Generation Interconnection

Combined Feasibility/System Impact Study Report

for

Queue Project AG1-397

WALSTON 12 KV

4.1882 MW Capacity / 9.972 MW Energy

January 2021

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1 Introduction

This Combined Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is DPL.

2 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer 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. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. 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 Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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 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.

3 General

The Interconnection Customer (IC), has proposed a Solar; Storage generating facility located in Wicomico County, Maryland. The installed facilities will have a total capability of 9.972 MW with 4.1882 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is November 01, 2021. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-397
Project Name	WALSTON 12 KV
State	Maryland
County	Wicomico
Transmission Owner	DPL
MFO	10
MWE	9.972
MWC	4.1882
Fuel	Solar; Storage
Basecase Study Year	2024

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Point of Interconnection

AG1-397 will interconnect behind the Walston Switch tap (Choptank Electric Cooperative) of the North Salisbury to Worcester 69kV line .

5 Cost Summary

The AG1-397 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$0
Total System Network Upgrade Costs	$0
Total Costs	$0

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

6 Transmission Owner Scope of Work

No transmission owner work is necessary to facilitate the interconnection of this generator.

The total physical interconnection costs is given in the table below:

Description	Total Cost
Total Physical Interconnection Costs	$0

7 Schedule

N/A

8 Transmission Owner Analysis

None

9 Interconnection Customer Requirements

DPL will require Choptank install Over-Voltage Protection Relaying on the high side (69kV) of Choptank's transformer at the Walston Switch Substation (on the Choptank side of the POI)

- This work should be completed by Choptank or their contractors
- The required settings are from IEEE 1547 – 110% of nominal (phase-ground voltage) clearing in 1s, 120% of nominal without delay
- Activation of this relay should trip either the Choptank delivery point or the generators connected behind that delivery point

The Interconnection Customer is responsible for contacting Choptank Electric Cooperative (CEC) for any additional Interconnection Customer requirements.

10 Revenue Metering and SCADA Requirements

10.1 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 Section 8 of Attachment O.

10.2 Meteorological Data Reporting Requirements

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

10.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

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

11 Summer Peak - Load Flow Analysis

The Queue Project AG1-397 was evaluated as a 10.0 MW (Capacity 4.2 MW) injection in the DPL area. Project AG1-397 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-397 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

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

None

11.2 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

11.3 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

11.4 Potential Congestion due to Local Energy Deliverability

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.

Note: Only the most severely overloaded conditions are listed below. 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 shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
167974787	232114	SHARNGTN	138.0	DP&L	232112	FELTON	138.0	DP&L	1	DPL_P1_2_CKT 23031	operation	242.0	99.89	100.34	DC	1.08
167974676	232250	NELSN_69	69.0	DP&L	232828	SHORT 1	69.0	DP&L	1	DPL_P1_2_CKT 23002	operation	112.0	124.8	125.86	DC	1.25
167974678	232250	NELSN_69	69.0	DP&L	232828	SHORT 1	69.0	DP&L	1	Base Case	operation	87.0	100.0	101.21	DC	1.05
167974686	232270	HEBRON	69.0	DP&L	232838	MARDELA	69.0	DP&L	1	DPL_P1_2_CKT 13780	operation	64.0	116.02	118.61	DC	1.66
167974595	232828	SHORT 1	69.0	DP&L	232249	LAUREL	69.0	DP&L	1	DPL_P1_2_CKT 23002	operation	93.0	138.9	140.18	DC	1.25
167974743	232838	MARDELA	69.0	DP&L	232241	VIENN_69	69.0	DP&L	1	DPL_P1_2_CKT 13780	operation	64.0	106.49	109.08	DC	1.66

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
			TOTAL COST	**$0**

11.6 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

11.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

None

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
Base Case	
DPL_P1_2_CKT 23002	CONTINGENCY 'DPL_P1_2_CKT 23002' DISCONNECT BUS 232007 /INDIAN RIVER - PINEY GROVE 230 & PNY GRV AT-20 XFMER END
DPL_P1_2_CKT 23031	CONTINGENCY 'DPL_P1_2_CKT 23031' OPEN LINE FROM BUS 232002 TO BUS 232004 CIRCUIT 1 /CEDAR CREEK - MILFORD 230 END
DPL_P1_2_CKT 13780	CONTINGENCY 'DPL_P1_2_CKT 13780' OPEN LINE FROM BUS 232127 TO BUS 232117 CIRCUIT 1 /LORETTO - VIENNA 138 END

12 Short Circuit Analysis

None

13 Affected Systems

None

14 Attachment 1: One Line Diagram