Generation Interconnection

System Impact Study Report

for

Queue Project AF2-421

EAST HAZELTON-WEATHERLY TAP 69

12 MW Capacity / 20 MW Energy

February 2021

Table of Contents

1 Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 205, as well as the System Impact Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is PPL.

2 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.

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.

3 General

The Interconnection Customer (IC), **LU-Club Ford 1 LLC**, has proposed a Solar generating facility located in Luzerne County, Pennsylvania. The installed facilities will have a total capability of 20 MW with 12 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is March 01, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-421
Project Name	EAST HAZELTON-WEATHERLY TAP 69
State	Pennsylvania
County	Luzerne
Transmission Owner	PPL
MFO	20
MWE	20
MWC	12
Fuel	Solar
Basecase Study Year	2023

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

AF2-421 will interconnect with the PPL transmission system via tapping the Harwood to East Hazelton #1 69 kV line between the East Hazelton #1 and Weatherly Tap 1 69 kV busses. The Point of Interconnection (POI) will be at the PPL EU owned termination structure where the Interconnection Customer's transmission line terminates (with insulators).

5 Cost Summary

The AF2-421 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$ 1,128,400
Allocation towards System Network Upgrade Costs*	$ 0
Total Costs	$ 1,128,400

*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

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.

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

Note 2: For customers with System Reinforcements listed: If you're present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc., the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

6 Transmission Owner Scope of Work

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

Description	Total Cost
Attachment Facilities	$ 893,800
Direct Connection Network Upgrade	$ 0
Non-Direct Connection Network Upgrades	$ 234,600
Total Costs	$ 1,128,400

PPL EU can accommodate this interconnection by constructing a new transmission line tap off the Harwood – East Hazelton #1 69 kV line and completing associated remote end relay work.

Risks and Assumptions

- No major environmental, real estate, siting, or permitting issues.
- IC is responsible for acquisition of easements, permits, and right of way for any Direct Connection Network Upgrades and Attachment Facilities per PPL EU standards and requirements.
- PPL EU will perform all grading, site preparation, and establish access roads for the PPL EU owned Attachment Facilities per PPL EU standards and requirements.
- Harwood – East Hazelton #1 and #2 69 kV line outages.

6.1 Attachment Facilities

69 kV Transmission Line Tap

PPL EU will tap the Harwood – East Hazelton #1 69 kV line at or near GPS Coordinates: 40.940580, -75.942045. PPL EU will extend the tap north towards the IC site. PPL EU will install a motor operated switch and POI termination structure. The IC must build the remainder of the Attachment Facilities from the POI termination structure to the IC substation. The IC is responsible for procuring 100 ft. ROW for these facilities. For the purposes of this Feasibility Study Report cost estimate, PPL EU is assuming all engineering and construction responsibility for land development activities, including grading, site preparation, and new access road. During the Facilities Study phase, PPL EU and the IC will review land development activities, and the IC may choose to perform some, or all, of these activities. The cost estimate will be updated accordingly and included in the Facilities Study Report.

PPL EU work will consist of installing the following:

- Install one (1) new double circuit, custom steel/foundation, tap structure (tap off arms).
- Install one (1) new single circuit, direct-embed, custom steel, motor operated switch structure.
- Install one (1) new single circuit, direct-embed, steel, self-supporting structure (dead-end).
- New circuit will consist of three (3) phase 556.6 kcmil 24/7 ACSR conductor and 48-ct optical ground wire (OPGW).

Note: The 69 kV Tap crosses an existing 12 kV line at tap pole.

The total preliminary cost estimate for the Attachment work is given in the table below.

Description	Total Cost
69 kV Transmission Line Tap	$ 869,400
IC substation facility acceptance, testing, commissioning, & telemetry coordination	$ 24,400
Total Attachment Facility Costs	$ 893,800

6.2 Direct Connection Cost Estimate

None.

6.3 Non-Direct Connection Cost Estimate

Remote End Relay Work – Harwood 69 kV Substation

- Complete remote end relay work at Harwood 69 kV substation for Direct Transfer Trip.
- Model IC in CAPE and conduct a wide area short circuit study two busses away from the IC facilities. Identify affected relays and revise settings as needed.
- Conduct a review of the IC relay settings and engineering package (submitted by IC to PPL EU).

- PPL EU currently has OPGW on the Harwood – East Hazelton #1 69 kV line available as the communication circuit for DTT to the Harwood 69 kV substation.

Optional: The IC may obtain DTT via the Harwood - Palooka #1 69 kV line by completing upgrades at the Harwood 69 kV substation. This would enable this project to generate on the Harwood – Palooka #1 69 kV line in the event that the POI is ever sourced from this line.

Harwood – East Hazelton #1 69 kV Modifications to tie in the AF2-421 Attachment Facilities

- Tie the new AF2-421 Attachment Facilities into Harwood – East Hazelton #1 69 kV line.
- Reframe existing double circuit suspension to tension structure on the Harwood – East Hazelton #1 69 kV line.
- Install one span of ADSS fiber optic cable from existing splice box approximately 350'-0 away from tap pole.
- Install splice box at new tap pole.

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below.

Description	Total Cost
Harwood – East Hazelton #1 69 kV Modifications to tie in the AF2-421 Attachment Facilities	$ 96,600
Remote End Relay Work – Harwood 69 kV Substation	$ 138,000
Total Non-Direct Connection Facility Costs	$ 234,600

7 Schedule

The estimated time to complete the scope of work is 12-18 months after the PJM three-party Interconnection Service Agreement (ISA) and Interconnection Construction Service Agreement (ICSA) are signed and PPL EU receives Notice to Proceed from the IC.

8 Interconnection Customer Requirements

PPL EU applicable technical standards that address requirements for interconnection of generation, transmission, and end user facilities can be found at the following link:

https://pjm.com/planning/design-engineering/to-tech-standards/private-ppl.aspx

9 Revenue Metering and SCADA Requirements

9.1 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.

9.2 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

9.3 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/

10 Summer Peak Analysis

The Queue Project AF2-421 was evaluated as a 20 MW (Capacity 12 MW) injection tapping the Harwood to East Hazleton #1 69 kV line in the PPL area. Project AF2-421 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-421 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

10.1 Generation Deliverability

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

None

10.2 Multiple Facility Contingency

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

None

10.3 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

10.4 Steady-State Voltage Requirements

To be determined during the Facilities Study

10.5 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.

None

10.6 System Reinforcements

None

11 Light Load Analysis

Not Required

12 Short Circuit Analysis

The following Breakers are overdutied:

None

12.1 System Reinforcements - Short Circuit

None

13 Stability and Reactive Power

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

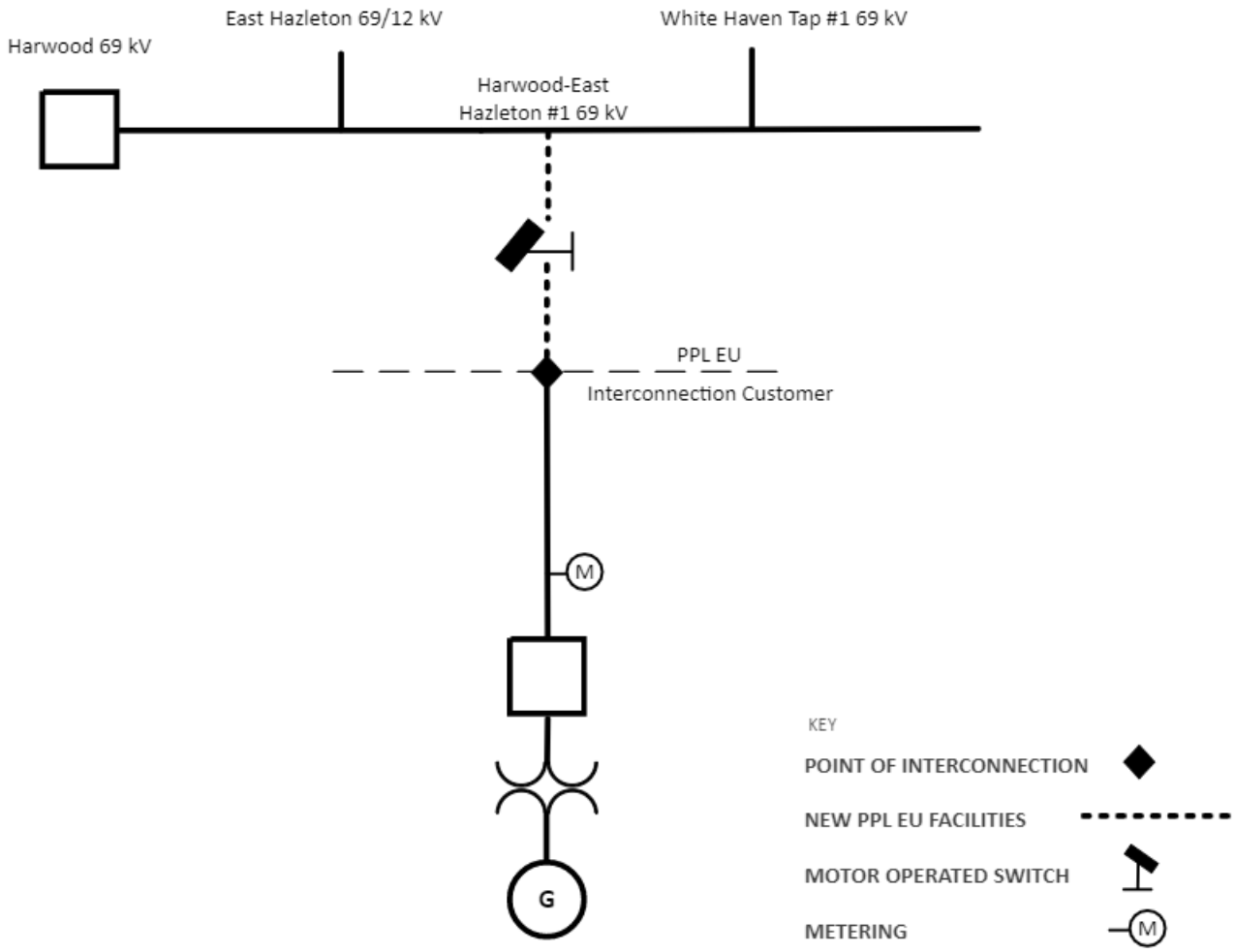
To be determined in the Facilities Study Phase.

14 Affected Systems

14.1 NYISO

NYISO Impacts to be determined during later study phases (as applicable).

15 Attachment 1: One Line Diagram



16 Attachment 2: Project Location