



**Generation Interconnection
Feasibility Study Report
for
Queue Project AF2-361
MIFFLINTOWN TAP 69 KV
35 MW Capacity / 85 MW Energy**

July 2020

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13 Attachment 1: Single line **Error! Bookmark not defined.**
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1 Introduction

This Feasibility 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), the Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is PPL.

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 generating facility located in Juniata County, Pennsylvania. The installed facilities will have a total capability of 85 MW with 35 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 31, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-361
Project Name	MIFFLINTOWN TAP 69 KV
State	Pennsylvania
County	Juniata
Transmission Owner	PPL
MFO	85
MWE	85
MWC	35
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

AF2-361 will interconnect with the PPL EU transmission system via Mifflintown Tap 69 kV line, 0.56 miles from the **Mifflintown Tap** and 2.98 miles from the **Mifflintown** bus. The Point of Interconnection (POI) will be at the PPL EU owned termination structure where the Interconnection Customer’s transmission line terminates (with insulators).

Note: As part of Supplemental Project s0945.2, PPL EU is rebuilding the Juniata – Richfield/Newport 69 kV lines to a double circuit. It is assumed that s0945.2 will be complete prior to AF2-361’s interconnection to the PPL EU Transmission System.

5 Cost Summary

The AF2-361 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$ 1,204,000
Total System Network Upgrade Costs	\$ 141,000,000
Total Costs	\$ 142,204,000

This cost excludes CIAC Tax Gross Up charges. Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

6 Transmission Owner Scope of Work

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

Description	Total Cost
Attachment Facilities	\$ 869,400
Direct Connection Network Upgrade	\$ 0
Non Direct Connection Network Upgrades	\$ 334,600
Total Physical Interconnection Costs	\$ 1,204,000

PPL EU can accommodate this interconnection by constructing a new transmission line tap off the Mifflintown Tap 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.
- Assume that Supplemental Project s0945.2 will be completed prior to the AF2-361 interconnection in service date.

6.1 Attachment Facilities

69 kV Transmission Line Tap

PPL EU will tap the Mifflintown Tap 69 kV line at or near GPS Coordinates: 40.5638, -77.3452. 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.
- Install one (1) new single circuit, direct-embed, custom steel, motor operated switch structure.
- Install one (1) new single circuit, direct-embed, steel, tension structure (dead-end).
- New circuit will consist of three (3) phase 556.6 kcmil 24/7 ACSR conductor.

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
69 kV Transmission Line Tap	\$ 869,400
Total Attachment Facility Costs	\$ 869,400

6.2 Direct Connection Cost Estimate

None.

6.3 Non-Direct Connection Cost Estimate

Remote End Relay Work – Juniata 69 kV Substation

- Complete remote end relay work at Juniata 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).

Mifflintown Tap 69 kV Modifications to tie in the AF2-361 Attachment Facilities

- Tie the new AF2-361 Attachment Facilities into the Mifflintown Tap 69 kV line.
- Re-frame adjacent suspension structure 11232S44843 to tension.

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Remote End Relay Work – Juniata 69 kV Substation	\$ 238,000
Mifflintown Tap 69 kV Modifications to tie in the AF2-361 Attachment Facilities	\$ 96,600
Total Non-Direct Connection Facility Costs	\$ 334,600

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

8.1 PPL EU Interconnection 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>

8.2 IC Direct Transfer Trip (DTT) Requirements

PPL EU will require an independent communication path, for DTT of the IC Intertie Protective Relaying (IPR) Fault Interrupting Devices (FIDs), consisting of one communication circuit with the Juniata 69 kV Substation breaker 14L. The IC may elect to obtain DTT via the Richfield – Dalmatia 2 Tie 69 kV line by completing upgrades at the Dauphin 69 kV Substation. This would enable AF2-361 to generate on the Richfield - Dalmatia 2 Tie 69 kV line in the event that the POI is ever sourced from this line. Substation upgrades for the Richfield – Dalmatia 2 Tie 69 kV line are not currently in the scope and estimate of this report. PPL EU can evaluate this at the request of the IC during subsequent study phases from both a cost and interconnection analysis perspective.

PPL EU does not have OPGW available on the Mifflintown Tap 69 kV line available for DTT to the Juniata 69 kV Substation. PPL EU assumes that the IC will procure the independent communication path through a third-party provider. Upon request, PPL EU will evaluate the feasibility of installing OPGW on the Mifflintown Tap 69 kV line for DTT.

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 PPL EU Requirements

Installation of revenue grade Bi-directional Metering Equipment will be required in the vicinity of the POI to measure kWh and kVARh. PPL EU will design and supply the required metering equipment; all installation costs would be borne by the IC including CTs/PTs. All metering equipment must meet applicable PPL EU tariff requirements as well as being compliant with all applicable requirements of the PJM agreements. The equipment must provide bidirectional revenue metering (kWh and kVARh) and real-time data (kW, kVAR, circuit breaker status, and generator bus voltages) for the IC's generating resource. The metering equipment should be housed in a control cabinet or similar enclosure and must be accessible to PPL EU metering personnel.

10 Summer Peak - Load Flow Analysis

The Queue Project AF2-361 was evaluated as an 85.0 MW (Capacity 35.0 MW) injection tapping the **Mifflintown Tap to Mifflintown 69 kV line** in the PPL area. Project AF2-361 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-361 was studied with a commercial probability of 53.0 %. 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)

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
99651282	208004	JUNIBU1	230	PPL	207950	CUMBTR2	230	PPL	1	PL_P42_000451	breaker	624.0	99.72	101.37	DC	10.31

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)

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
99651280	208004	JUNIBU1	230	PPL	207950	CUMBTR2	230	PPL	1	ME_P4-500-001B	breaker	624.0	101.9	103.39	DC	9.32
99651281	208004	JUNIBU1	230	PPL	207950	CUMBTR2	230	PPL	1	ME_P4-500-001C	breaker	624.0	101.1	102.58	DC	9.2
99651226	208005	JUNIBU2	230	PPL	207955	DAUPTR2	230	PPL	1	ME_P4-500-001B	breaker	531.0	101.73	102.42	DC	8.09

10.4 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
99651831	208004	JUNI BU1	230	PPL	207950	CUMB TR2	230.0	PPL	1	PL_P12_000196	operation	624.0	99.65	101.37	DC	10.74
99651832	208004	JUNI BU1	230	PPL	207950	CUMB TR2	230.0	PPL	1	PL_P12_100598	operation	624.0	99.65	101.37	DC	10.74
99651833	208004	JUNI BU1	230	PPL	207950	CUMB TR2	230.0	PPL	1	PL_P21_000305	operation	624.0	99.65	101.37	DC	10.74

10.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
99651280, 99651281, 99651282	1	JUNI BU1 230.0 kV - CUMB TR2 230.0 kV Ckt 1	PPL_CUMB-WIGR (1934): Switching operation. Change WIGR-CUMB 69kV to operate in network configuration. Project Type : CON Cost : \$0 Time Estimate : Months	\$0
99651226	2	JUNI BU2 230.0 kV - DAUP TR2 230.0 kV Ckt 1	R-PL-0004 (1927) : Build new SUNB-DAUP 230kV Line and Rebuild DAUP 230kV Yard Project Type : CON Cost : \$141,000,000 Time Estimate : 80.0 Months	\$141,000,000
TOTAL COST				\$141,000,000

10.6 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".

10.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
99651280	208004	JUNI BU1	PPL	207950	CUMB TR2	PPL	1	ME_P4-500-001B	breaker	624.0	101.9	103.39	DC	9.32

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
208769	SISO	-0.1604	Adder	-0.19
235003	AC1-025 E	0.0839	Adder	0.1
236828	01GRAYMONT	0.2178	Adder	0.26
933771	AC2-170	-0.0612	Adder	-0.07
933973	AD1-020 BAT	1.3548	Merchant Transmission	1.3548
937271	AD2-166	-7.0811	Adder	-8.33
939171	AE1-147 C	0.6506	Adder	0.77
939172	AE1-147 E	0.4337	Adder	0.51
940201	AE2-001 C	0.6522	Adder	0.77
940202	AE2-001 E	0.4348	Adder	0.51
940681	AE2-055 C (Suspended)	0.6769	Adder	0.8
940682	AE2-055 E (Suspended)	0.4512	Adder	0.53
940731	AE2-060 C	0.9215	50/50	0.9215
940732	AE2-060 E	1.2725	50/50	1.2725
941231	AE2-117 C	0.7151	Adder	0.84
941232	AE2-117 E	0.4767	Adder	0.56
941241	AE2-118 C	0.7151	Adder	0.84
941242	AE2-118 E	0.4767	Adder	0.56
941261	AE2-120 C	0.6531	Adder	0.77
941262	AE2-120 E	0.4354	Adder	0.51
941271	AE2-121 C	0.3444	Adder	0.41
941272	AE2-121 E	0.2300	Adder	0.27
942351	AE2-248 C	0.5333	Adder	0.63
942352	AE2-248 E	0.3555	Adder	0.42
942491	AE2-262 C	2.3698	Adder	2.79
942492	AE2-262 E	1.5925	Adder	1.87
942501	AE2-263 C	2.2276	Adder	2.62
942502	AE2-263 E	1.4873	Adder	1.75
942511	AE2-264 C	2.4921	Adder	2.93
942512	AE2-264 E	1.6614	Adder	1.95
944001	AF1-068 C O1	0.7144	Adder	0.84
944002	AF1-068 E O1	0.4018	Adder	0.47
944311	AF1-099 C	3.5974	Adder	4.23

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
944312	AF1-099 E	2.3982	Adder	2.82
944321	AF1-100 C	6.3788	Adder	7.5
944322	AF1-100 E	4.2526	Adder	5.0
944471	AF1-112 C	0.7082	Adder	0.83
944472	AF1-112 E	0.3984	Adder	0.47
944671	AF1-132 C O1	0.6715	Adder	0.79
944672	AF1-132 E O1	0.4476	Adder	0.53
944771	AF1-142 C	5.7558	Adder	6.77
944772	AF1-142 E	3.8372	Adder	4.51
944841	AF1-149 C	0.6532	Adder	0.77
944842	AF1-149 E	0.4355	Adder	0.51
945161	AF1-181	0.0341	Adder	0.04
945171	AF1-182	0.1709	Adder	0.2
945491	AF1-214 C	0.6530	Adder	0.77
945492	AF1-214 E	0.4353	Adder	0.51
957363	AF2-030 BAT	0.6269	Merchant Transmission	0.6269
958561	AF2-147 C	0.3196	Adder	0.71
958562	AF2-147 E	0.2131	Adder	0.47
959043	AF2-195 BAT	9.0300	Merchant Transmission	9.0300
959223	AF2-213 BAT	4.2141	Merchant Transmission	4.2141
959401	AF2-231 C	0.0948	Adder	0.21
959402	AF2-231 E	0.0632	Adder	0.14
959773	AF2-268 BAT	0.0540	Merchant Transmission	0.0540
959813	AF2-272 BAT	0.0497	Merchant Transmission	0.0497
959883	AF2-279 BAT	0.0706	Merchant Transmission	0.0706
959893	AF2-280 BAT	0.0520	Merchant Transmission	0.0520
959903	AF2-281 BAT	0.0434	Merchant Transmission	0.0434
959953	AF2-286 BAT	0.1585	50/50	0.1585
959962	AF2-287 E	0.4305	50/50	0.4305
959972	AF2-288 E	0.4305	50/50	0.4305
960022	AF2-293 E	0.0335	Adder	0.07
960701	AF2-361 C	3.8395	50/50	3.8395
960702	AF2-361 E	5.4850	50/50	5.4850
960922	AF2-383 BAT	1.0176	Merchant Transmission	1.0176
961373	AF2-428 BAT	0.0426	Merchant Transmission	0.0426
961383	AF2-429 BAT	0.0462	Merchant Transmission	0.0462
961393	AF2-430 BAT	0.0436	Merchant Transmission	0.0436
961403	AF2-431 BAT	0.0318	Merchant Transmission	0.0318
WEC	WEC	0.2460	Confirmed LTF	0.2460
LGEE	LGEE	0.4256	Confirmed LTF	0.4256
CPL	CPL	0.1039	Confirmed LTF	0.1039
CBM-W2	CBM-W2	5.4218	Confirmed LTF	5.4218
CBM-W1	CBM-W1	10.2332	Confirmed LTF	10.2332
TVA	TVA	0.8148	Confirmed LTF	0.8148
O-066	O-066	6.5050	Confirmed LTF	6.5050
CBM-S2	CBM-S2	1.6646	Confirmed LTF	1.6646
CBM-S1	CBM-S1	5.2142	Confirmed LTF	5.2142
G-007	G-007	1.1908	Confirmed LTF	1.1908
MEC	MEC	1.1695	Confirmed LTF	1.1695

10.6.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
99651226	208005	JUNI BU2	PPL	207955	DAUP TR2	PPL	1	ME_P4-500-001B	breaker	531.0	101.73	102.42	DC	8.09

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
208769	SISO	-0.1223	Adder	-0.14
235003	AC1-025 E	0.0758	Adder	0.09
236828	01GRAYMONT	0.1965	Adder	0.23
933973	AD1-020 BAT	1.1686	Merchant Transmission	1.1686
937271	AD2-166	-8.1139	Adder	-9.55
939171	AE1-147 C	0.5868	Adder	0.69
939172	AE1-147 E	0.3912	Adder	0.46
940201	AE2-001 C	0.5883	Adder	0.69
940202	AE2-001 E	0.3922	Adder	0.46
940681	AE2-055 C (Suspended)	0.6111	Adder	0.72
940682	AE2-055 E (Suspended)	0.4074	Adder	0.48
940731	AE2-060 C	0.6798	Adder	0.8
940732	AE2-060 E	0.9388	Adder	1.1
941231	AE2-117 C	0.6473	Adder	0.76
941232	AE2-117 E	0.4315	Adder	0.51
941241	AE2-118 C	0.6473	Adder	0.76
941242	AE2-118 E	0.4315	Adder	0.51
941261	AE2-120 C	0.5892	Adder	0.69
941262	AE2-120 E	0.3928	Adder	0.46
941271	AE2-121 C	0.3106	Adder	0.37
941272	AE2-121 E	0.2074	Adder	0.24
942351	AE2-248 C	0.4813	Adder	0.57
942352	AE2-248 E	0.3209	Adder	0.38
942491	AE2-262 C	2.1301	Adder	2.51
942492	AE2-262 E	1.4314	Adder	1.68
942501	AE2-263 C	2.0023	Adder	2.36
942502	AE2-263 E	1.3369	Adder	1.57
942511	AE2-264 C	2.2513	Adder	2.65
942512	AE2-264 E	1.5009	Adder	1.77
944001	AF1-068 C O1	0.6447	Adder	0.76
944002	AF1-068 E O1	0.3627	Adder	0.43
944311	AF1-099 C	3.2335	Adder	3.8
944312	AF1-099 E	2.1557	Adder	2.54
944471	AF1-112 C	0.6390	Adder	0.75
944472	AF1-112 E	0.3594	Adder	0.42
944671	AF1-132 C O1	0.6060	Adder	0.71
944672	AF1-132 E O1	0.4040	Adder	0.48
944771	AF1-142 C	5.1736	Adder	6.09
944772	AF1-142 E	3.4491	Adder	4.06
944841	AF1-149 C	0.5892	Adder	0.69
944842	AF1-149 E	0.3928	Adder	0.46

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945491	AF1-214 C	0.5891	Adder	0.69
945492	AF1-214 E	0.3927	Adder	0.46
957363	AF2-030 BAT	0.8208	Merchant Transmission	0.8208
958561	AF2-147 C	0.2902	Adder	0.64
958562	AF2-147 E	0.1935	Adder	0.43
959043	AF2-195 BAT	7.1772	Merchant Transmission	7.1772
959223	AF2-213 BAT	3.7579	Merchant Transmission	3.7579
959401	AF2-231 C	0.0858	Adder	0.19
959402	AF2-231 E	0.0572	Adder	0.13
959773	AF2-268 BAT	0.0465	Merchant Transmission	0.0465
959813	AF2-272 BAT	0.0666	Merchant Transmission	0.0666
959873	AF2-278 BAT	0.6130	50/50	0.6130
959883	AF2-279 BAT	0.0554	Merchant Transmission	0.0554
959903	AF2-281 BAT	0.0547	Merchant Transmission	0.0547
959953	AF2-286 BAT	0.2343	50/50	0.2343
959962	AF2-287 E	0.3771	50/50	0.3771
959972	AF2-288 E	0.3771	50/50	0.3771
960022	AF2-293 E	0.0302	Adder	0.07
960701	AF2-361 C	1.5012	Adder	3.33
960702	AF2-361 E	2.1446	Adder	4.76
960922	AF2-383 BAT	0.8243	Merchant Transmission	0.8243
961373	AF2-428 BAT	0.0484	Merchant Transmission	0.0484
961383	AF2-429 BAT	0.0589	Merchant Transmission	0.0589
961393	AF2-430 BAT	0.0545	Merchant Transmission	0.0545
961403	AF2-431 BAT	0.0396	Merchant Transmission	0.0396
WEC	WEC	0.2403	Confirmed LTF	0.2403
LGEE	LGEE	0.4187	Confirmed LTF	0.4187
CPL	CPL	0.1568	Confirmed LTF	0.1568
CBM-W2	CBM-W2	5.4300	Confirmed LTF	5.4300
CBM-W1	CBM-W1	9.9455	Confirmed LTF	9.9455
TVA	TVA	0.8330	Confirmed LTF	0.8330
O-066	O-066	8.5210	Confirmed LTF	8.5210
CBM-S2	CBM-S2	2.0114	Confirmed LTF	2.0114
CBM-S1	CBM-S1	5.2909	Confirmed LTF	5.2909
G-007	G-007	1.4466	Confirmed LTF	1.4466
MEC	MEC	1.1536	Confirmed LTF	1.1536

10.7 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.

Queue Number	Project Name	Status
AC1-025	Dale Summit	In Service
AC2-170	Quarryville	Engineering and Procurement
AD1-020	Hunterstown-Lincoln 115 kV	Engineering and Procurement
AD2-166	Ironwood 230kV	Partially in Service - Under Construction
AE1-147	Bellefonte 46 kV	Engineering and Procurement
AE2-001	Nittany-Zion 46 kV	Active
AE2-055	Shingletown-Boalsburg 46 kV	Suspended
AE2-060	Mifflintown Bus-Mifflintown Tap 69 kV	Active
AE2-117	ABW Tap-Alexandria 46 kV	Active
AE2-118	ABW Tap-Williamsburg 46 kV	Active
AE2-120	Graymont-Zion 46 kV	Active
AE2-121	Milesburg-Tanney Junction 46 kV	Active
AE2-248	Fillmore-Thompson Farm 46 kV	Active
AE2-262	Moshannon-Milesburg 230 kV	Active
AE2-263	Moshannon-Milesburg 230 kV	Active
AE2-264	Altoona-Raystown 230 kV	Active
AF1-068	Boalsburg-Centre Hall 46 kV	Active
AF1-099	Moshannon-Milesburg 230 kV	Active
AF1-100	Shawville-Moshannon 230 kV	Active
AF1-112	Centre Hall-Boalsburg 46 kV	Active
AF1-132	Shingletown-Boalsburg 46 kV	Active
AF1-142	Moshannon-Milesburg 230 kV	Active
AF1-149	Graymont-Zion 46 kV	Active
AF1-181	Shawville 3 230 kV	Partially in Service - Under Construction
AF1-182	Shawville 4 230 kV	Partially in Service - Under Construction
AF1-214	Nittany-Zion 46 kV	Active
AF2-030	Ontelaunee 230 kV	Active
AF2-147	McVeytown-Strodes Mill 46 kV	Active
AF2-195	Queen Street 115 kV	Active
AF2-213	Zions View-Smith Street 115 kV	Active
AF2-231	Belleville 12.47 kV	Active
AF2-268	Orrtanna 13.2 kV	Active
AF2-272	Berville 13.2 kV	Engineering and Procurement
AF2-278	Halifax 12.47 kV	Active
AF2-279	Letort 12.47 kV	Active
AF2-280	Buck 12.47 kV	Active
AF2-281	Lynnville 13.2 kV	Engineering and Procurement
AF2-286	Shermansdale 12.47 kV	Active
AF2-287	Green Park 12.47 kV	Active

Queue Number	Project Name	Status
AF2-288	Benvenue 12.47 kV	Active
AF2-293	Beech Creek 46 kV	Active
AF2-361	Mifflintown-Walker 69 kV	Active
AF2-383	Tolna 115 kV	Active
AF2-428	West Boyertown 13.2 kV	Engineering and Procurement
AF2-429	South Hamburg 34.5 kV	Active
AF2-430	Moselem 13.2 kV	Engineering and Procurement
AF2-431	Baldy 13.2 kV	Active

10.8 Contingency Descriptions

Contingency Name	Contingency Definition
PL_P42_000451	CONTINGENCY 'PL_P42_000451' /* JUNI-DAUP 230KV STUCK BREAKER CONNECTED TO JUNI TR4 DISCONNECT BRANCH FROM BUS 208005 TO BUS 209997 CKT 4 /* JUNI BU2-JUNI 230-69 DISCONNECT BRANCH FROM BUS 207955 TO BUS 208005 CKT 1 /* DAUP TR2-JUNI BU2 230 DISCONNECT BRANCH FROM BUS 207955 TO BUS 209866 CKT 2 /* DAUP TR2-DAUP 230-69 END
PL_P21_000305	CONTINGENCY 'PL_P21_000305' /* JUNI-DAUP 230KV PATHEND
ME_P4-500-001C	CONTINGENCY 'ME_P4-500-001C' /* JUNIATA-THREE MILE & TMI XF STUCK CB DISCONNECT BRANCH FROM BUS 200016 TO BUS 200009 CKT 1 /* 3 MILE I 500 JUNIATA 500 DISCONNECT BRANCH FROM BUS 200016 TO BUS 204514 CKT 1 /* 3 MILE I 500 27TMI 230 END
ME_P4-500-001B	CONTINGENCY 'ME_P4-500-001B' /* THREE MILE-X4-020 & TMI-X4 BTM STUCK CB DISCONNECT BRANCH FROM BUS 200016 TO BUS 200009 CKT 1 /* 3 MILE I 500 JUNIATA 500 DISCONNECT BRANCH FROM BUS 200016 TO BUS 270072 CKT 1 /* 3 MILE I 500 FURNACE RUN 500 KV END
PL_P12_000196	CONTINGENCY 'PL_P12_000196' /* JUNI-DAUP 230KV LINE DISCONNECT BRANCH FROM BUS 207955 TO BUS 208005 CKT 1 /* DAUP TR2-JUNI BU2 230 DISCONNECT BRANCH FROM BUS 207955 TO BUS 209866 CKT 2 /* DAUP TR2-DAUP 230-69 END

Contingency Name	Contingency Definition
PL_P12_100598	CONTINGENCY 'PL_P12_100598' /* JUNIATA-DAUPHIN 230 LINE & DAUPHIN TR2 OUT DISCONNECT BRANCH FROM BUS 207955 TO BUS 207953 CKT 1 /* /*DAUP 230 CB DISCONNECT BRANCH FROM BUS 208005 TO BUS 207955 CKT 1 /* /*JUNI-DAUP 230 DISCONNECT BRANCH FROM BUS 207955 TO BUS 209866 CKT 2 /* /*DAUP T2 END

11 Short Circuit Analysis

To be performed during the System Impact Study

12 Affected Systems

12.1 NYISO

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