Revised
Generation Interconnection
System Impact Study Report

For

PJM Generation Interconnection Request
Queue Position AD2-073

“Sanders DP 230 kV”

13.32 MW Capacity / 19.92 MW Energy

March 2019

Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between **Westmoreland County Solar Project, LLC**, the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company (VEPCO).

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 project developer 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.

Changes from System Impact Study Report Issued February 2019

The System Impact Study has been modified to reflect the need to move to a Facilities Study phase for this project in order for VEPCO to identify the remote terminal and anti-islanding scope of work needed to accommodate this generation (see the added section "Non-Direct Connection Work" section below).

General

The IC has proposed a solar generating facility located in Warsaw, Virginia (Westmoreland Township). The installed facilities will have a total capability of **19.92 MW** with **13.32 MW** of this output being recognized by PJM as capacity. The expected Commercial Operation Date for this project is by **December 1, 2021**.

Attachment facilities and local upgrades (if required) along with terms and conditions to interconnect AD1-073 will be specified in a separate two party Interconnection Agreement (IA) between Northern Neck Electric Cooperative 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 in the "Network Impacts" section below.

Point of Interconnection

AD2-073 "Sanders DP 230 kV" will interconnect to the Northern Neck Electric Cooperative and participate in the PJM market via a Wholesale Market Participation Agreement (WMPA) with VEPCO and PJM. The Point of Interconnection for purposes of effectuating sales of Capacity or energy into PJM's wholesale markets is shown as a yellow star on the high side of the 230-34.5 kV transformer at the Sanders DP Substation in **Attachment 1**. This is the point of demarcation between VEPCO and the Northern Neck Electric Cooperative. The physical interconnection point to the system (point of common coupling) will be on the Northern Neck Electric Cooperative 34.5 kV system via a single 34.5 kV breaker. This point of common coupling is shown as a blue triangle in Attachment 1. The VEPCO system feeds the Sanders DP 230 kV Substation. See the one line in Attachment 1 for clarity.

Transmission Owner Scope of Work

Attachment facilities and local upgrades (if required) along with terms and conditions to interconnect AD2-073 will be specified in a separate two party Interconnection Agreement (IA) between Northern Neck Electric Cooperative and the IC as this project is considered FERC non-jurisdictional per the PJM Open Access Transmission Tariff (OATT). From the transmission system perspective, network impacts were identified as detailed below. The single line is shown below in **Attachment 1**.

Interconnection Customer Requirements

The Interconnection Customer assumes full responsibility for design and construction of all facilities associated with the AD2-073 solar facility and the direct connection line on the IC side of the Point of Common Coupling as defined in Attachment 1.

Non-Direct Connection Work

Remote Terminal Work: During the Facilities Study, ITO's System Protection Engineering Department will review transmission line protection as well as anti-islanding required to accommodate the new generation. System Protection Engineering will determine the minimal acceptable protection requirements to reliably interconnect the proposed generating facility with the system. The review is based on maintaining system reliability by reviewing ITO's protection requirements with the known transmission system configuration which includes generating facilities in the area. This review may determine that transmission line protection and communication upgrades are required at remote substations.

Revenue Metering and SCADA Requirements

Wholesale Market Participant shall be responsible for the installation of metering and telemetry at the point of common coupling (as shown in Schedule A) between the Wholesale Market Participant's Participant Facility and the Northern Neck Electric Cooperative system as required by PJM Manuals M-01 and M14D. Northern Neck Electric Cooperative and the Wholesale Market Participant will collectively determine meter ownership.

Wholesale Market Participant shall make its metering data at the point of common coupling available to Northern Neck Electric Cooperative, or its affiliate, via telemetry for use by Northern Neck Electric Cooperative and Transmission Owner for balancing, settlement and audit purposes. Wholesale Market Participant may purchase and install its own backup metering.

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Network Impacts

The Queue Project AD2-073 was evaluated as a 19.92 MW (Capacity 13.32 MW) injection at Sanders DP 230 kV in the ITO area. Project AD2-073 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-073 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2021

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

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

Short Circuit

(Summary of impacted circuit breakers)

None

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

Dynamic analysis is not required.

Affected System Analysis & Mitigation

None

System Reinforcements

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

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)

None

Light Load Analysis - 2021

Not required for this fuel type.

Incremental Capacity Transfer Rights (ICTRs)

No network upgrades were identified so no study is required for an increase to the CETL in the 2021/2022 BRA case.

Attachment 1. AD2-073 "Sanders DP 230 kV"
One Line Diagram