Not required

Additional Interconnection Customer Responsibilities:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

Conclusion

Based upon the results of this System Impact Study, the construction of the 394.0 MW (388.6 MW Capacity) natural gas generating facility of Moundsville Power (PJM Project #AB2-141) will require the following additional interconnection charges. This plan of service will interconnect the proposed generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the Moundsville Power generating facility.

Cost Breakdown for the Direct Connection at the newly configured George Washington 138 kV GIS Substation			
Type of Network Upgrade	**Network Upgrade Number**	**Description**	**Estimated Cost**
Non-Direct Connection Cost Estimate	**n5557**	Expand the George Washington 138 kV GIS Substation	**$2,000,000**
	n5558	138 kV Revenue Metering	**$250,000**
	n5559	Install line protection and controls at the newly configured George Washington 138 kV GIS substation.	**$250,000**
		Total Estimated Cost for Project AB2-141	**$2,500,000**

Table 2

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.

Figure 1: Point of Interconnection (George Washington 138 kV Substation)
Single-Line Diagram

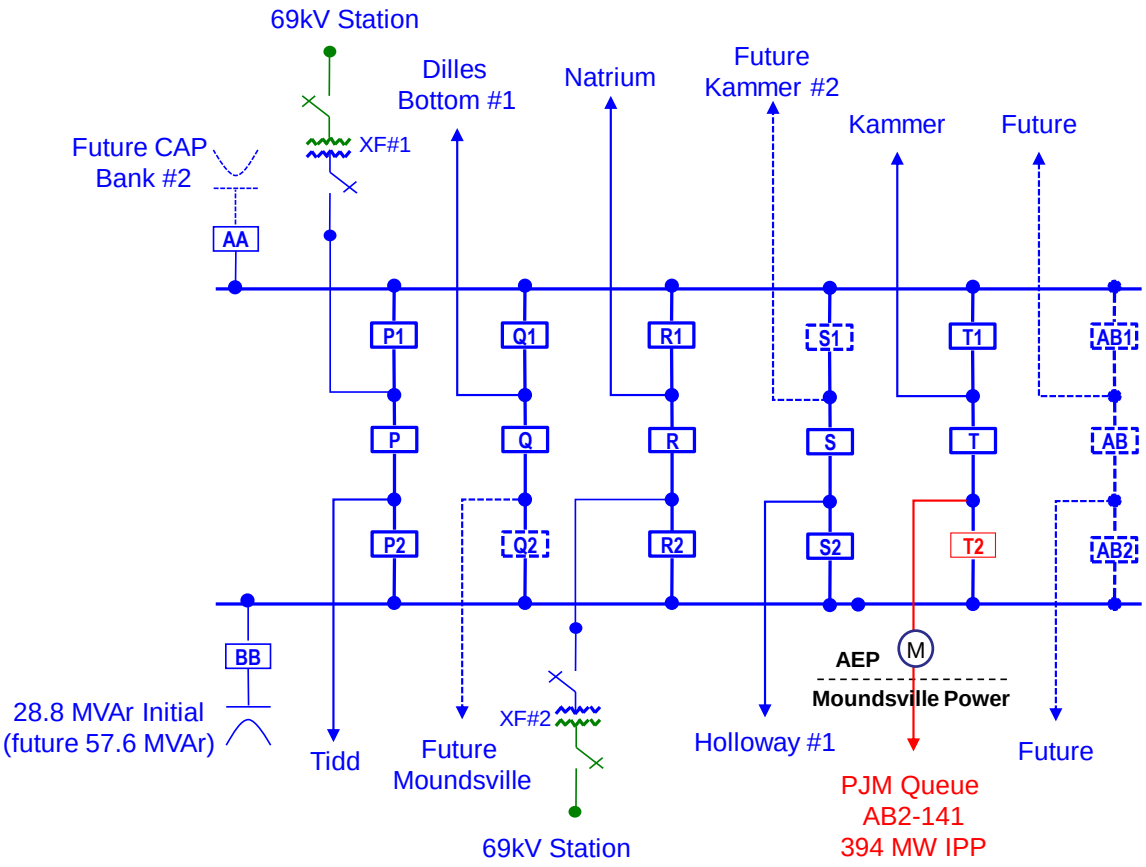

Figure 2: Point of Interconnection (George Washington 138 kV Substation)