Generation Interconnection System Impact Study Report

For

PJM Generation Interconnection Request Queue Position AC2-120

“Ripley 69 kV”

February 2018

Preface

The intent of the 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 will be deferred until the System Impact Study is performed.

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

General

MD Solar 2, LLC, the Interconnection Customer (IC), has proposed a 27.5 MW (10.45 MWC) solar generating facility to be located in Charles County, Maryland. PJM studied AC2-120 as a 27.5 MW injection into the Southern Maryland Electric Cooperative (SMECO) system at the Ripley 69 kV Substation and evaluated it for compliance with reliability criteria for summer peak conditions in 2020. The planned in-service date, as requested by the IC during the project kick-off call, is June 30, 2019. This date may not be attainable due to additional required PJM studies and the Transmission Owner's construction schedule.

Point of Interconnection

The Interconnection Customer requested a transmission level Point of Interconnection (POI). As a result, AC2-120 will interconnect with the SMECO transmission system at an open 69 kV bay within the existing SMECO 69 kV Ripley switching station (see Attachment 1).

Transmission Owner Scope of Direct Connection Work

Substation Estimate

Scope: The proposed interconnection will utilize an open 69 kV bay within the existing SMECO 69 kV Ripley switching station as indicated herein. To use this open bay, the existing station fence line will need to be expanded by approximately 26' X 122' with an extra 5' outside the fence line for the ground grid. The station fence line expansion allows the room needed to install the utility required line breaker, metering, and disconnect switch while still maintaining sufficient access within and

around the station. The IC is responsible for acquiring and conveying the necessary land, opposite the open bay position, to SMECO to accommodate the station fence expansion. It is believed that the adjacent land area is owned or otherwise available to the IC for this purpose.

Breaker isolating disconnect switches need to be added to the existing Ripley switching station bus at the open bay position. This work requires a partial 69 kV bus outage. During the bus outage period, SMECO will need to construct two temporary 69 kV bypass circuits to maintain service to existing Grayton and McConchie substation loads served via 69 kV line #6718 and #6727 respectively.

The SMECO owned side of the physical interconnection includes a 69 kV line breaker with protective relaying and control circuits, communications, revenue metering units, and disconnect switches. The IC installed and owned self-supporting dead-end structure outside SMECO's substation will be the POI and physical SMECO / IC demarcation. The physical line connection from the station to the IC dead-end structure will be a TBD overhead line conductor.

Scope-of-Work clarifications include:

1. The temporary 69 kV transmission bypass circuits require jumpers to be installed on the 69 kV dual-circuit #6727 / #6717 pole line just south of Ripley switching station. The 69 kV line #6717 feeding towards Mason Springs substation must be temporarily relocated to a second open bay at Ripley switching station. This temporary line work allows for the necessary bus outage on half of Ripley switching station.

2. Protective relaying is installed within the 69 kV breaker cabinet as opposed to being housed within a separate control building. This estimate does not include the addition of a climate-controlled control building at Ripley switching station.

Cost Estimate:

Engineering, Company Labor, and Overhead	$184,665.00
Material	$197,125.00
Construction	$289,710.00
Total	**$671,500.00**

Note: The increased cost difference between the previous Feasibility Study and the new System Impact study includes:

1. Added engineering and surveying costs
2. Costs to extend the station fence line and rock the construction area

Cost estimate clarifications:

1. SMECO's estimated cost covers engineering, project management, labor and materials, construction, and construction management. A 15% contingency is added for material and labor.

2. Estimate does not include grading and site work for the fence extension; however, the costs to relocate the fence and rock the construction area are included in the estimate.
3. Estimate does not include any environmental, real estate, or permitting costs. Such items were not reviewed as part of this Impact Study.

Construction Schedule:

Estimated engineering and construction time is 12 months after receiving the signed interconnection agreement and initial milestone payment as follows:

Engineering	3 months
Material Procurement	6 months
Construction	3 months

Note: SMECO prefers that construction be scheduled between March and October.

Interconnection Customer Scope of Work

1. The SMECO / IC demarcation (POI) is the IC installed and owned dead-end structure just outside of the expanded Ripley switching station fence line. The IC is responsible for installing the conductor from the proposed project site to the dead-end and SMECO is responsible for the overhead conductor and disconnect switch jumpers from the station to the dead-end.
2. The IC is required to have a separate 69 kV load-break line disconnect switch at the IC collector substation.
3. The IC is responsible for all aspects of the new 69 kV tap line, the isolation transformer, and associated distribution feeder circuits. All such facilities are subject to SMECO review and approval.

Metering

The IC is required to provide revenue metering and real-time telemetering data to PJM in conformance with the requirements contained in PJM Manuals M-01 and M-14 and the PJM Tariff.

Required Relaying and Communications

Protective relaying design and installation must comply with SMECO's applicable standards.

Summer Peak Analysis - 2020

Transmission Network Impacts

Potential transmission network impacts are as follows:

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

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

Steady-State Voltage Requirements

To be performed during later study phases.

Short Circuit

No issues identified.

Stability and Reactive Power Requirement

No issue identified.

Light Load Analysis - 2020
Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

Facilities Study Estimate

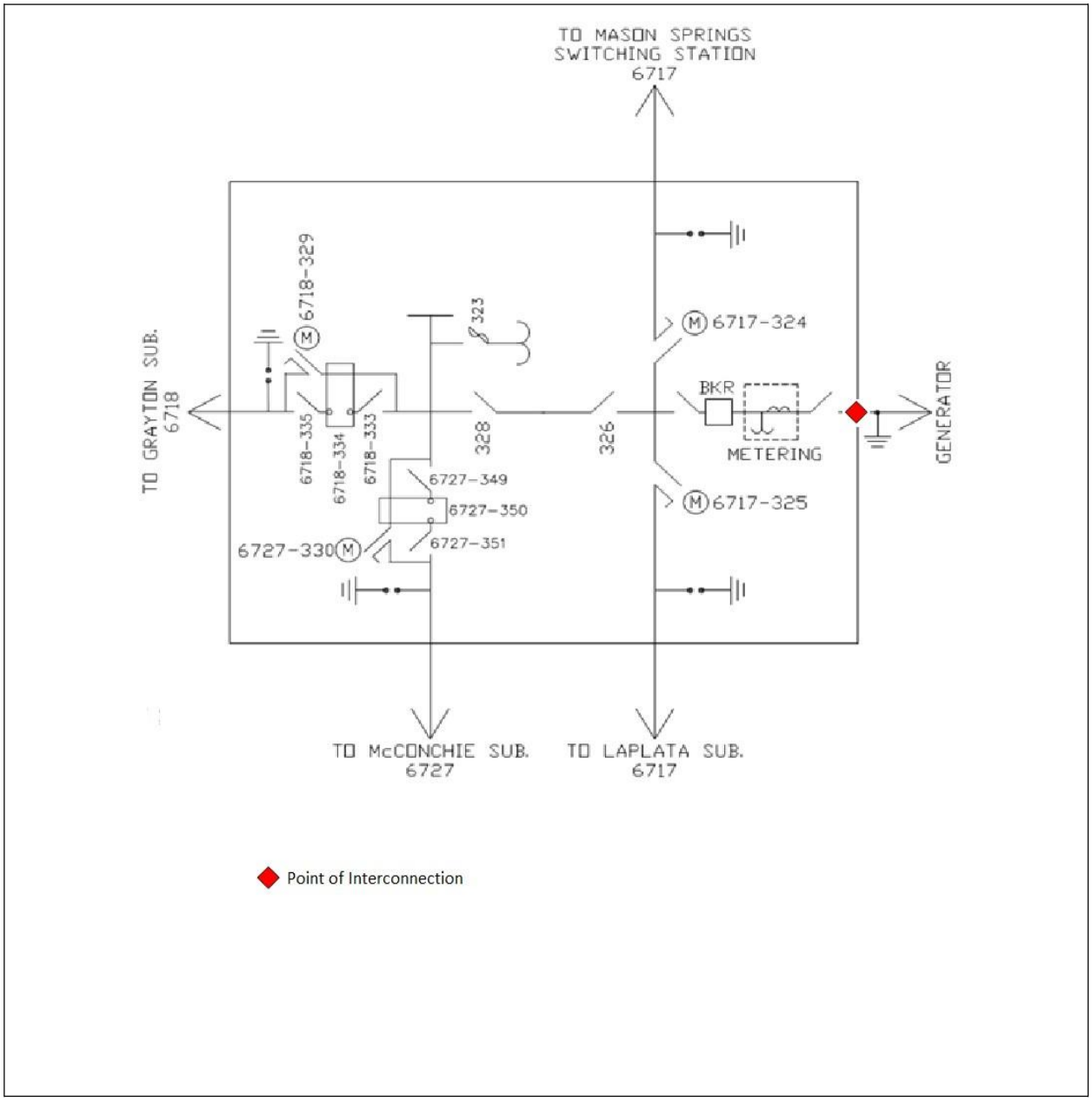
7 months: $100,000

Delivery of Energy Portion of Interconnection Request

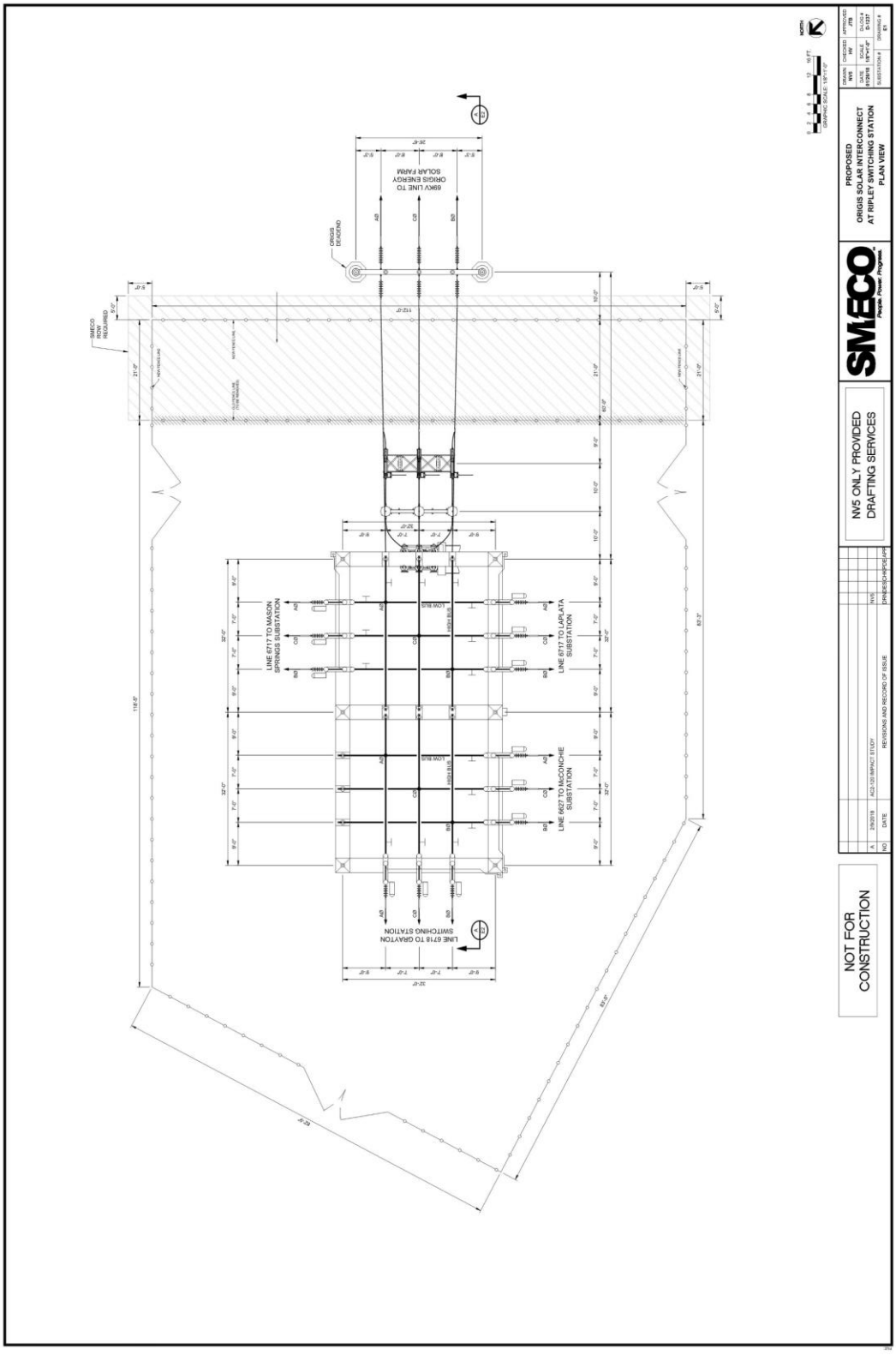
PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion 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

Attachment 1



Attachment 1 cont'd



Attachment 1 cont'd