Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position AA2-137

Hanging Rock (Power Block I) 765 kV

August 2015

Preface

The intent of the Feasibility Study is to determine a plan, with high level estimated cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the IC. The IC may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the IC may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the Impact Study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The IC is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by ITO, the costs may be included in the study.

AEP Analysis

General

Interconnection Customer proposes to increase the natural gas fired generation of its existing combined cycle plant of Power Block 1 section at Hanging Rock 765 kV by 45 MW (45 MWC) (see Figure 1). Currently Power Block 1 section is assigned CIRs of 625 MWs, and thus, the proposed increase will bring the total MFO of Power Block 1 section to 670 MW. Interconnection Customer described that the increase will be accomplished by modifications introduced to the control systems, and turbines. There will be no change to the electrical or inertial characteristics of the plant equipment including the GSUs. The location of the generating facility of PJM Project AA2-137 is Ironton, OH (see Figure 2).

Note that the CIR and MFO values stated above reflect the as-yet-unexecuted AA1-013 Interconnection Service Agreements.

The requested in service date is May 1, 2019.

The objective of this Feasibility 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 not included as part of this study.

Attachment Facilities

Station Cost:

- No work is required.

Protection and Relaying Cost:

- No work is required.

Local and Network Impacts

The impact of the proposed generating facility on the AEP Transmission 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 criterion were used to assess the impact of the proposed facility on the AEP System. PJM project # AA2-137 was studied as a 45 MW (45 MW Capacity) increase at Hanging Rock 765 kV Substation consistent with the interconnection application. PJM Queue #AA2-137 project was evaluated for compliance with reliability criteria for summer peak conditions in 2019.

Potential Network Impacts were as follows:

Normal System (2019 Summer Conditions Capacity Output)

- No problems identified

Single Contingency (2019 Summer Conditions Capacity Output)

- No problems identified

Multiple Contingency (2019 Summer Conditions Capacity Output)

- No problems identified

Contributions to Previously Identified Overloads (2018 Summer Conditions Capacity Output)

- No problem identified

Normal System (2019 Summer Conditions Full Output)

No problem identified

Single Contingency (2019 Summer Conditions Full Output)

- No problem identified

Multiple Contingency (2019 Summer Conditions Full Output)

- No problem identified

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1 https://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/GuideLines/2015_AEP_PJM_FERC_715_Final_Part_4.pdf

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

Contributions to Previously Identified Overloads (2019 Summer Conditions Full Output)

- No problem identified

Short Circuit Analysis

- No problems identified

Stability Analysis

- Stability study to be performed during the System Impact Study stage.

Voltage Variations

- No problems identified

Additional Limitations of Concern

- No known additional limitations of concern.

Conclusion

Based upon the results of this Feasibility Study, the increase of 45 MW (45 MW Capacity) of generation at Hanging Rock 765 kV Substation (PJM Project #AA2-137) will not require additional Network upgrades.

PJM Analysis

Network Impacts

The Queue Project AA2-137 was evaluated as a 45.0 MW (Capacity 45.0 MW) injection at Hanging Rock 765kV substation in the AEP area. Project AA2-137 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AA2-137 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Analysis - 2019

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

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

To be determined

Short Circuit

(Summary of impacted circuit breakers)

None

Affected System Analysis & Mitigation

To be determined

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.

Not Applicable

Light Load Analysis – 2019

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

Short Circuit

(Summary form of Cost allocation for breakers will be inserted here if any)

None

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

To be determined

Summer Peak Load Flow Analysis Reinforcements

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)

None

Light Load Load Flow Analysis Reinforcements

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

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)

None

AA2-137 Hanging Rock (Cornu) 765kV

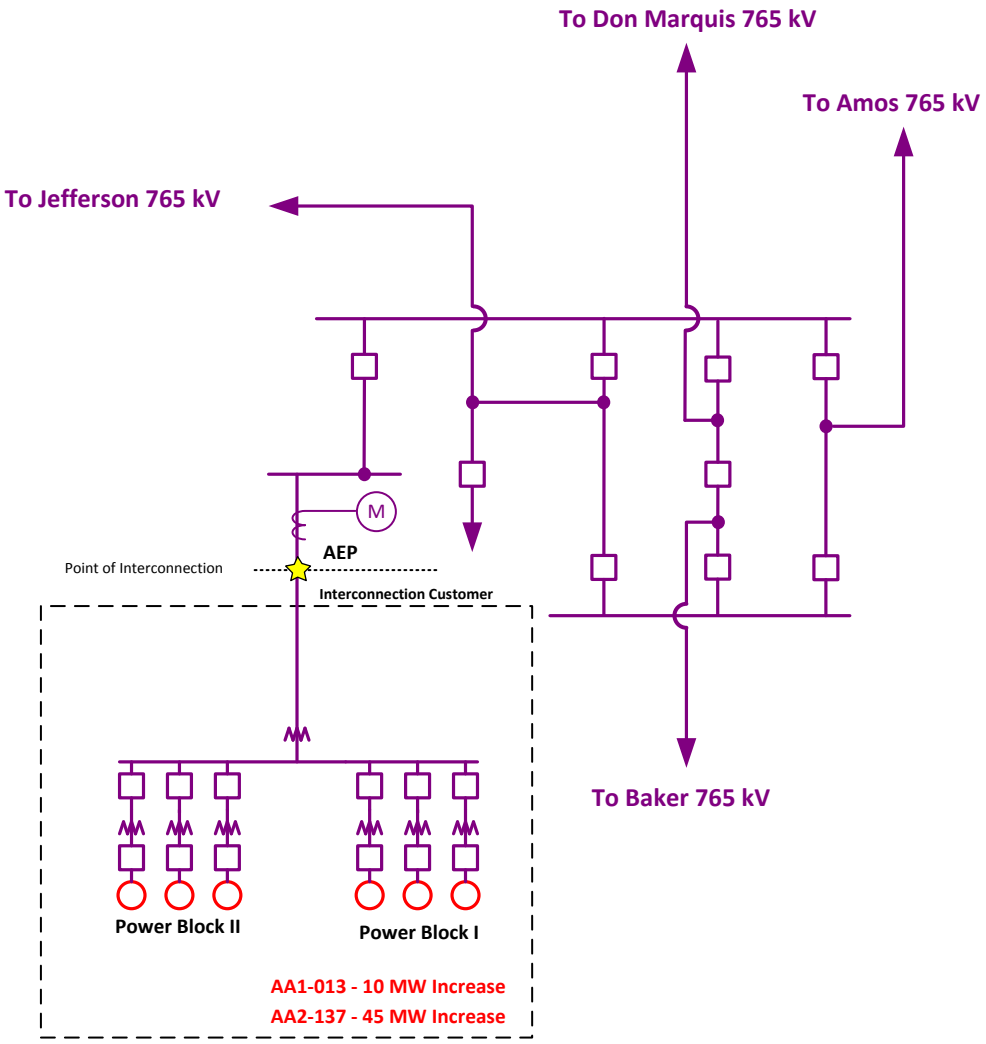

Figure 1

Figure 2