Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position AA2-070

Smith Mountain 138 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.

General

Interconnection Customer (IC) proposes to increase the generation at the Smith Mountain 138 kV Hydro plant by 34 MW (34 MW Capacity) to a total Maximum Facility Output (MFO) of 649 MW. The PJM Project Queue AA2-070, 34 MW (34 MW Capacity) increase is due to demonstrated testing. In addition, it was noted that the generators for units #2 and #4 were rewound. The location of the generating facility is in Sandy Level, VA.

The requested increase in MFO is shown by unit in the Table 1 below.

Smith Mountain Unit	Existing MFO and CIR	New MFO and CIR	MFO and CIR Increase
1	70	71	1
2	185	193	8
3	105	121	16
4	185	190	5
5	70	74	4
	615	**649**	**34**

Table 1

The requested in service date is June 1, 2015. Since the requested service date is ahead of the 2019 study year of PJM Project Queue AA2-070, IC has submitted an interim deliverability study request to PJM to determine if deliverability of the generator ahead of its 2019 study year is possible.

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.

Attachment Facilities

Not required for an existing facility

AEP Analysis

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 Queue # AA2-070 was studied as a 34 MW (34 MW capacity) injection at Smith Mountain 138 kV station consistent with the interconnection application. Project #AA2-070 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

Contribution to Previously Identified Overloads (2019 Summer Conditions Capacity Output)

- No problems identified

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1 https://www.aep.com/about/codeofconduct/oasis/transmissionstudies/GuideLines/2014%20AEP%20PJM%20FERC%20715_Final_Part%204.pdf

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

Normal System (2019 Summer Conditions Full Output)

- No problems identified

Single Contingency (2019 Summer Conditions Full Output)

- No problems identified

Multiple Contingency (2019 Summer Conditions Full Output)

- No problems identified

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

- No problems identified

Short Circuit Analysis

- No problems identified

Stability Analysis

- No problems identified

Voltage Variations

- No problems identified

Additional Limitations of Concern

- No problems identified

Local/Network Upgrades

- No problems identified

Conclusion

Based upon the results of this Feasibility Study, the injection of an additional 34 MW (34 MW Capacity) at Mountain Smith 138 kV Hydro Plant would not require additional Network upgrades.

PJM Analysis

Network Impacts

The Queue Project AA2-070 was evaluated as a 34.0 MW (Capacity 34.0 MW) injection into the Smith 138kV substation in the AEP area. Project AA2-070 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AA2-070 was studied with a commercial probability of 100%. 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 during later study phases

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)

Light Load 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)

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

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)

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