Generation Interconnection Combined Feasibility/System Impact Study Report

For

PJM Generation Interconnection Request Queue Position AB2-027

Maple Avenue - Mt. Lena 34.5 kV

(Revised)

December 2016

Preface

The intent of the Combined Feasibility and System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, 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, if any, is included in the System Impact Study.

The Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. Interconnection Customer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs associated with them will be addressed when seeking an Interconnection Agreement as outlined below. Interconnection Customer will also be responsible for providing and installing metering equipment in compliance with applicable PJM and Transmission Owner standards.

General

Salt Energy Group (or "Interconnection Customer") has proposed a solar generating facility located at Funkstown in Washington County, MD . The installed facilities will have a total capability of 8.8 MW with 3.3 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is July 1, 2017. **This study does not imply a Potomac Edison commitment to this in-service date.**

Attachment facilities and local upgrades (if required) along with terms and conditions to interconnect AB2-027 will be specified in a separate two party Interconnection Agreement (IA) between Potomac Edison and the Interconnection Customer as this project is considered FERC non-jurisdictional per the PJM Open Access Transmission Tariff (OATT). From the transmission system perspective, no network impacts were identified as detailed below.

Point of Interconnection

AB2-027 will interconnect with the Potomac Edison distribution system by tapping the Maple Avenue – Mt. Lena 34.5 kV (B1) line. The tap point is located approximately 0.9 miles North of POI coordinates 39.598367, -77.701876. Refer to the one-line diagram in Appendix 2 for system configuration.

Costs Summary

Potomac Edison facilities and network upgrades as well as related costs estimates required for this interconnection project are listed below. Contributions in Aid of Construction (CIAC) tax gross-up is not included.

(a.) Attachment Facilities, **$ 256,100**, detailed as follows:

(a.1) Install 2 – 34.5 kV, 1200 A, load-break air switches on the Maple Ave – Mt. lena 34.5 kV line. Install 34.5 kV metering in customer's facilities and build single span of 336 ACSR to point of interconnection w/ customer.

- Cost estimate: $ 243,600
- Estimated time to complete: 12 Months
- Network Upgrade Number: Not Required

(a.2) Adjust Remote Relay and Metering Settings at Boonsboro and Maple Ave substations.

- Cost estimate: $ 12,500
- Estimated time to complete: 12 Months
- Network Upgrade Number: Not Required

(b.) Direct Connection Network Upgrades, $ 0 (None).

(c.) Non-Direct Connection Network Upgrades, $ 0 (None).

(d.) Direct Connection Local Upgrades: $ 0 (None).

(e.) Non-Direct Connection Local Upgrades: $ 0 (None).

(f.) Contributions for Previously Identified Upgrades: $ 0 (None).

(g.) Baseline Upgrades: $ 0 (None).

Total costs (a.) to (g.) w/o tax: $ 256,100

Interconnection Customer Requirements

In addition to the Potomac Edison facilities, Salt Energy Group will also be responsible for meeting all criteria as specified in the applicable sections of the FirstEnergy "Requirements for Transmission Connected Facilities" document including:

1. The purchase and installation of fully rated interrupting device on the high side of the AB2-027 step-up transformer.

2. The purchase and installation of the minimum required FirstEnergy generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.

3. The purchase and installation of a 34.5 KV interconnection metering package. FirstEnergy will provide the ratio and accuracy specifications.

4. The purchase and installation of supervisory control and data acquisition ("SCADA") equipment to provide information in a compatible format to the FirstEnergy Transmission System Control Center.

5. The establishment of dedicated communication circuits for SCADA to the FirstEnergy Transmission System Control Center.

6. A compliance with the FirstEnergy and PJM generator power factor and voltage control requirements of 0.95 leading to 0.95 lagging measured at the generator's terminals.

7. The execution of a back-up retail service agreement with the electric distribution company to serve the customer load supplied from the AB2-027 generation project interconnection point when the units are out-of-service.

The above requirements are in addition to any metering or other requirements imposed by PJM.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

Transmission Owner Requirements

Salt Energy Group will be required to comply with all FirstEnergy revenue metering requirements for generation interconnection customers. The FirstEnergy revenue metering requirements may be found in the FirstEnergy "Requirements for Transmission Connected Facilities" document located at the following links:

http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx

Schedule

Based on the extent of the FirstEnergy attachment facilities, direct and non-direct network system upgrades required to support the AB2-027 generation project, it is expected to take a minimum of 12 months from the date of a fully executed Interconnection Construction Service Agreement to complete the installation. This includes the requirement for Salt Energy Group to make a preliminary payment to FirstEnergy which funds the first three months of engineering design that is related to the construction of the Direct Connection facilities. It further assumes that Salt Energy Group will provide all rights-of-way, permits, easements, etc. that will be needed. A further assumption is that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined Direct Connection and Non-direct Connection upgrades, and that all system outages will be allowed when requested.

Other Supporting Facilities Charge

The Other Supporting Facilities Charge (OSFC) may include non-transmission facilities directly assigned and/or a general (rolled-in) facilities charge.

The Other Supporting Facilities Charge for the AB2-027 generator interconnection project has been estimated to be $13,773/month in 2016 dollars. The estimate is based on a direct assigned rate and an average (or rolled-in) rate for Potomac Edison's transmission system less than 100 kV.

Network Impacts

The Queue Project AB2-027 was evaluated as a 8.8 MW (Capacity 3.3 MW) injection tapping the Maple Ave-Mount Lena 34.5kV line in the APS area. Project AB2-027 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB2-027 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.

Steady-State Voltage Requirements

Not required.

Short Circuit

(Summary of impacted circuit breakers)

None.

Affected System Analysis & Mitigation

NYISO Impacts:

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.

Light Load Analysis - 2020

None.

System Reinforcements

Short Circuit

None.

Stability and Reactive Power Requirement

None.

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)

None.

Light Load Load Flow Analysis Reinforcements

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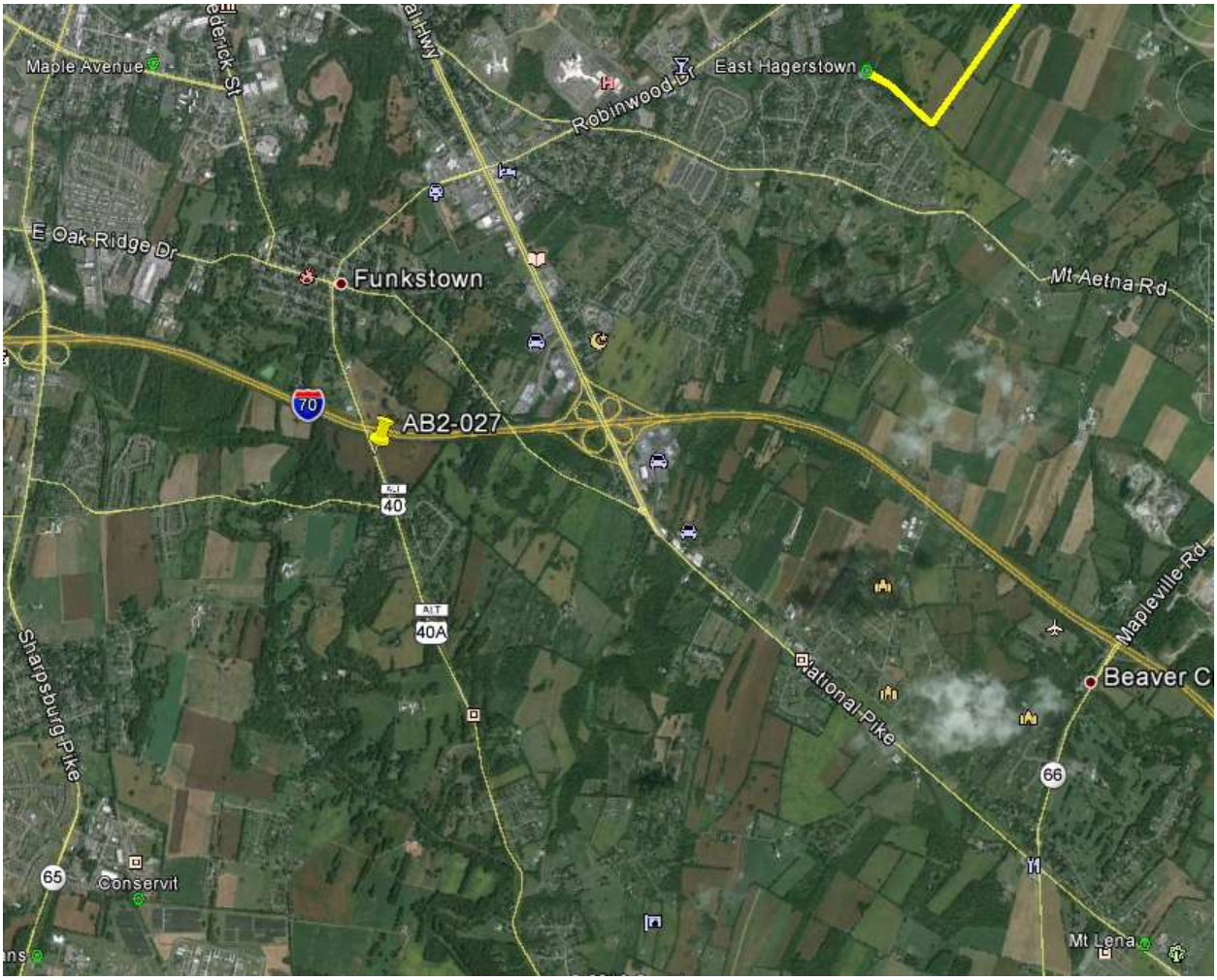
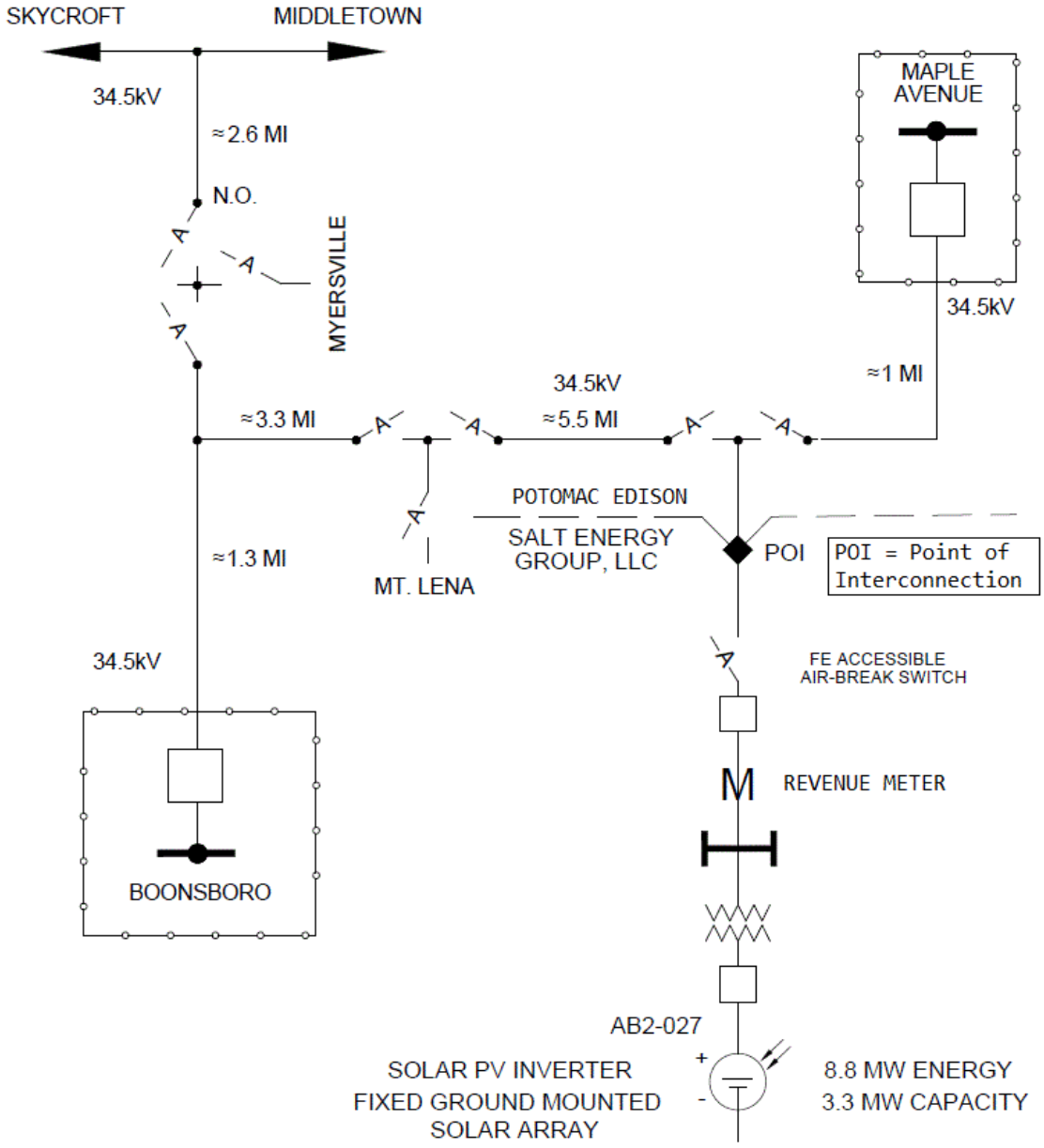
Appendix 1
Facility Location



Appendix 2

Interconnection Single Line Diagram (SLD)
PJM Queue Project Number: AB2-027



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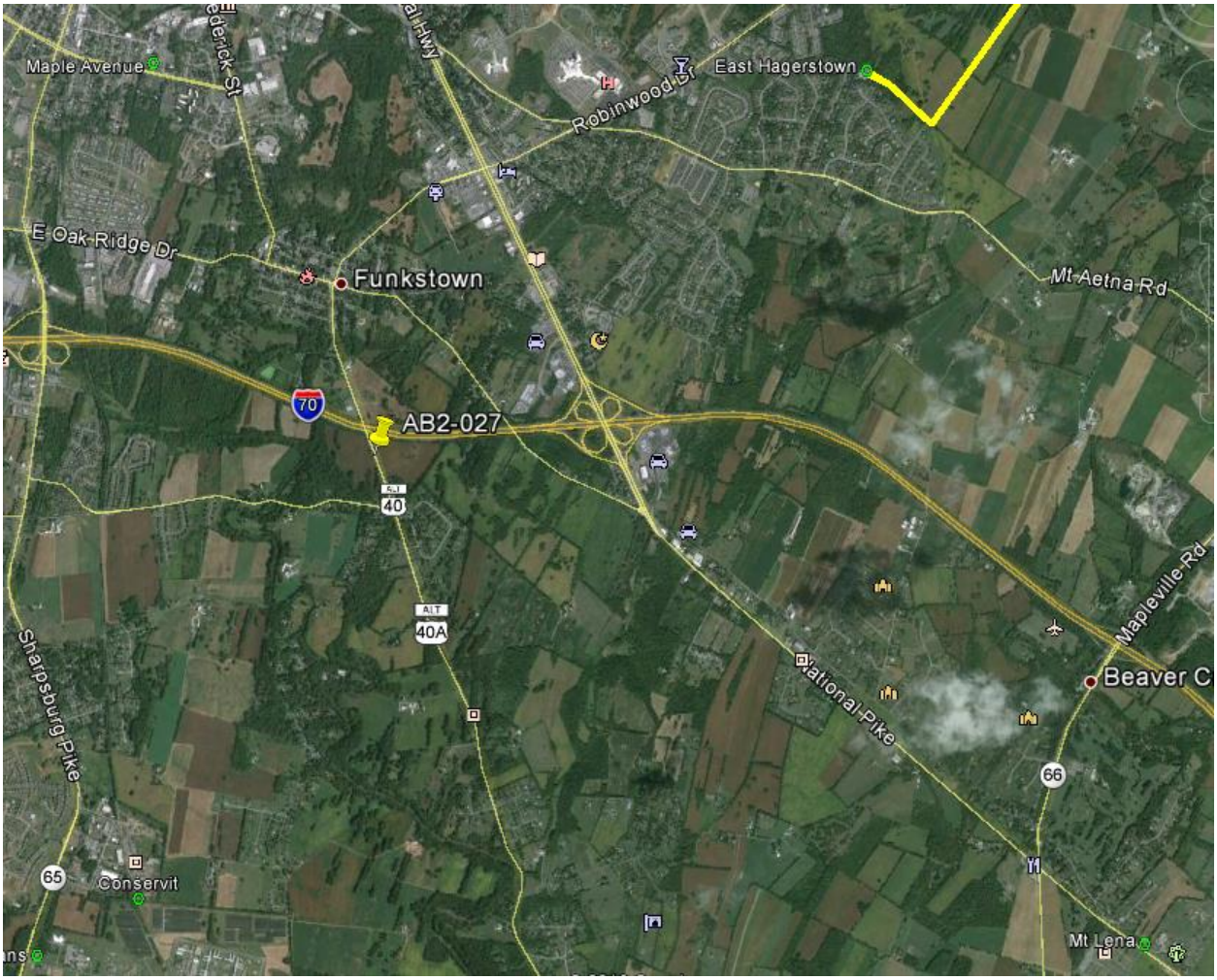

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