

***Generation Interconnection
Feasibility Study Report
(Web Version)***

For

***PJM Generation Interconnection Request
Queue Position W1-051***

Saint Thomas 34 kV III

Network Impacts

Queue project W1-051 was studied as a(n) 130.0MW (49.4MW of which was Capacity) injection into APS's system at two optional points of interconnection. The primary point of interconnection is the Warm Springs 138kV substation that is assumed to be constructed by a preceding project. The secondary point of interconnection is a tap of the Warm Springs – McConnellsburg 138kV line. Project W1-051 was evaluated for compliance with reliability criteria for summer peak conditions in 2014. Potential network impacts were as follows:

Primary POI: Warm Springs 138kV substation

Generator Deliverability

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

No problems identified.

Multiple Facility Contingency

(Double Circuit Tower Line Contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No problems identified.

Contribution to Previously Identified Overloads

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have % allocation of cost responsibility which will be calculated and reported for the Impact Study.)

No problems identified.

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)

None.

Short Circuit

(Report Overdutied breakers here)

APS has determined that no breakers were identified as being over their maximum interrupting rating.

Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of the surrounding generation. Any potential 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 Transmission Interconnection request.

Note: 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 analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.

No problems identified.

Attachment Facilities and Related Network Upgrades

This summary assumes the Warm Spring 138kV SS project (V3-062) has been completed prior to this project.

Install 1-138kV breaker in the existing ring bus, install 2-138kV switches, 138kV metering, 138kV CVT's, 138kV bus supports, 138kV dead-end structure and static pole. Install control cables and panels, and associated material. The IC shall interconnect via an overhead 138kV line. The IC is to install OPGW from Warm Springs SS to W1-051.

Estimated Cost: **\$725,132 in 2012 dollars**

Modify 138kV transfer trip facilities at Guilford Substation.

Estimated Cost: **\$44,381 in 2012 dollars**

Modify 138kV transfer trip facilities at McConnellsburg Substation.

Estimated Cost: **\$44,381 in 2012 dollars**

Modify 138kV transfer trip facilities at Cherry Run Substation.

Estimated Cost: **\$44,381 in 2012 dollars**

The estimated project duration is **15 months after the receipt of an executed Interconnection Service Agreement and Construction Service Agreement.**

While the information in this transmittal is reasonable for the scope of work defined, it should, however, be noted that the cost figures are conceptual in nature at this stage, as an engineering team has not been assigned to the project. Obviously, any change to the scope of work will require that the estimates be revisited. The costs are a best estimate, but the IC will be charged for actual costs. Any under-runs or over-runs will be reconciled at the conclusion of the project. The estimates in this report do not include tax gross-up.

The IC will interconnect with the Allegheny Power (AP) system via a customer-owned overhead line from a customer-owned substation located approximately 0.5 mile from the future Warm Spring SS. The above cost estimates do not include construction of that line. Route selection, line design, rights-of-way acquisition and construction of such lines will be entirely the responsibility of the IC. It is assumed that the IC's main step up transformer will conform to the AP standard with delta on the low side and grounded wye on the high side as illustrated in the AP Facility Connection Manual:

<http://www.alleghenypower.com/Bus2Bus/Gen%20Trans%20AP%20Facility%20Connection%20Requirements.pdf>.

AP reserves the right to review the electrical protection design and relay settings for IC facilities to ensure that the protective relaying equipment will be compatible with that installed at the new switching station. The relaying package will likely include both primary and backup protection. AP personnel must be present at the time of commissioning to inspect and witness proper function of the control scheme and related coordination. The estimated cost to perform this engineering review and field test effort is **\$10,000 in 2012 dollars**.

Note: The purchase and installation of protective relaying and associated equipment at the generation site is the responsibility of the IC and is not included in this scope of work.

It is assumed that a fiber optic interface will be used for the protection channel between the AP and IC stations. The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with the AP applicable standards.

Overloads and Required Reinforcements

No Generator Deliverability overloads were identified.

Secondary POI: Tap of the 138kV line between Warm Springs and McConnellsburg

Generator Deliverability

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

No problems identified.

APS Overloads and Required Reinforcements

No Generator Deliverability overloads were identified.

Multiple Facility Contingency

(Double Circuit Tower Line Contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No problems identified.

Contribution to Previously Identified Overloads

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have % allocation of cost responsibility which will be calculated and reported for the Impact Study.)

No problems identified.

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)

None.

Short Circuit

APS has determined that no breakers were identified as being over their maximum interrupting rating.

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Energy Portion of Interconnection Request

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Note: 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 analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.

No problems identified.

AP reserves the right to review the electrical protection design and relay settings for IC facilities to ensure that the protective relaying equipment will be compatible with that installed at Lime Kiln substation. The relaying package will likely include both primary and backup protection. AP personnel must be present at the time of commissioning to inspect and witness proper function of the control scheme and related

coordination. The estimated cost to perform this engineering review and field test effort is **\$10,000 in 2012 dollars**.

Note: The purchase and installation of protective relaying and associated equipment at the generation site is the responsibility of the IC and is not included in this scope of work.

It is assumed that a fiber optic interface will be used for the protection channel between the AP and IC stations. The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with the AP applicable standards.