Generation Interconnection Combined Feasibility/Impact Study Report

For

PJM Generation Interconnection Request Queue Position Y3-29

Damascus - Mt. Airy 34.5kV Project

August, 2013

Combined Feasibility/Impact Study Report

Damascus – Mt. Airy 34.5kV Generation Project – Queue No. Y3-029

Introduction

This combined Feasibility/System Impact Study report provides the documentation of an assessment that has been performed by PJM Interconnection LLC and FirstEnergy (FE) in response to a request made by Hickory Plains Equities, LLC for the connection of a 4.375 MW (4.375 MW Capacity) Damascus – Mt. Airy 34.5 kV Generation Project to the Potomac Edison subtransmission system.

Connection Facilities

Hickory Plains Equities, LLC has submitted a "Form of Generation Interconnection Feasibility Study Agreement " to PJM that identifies its plan to construct the Damascus – Mt. Airy 34.5kV Generation Project comprised of a CHP Cogeneration Unit on a property that is approximately 1.25 miles from the existing Damascus – Mt. Airy (AD1/AD2/AT1 Tap – Green Valley Tap Section) 34.5 kV Line (see Attachment 1 and Attachment 2). The installed facilities will have a total generating capability of 4.375 MW with 4.375 MW of this output being recognized by PJM as capacity.

As defined by Hickory Plains Equities, LLC and shown on Attachment 1, the proposed Damascus – Mt. Airy 34.5kV Generation Project site will be located at a point approximately 1.75 miles from Green Valley substation. The direct connection of this project will be accomplished by utilizing the proposed 34.5 kV tap from the AD1/AD2/AT1 Tap – Green Valley Tap 34.5 kV line 0.41 miles east of Green Valley substation. Hickory Plains Equities, LLC will be responsible for constructing a radial attachment line (which is to be constructed to serve the Hickory Plains Equities, LLC load connection) from the Damascus – Mt. Airy 34.5kV Generation Project generation bus to the 34.5kV point of interconnection (POI). Hickory Plains Equities, LLC may not install above ground equipment within any FE right-of-way unless permission to do so is expressly granted by FE.

Attachment 2 shows a conceptual one-line diagram of the 34.5kV interconnection to accommodate the attachment of the Damascus – Mt. Airy 34.5 kV Generation Project.

Hickory Plains Equities, LLC will be responsible for constructing all of the facilities on its side of the POI including the attachment line. A summary of the FE facilities required for the Damascus – Mt. Airy 34.5 kV Generation Project connection and their estimated cost are shown on Attachment 3.

PJM Interconnection Study Results

The following are the results of the analysis performed by PJM engineers with respect to the transmission system impacts.

Network Impacts

The Queue Project #Y3-029 was studied as a 4.4MW (Capacity 4.4MW) injection at the DAMASCUS 230 kV substation in the APS area. Project #Y3-029 was evaluated for compliance with reliability criteria for summer peak conditions in 2017. Potential network impacts were as follows:

Generator Deliverability

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

None

Light Load Analysis

Not applicable

Multiple Facility Contingency

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

None

Short Circuit

See the "Interconnected Transmission Owner's Analysis Results" section of this report

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

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

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.

Not Applicable

Interconnected Transmission Owner's Analysis Results

The following was generated by FirstEnergy, the Interconnected Transmission Owner, based upon its analysis, as well as that of PJM, for mitigation of the project's impacts on the transmission and lower voltage system as applicable. It includes the costs and schedules for any system upgrades.

Power Flow Analysis

A power flow study was conducted to determine the reliability impact of the proposed Damascus – Mt. Airy 34.5 kV Generation Project on the FE transmission and subtransmission systems. This study was completed using a 2013 summer peak load power flow model that contains a detailed representation of the Potomac Edison transmission and subtransmission networks in the area of the proposed Damascus – Mt. Airy 34.5kV Generation Project. The findings and the recommendations from this analysis are based on a contingency review that was performed to identify the facility loadings and/or voltage conditions that violate the ReliabilityFirst, PJM or FE Planning Criteria and are attributable to this project. Note that in accordance with PJM RTEP study procedures, this Damascus – Mt. Airy 34.5 kV Generation Project under study and earlier active generation queue projects are considered to be in service. Therefore, all active generation queue projects after Y3-029 are considered not in service.

The POI (see Attachment 2) of the 4.375 MW Damascus – Mt. Airy 34.5 kV Generation Project was modeled as connected to the Damascus – Mt. Airy 34.5 kV line between AD1/AD2/AT1 Tap and Green Valley Tap at a point approximately 0.41 miles east of Green Valley substation. The results of the FE analysis show that there are no transmission network upgrades required for the deliverability of the Damascus – Mt. Airy 34.5 kV Generation Project generation to the FE transmission system.

Note that a further conclusion of this study is that it will be mandatory for the Damascus – Mt. Airy 34.5 kV Generation Project to have a range of dynamic reactive capability that supports its operation from a 0.95 leading to 0.90 lagging power factor. Should Hickory Plains Equities, LLC fail to provide dynamic reactive capability from the Damascus – Mt. Airy 34.5 kV Generation Project for any reason once interconnected, the FE and/or PJM dispatchers may need to take action to curtail both the energy and capacity portion of the facility to prevent non-compliance with voltage criteria.

Short Circuit and Dynamics Analysis

A short circuit review was conducted by the FE staff for the Damascus – Mt. Airy 34.5 kV Generation Project. The analysis determined that no transmission or subtransmission FE circuit breaker will exceed its interrupting capability with the interconnection of the Damascus – Mt. Airy 34.5 kV Generation Project. Therefore no circuit breaker reinforcements will be required.

System Protection Analysis

An analysis was conducted to assess the impact of the Damascus – Mt. Airy 34.5kV Generation Project on the system protection requirements in the area. The results of this review have identified the following:

- Install an Anti-islanding Scheme between Damascus, Mt. Airy, and Hickory Plains (Customer Owned) substations to remove the Damascus – Mt. Airy 34.5kV Generation Project from service should the breakers at Damascus and Mt. Airy substations open.

Attachment 4 shows the specific power and protection equipment requirements.

Metering

Hickory Plains Equities, LLC will be required to comply with all PJM and FE Revenue Metering Requirements for Generation Interconnection Customers. The FirstEnergy Revenue Metering Requirements may be found in the FE "Requirements for Transmission Connected Facilities" document located at the following links:

www.firstenergycorp.com/feconnect
www.pjm.com/planning/design-engineering/to-tech-standards.aspx

Compliance Issues

The proposed interconnection facilities must be designed in accordance with the FE "Requirements for Transmission Connected Facilities" located at:

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

Hickory Plains Equities, LLC will also be responsible for following the requirements of the "FirstEnergy Wholesale Generation Interconnection (WGI) Manual" and the FE "Approved Vendors and Contractors" documents which are also located at the above link.

Hickory Plains Equities, LLC will also be required to meet all PJM, ReliabilityFirst and NERC reliability criteria and operating procedures for standards compliance. For example, Hickory Plains Equities, LLC will need to properly locate and report the over- and under-voltage and over- and under-frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and ReliabilityFirst audits. Failure to comply with these requirements may

result in a disconnection of service if the violation is found to compromise the reliability of the FE system.

FE Facility Upgrades and Costs

The results of the FE power flow analysis show that the Damascus – Mt. Airy 34.5 kV Generation Project does not attribute to any planning criteria violations.

The direct connection for the Damascus – Mt. Airy 34.5kV Generation Project to the Potomac Edison subtransmission system is detailed in Attachment 3. The associated one-line with the Damascus – Mt. Airy 34.5kV Generation Project direct connection is shown in Attachment 2. Note that all cost estimates contained in this document were produced without a detailed engineering review and are therefore subject to error. More accurate estimates will be determined as a part of the Facilities Study. Hickory Plains Equities, LLC will be responsible for the actual cost of the direct connection that is implemented. In addition, Hickory Plains Equities, LLC is responsible to provide the subtransmission line between the POI and the Damascus – Mt. Airy 34.5kV Generation Project collector substation, as Hickory Plains Equities, LLC will own this subtransmission line. FE herein reserves the right to return to any issues in this document and, upon appropriate justification, request additional monies to complete any reinforcements to the transmission or subtransmission systems.

Hickory Plains Equities, LLC Requirements

In addition to the FE facilities, Hickory Plains Equities, LLC will also be responsible for meeting all criteria as specified in the applicable sections of the FE "Requirements for Transmission Connected Facilities" document including:

1. The purchase and installation of a fully rated 34.5kV circuit breaker to permit tripping of the entire plant.

2. The purchase and installation of the minimum required FE 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 supervisory control and data acquisition (SCADA) equipment to provide information in a compatible format and to provide anti-islanding trip control to the FE Transmission System Control Center.

4. The establishment of dedicated communication circuits for SCADA reporting to the FE Transmission System Control Center.

5. A compliance with the FE and PJM generator power factor and voltage control requirements.

6. The execution of a back-up service agreement to serve the customer load supplied from the Damascus – Mt. Airy 34.5kV Generation Project 34.5kV metering point when the units are out-of-service. This assumes the intent of Hickory Plains Equities, LLC is to net the generation with the load.

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

Summary

The Damascus – Mt. Airy 34.5 kV Generation Project direct connection will require the facility upgrades defined in Attachment 3. As shown, the estimated cost of the facilities for the direct connection is $458,400. This cost includes a CIAC (Contribution in Aid of Construction) Federal Income Tax Gross Up charge of $107,600. This tax may or may not be charged based on whether or not this project meets the eligibility requirements of IRS Notice 88-129.

Based on the extent of the FE direct connection, it is expected to take a minimum of eight (8) months from the date of a fully executed Interconnection Construction Service Agreement to complete the installation required for the Damascus – Mt. Airy 34.5 kV Generation Project. This includes the requirement for Hickory Plains Equities, LLC to make a preliminary payment to FE which funds the first three months of engineering design that is related to the construction of the Direct Connection facilities. A further assumption is that there will be no environmental issues with any of the new properties associated with this project or the Hickory Plains CHP Load connection project, that there will be no delays in acquiring the necessary permits for implementing the defined direct connection and network upgrades, and that all system outages will be allowed when requested.

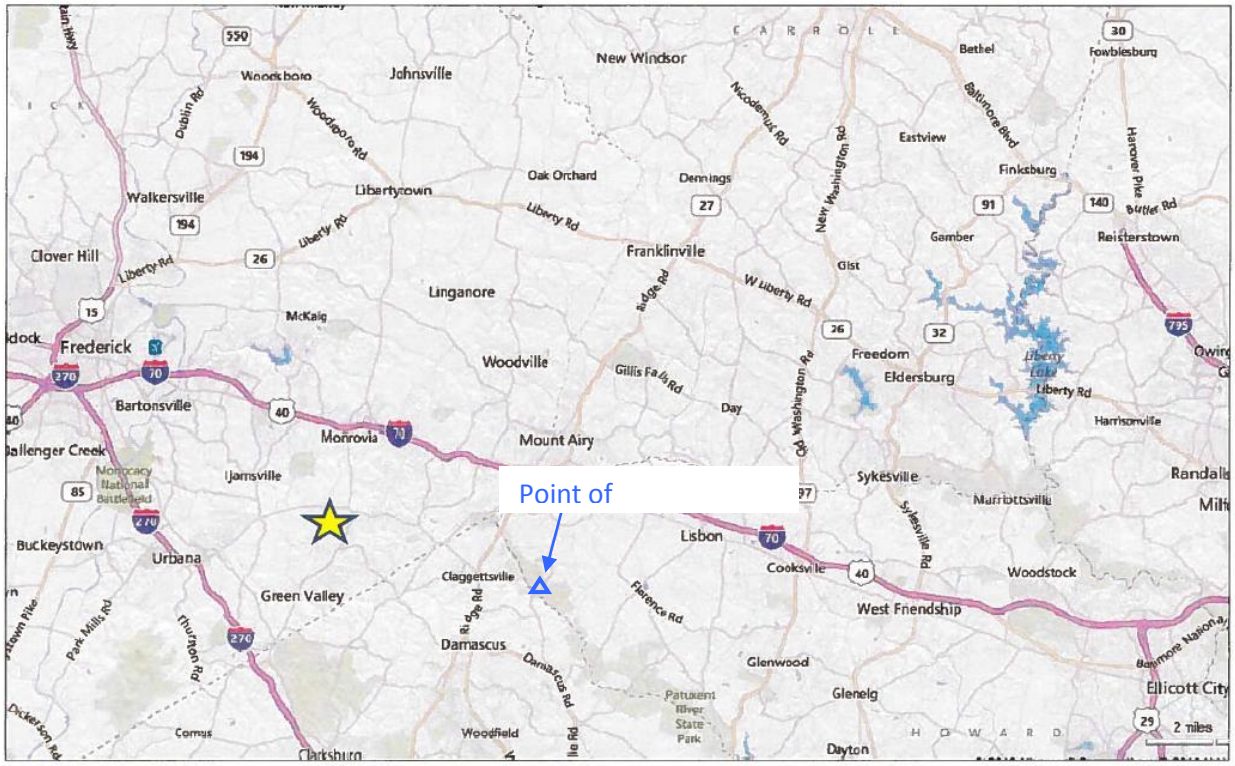
Note that the FE findings were made from a conceptual review of this project. A more detailed review of the connection facilities and their cost will be identified in the Facilities Study. Further note that the cost estimate data contained in this document should be considered as only ballpark since it was produced without a detailed engineering review. The applicant will be responsible for the actual cost of construction. FE herein reserves the right to return to any issues in this document and, upon appropriate justification, request additional monies to complete any upgrades to the transmission or subtransmission systems.

Attachment 1
Damascus – Mt. Airy 34.5kV Generation Project
Project Location

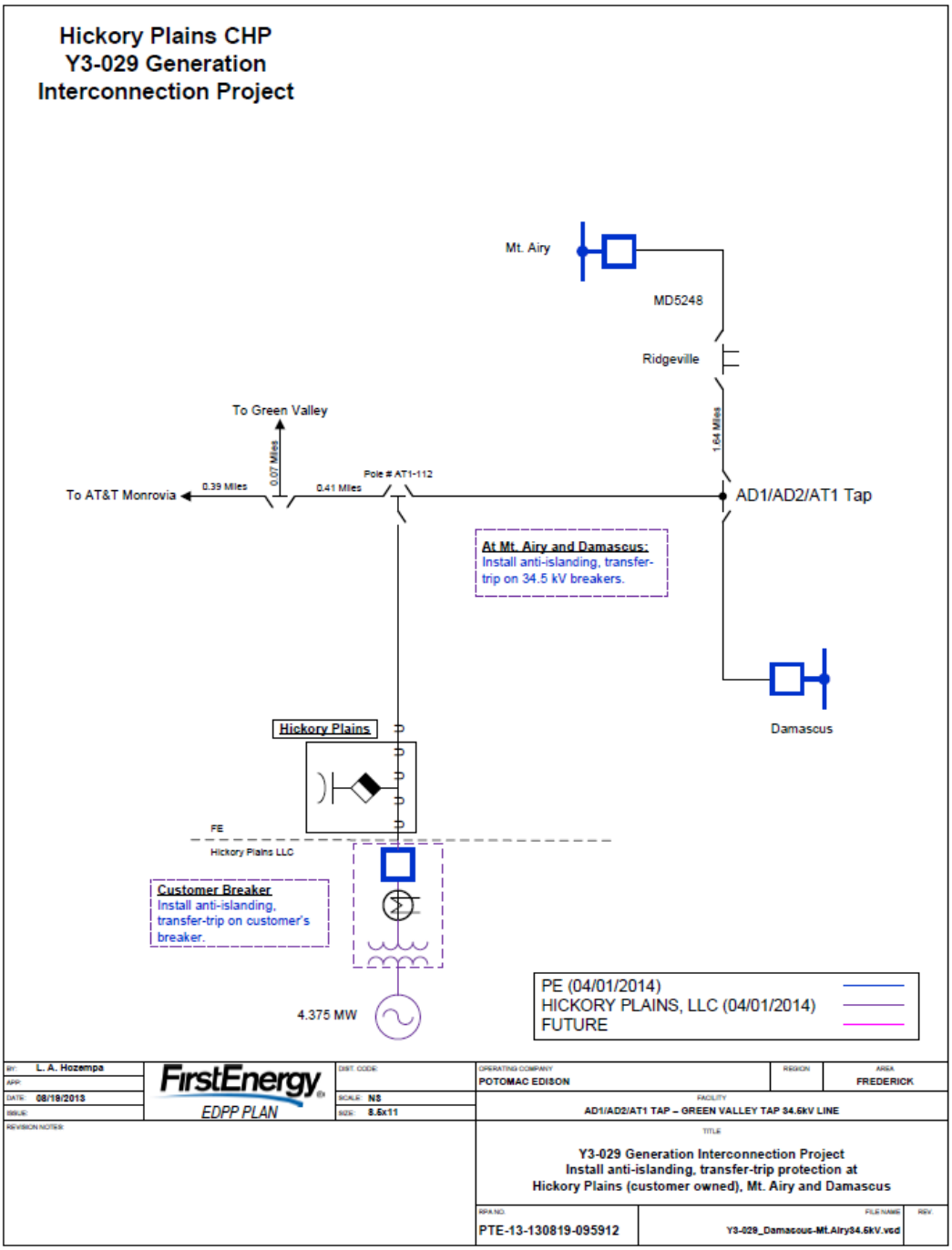
Tyler · Donegan
Real Estate Services

AREA PROPERTIES, LLC

Cohen Property – Greenhouse Project
Green Valley Rd, Ijamsville, Frederick County, MD



Attachment 2
Damascus – Mt. Airy 34.5kV Generation Project
34.5 kV Interconnection Substation Configuration



Attachment 3
Damascus – Mt. Airy 34.5kV Generation Project
Direct Connection Requirements

Upgrade ID	Description	Cost	Tax (If applicable)	Total Cost
PE-S-144-1 PJM n3790	**Hickory Plains SS:** Commissioning of anti-islanding transfer-trip facilities and metering equipment.	$ 20,100	$ 6,200	$ 26,300
PE-S-144-2 PJM n3791	**Mt. Airy SS:** Install line trap, CCVT, line tuner, and transfer-trip transmitter on the Damascus (AD1) 34.5 kV line terminal.	$ 123,300	$ 37,800	$ 161,100
PE-S-144-3 PJM n3792	**Damascus SS:** Install line trap, CCVT, line tuner, and transfer-trip transmitter on the Mt. Airy 34.5 kV line terminal.	$ 145,300	$ 44,500	$ 189,800
EOC PJM n3793	Engineering Oversight and Commissioning	$ 62,100	$ 19,100	$ 81,200
TOTAL		$ 350,800	$ 107,600	$ 458,400