Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-148

SHADE GAP-THREE SPRINGS KTS 23 KV

8.1 MW Capacity / 13.5 MW Energy

July 2020

Table of Contents

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), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Mid-Atlantic Interstate Transmission, LLC (MAIT) (PENELEC zone).

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 Huntingdon County, Pennsylvania. The installed facilities will have a total capability of 13.5 MW with 8.1 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is September 01, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-148
Project Name	SHADE GAP-THREE SPRINGS KTS 23 KV
State	Pennsylvania
County	Huntingdon
Transmission Owner	MAIT (PENELEC zone)
MFO	13.5
MWE	13.5
MWC	8.1
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

AF2-148 will interconnect with the PENELEC distribution system at POI pole 5-1410782, which is located on the 22.86 kV KTS-Three Springs ckt #00622-83 @ Shade Gap substation.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF2-148 generation project to connect to the Penelec distribution system. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the Penelec distribution system's direct connection facilities.

5 Cost Summary

The AF2-148 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$134,400
Total System Network Upgrade Costs	$151,541,902[1]
Total Costs	$151,676,302

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.

Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

[1] This project currently contributes to overloads of the Transmission System (see Summer Peak Load Flow Analysis section below) and therefore has potential to have cost allocation for the system reinforcements listed in the report. This will be re-evaluated in the System Impact phase. The results may vary with queue customers withdrawing from the queue and other generators deactivating over time. If a customer is the first to cause the need for a project (causes loading to exceed 100% of rating), then the customer is responsible. If a customer's MW contribution to a facility that is already overloaded by a prior queue is less than 5 MW, then they will not receive cost allocation.

6 Transmission Owner Scope of Work

AF2-148 will interconnect with the PENELEC distribution system at POI pole 5-1410782, which is located on the 22.86 kV KTS-Three Springs ckt #00622-83 @ Shade Gap substation.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF2-148 generation project to connect to the Penelec distribution system. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the Penelec distribution system's direct connection facilities.

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

Description	Total Cost
Tap the existing pole or interspersed pole on Penelec's existing distribution circuit (00622-82) near pole 5-1410782, new SCADA recloser, new primary metering	$134,400
Total Physical Interconnection Costs	$134,400

7 Schedule

Based on the scope of work for the interconnection facilities, it is expected to take a minimum of **9 months** after the signing of an Interconnection Construction Service Agreement and construction kickoff call to complete the installation. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined work and that any system outages will be allowed when requested.

If the customer is ultimately responsible for network upgrades, then the schedule for those upgrades will be refined in future study phases. The customer would need to wait for those upgrades to be completed prior to commercial operation unless determined deliverable by an interim deliverability study. The elapsed time to complete any network upgrades is provided in the System Reinforcements table of this report[1].

8 Transmission Owner Analysis

Penelec performed an analysis of its distribution system. The AF2-148 project did not contribute to any overloads on the distribution system.

9 Interconnection Customer Requirements

9.1 System Protection

An analysis was conducted to assess the impact of the Shade Gap - Three Springs KTS 23kV (AF2-148) Project on the system protection requirements in the area. The results of this review show that the following relay additions will be required:

Proposed single line diagrams show the IC constructing a generation facility that will connect to Penelec's 22.86kV Shade Gap substation ckt#00622-83 via a customer owned tap to pole 5-1410782.

The 22.86kV interconnection proposal will require Developer to meet applicable "Technical Requirements" as outlined in First Energy's document titled "Technical Requirements for the Interconnection of Customer-Owned Generation to the FirstEnergy Distribution System".

Protection requirements are included in the "Technical Requirements" document.

9.2 General Concerns

It is to be understood, for abnormal operation of the Penelec system, which could cause Developer's generation facility to be electrically isolated from the Penelec system synchronous source via the tripping of a interconnecting primary voltage line or device, Developer will, via Penelec's direction, be required to disconnect the generation from Penelec's system and remain disconnected (units are required to be OFF LINE), until the Penelec system normal circuitry is restored. These abnormal conditions will be reviewed by Penelec system operators as to the need for the generation facility to be disconnected.

9.3 Requirements for Owner's/Developer's generation IPP Facility

The proposed interconnection Owner's/Developer's facilities must be designed in accordance with the document titled FirstEnergy Distribution Engineering Practices Interconnection of Customer-Owned Generation to the FirstEnergy Distribution System dated 11/17/14 located at the following link:

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

The document is referred to as engineering practice EP(# 02-280) with section 4 part C specifically referencing the "interconnection technical requirements". Certain protection requirements are shown.

Additionally, Owner/Developer is responsible to provide adequate protection (for their equipment) under any distribution system operating condition' - which includes 'Separation from supply' (i.e. tripping of F.E. circuit breakers) and 'Re-synchronizing the generation after electric restoration of the supply' (i.e. reclosing of F.E. circuit breakers).

Owner's/Developer's protection must be designed to coordinate with the reclosing practices of FirstEnergy line protective devices. The generator must cease to energize the FirstEnergy circuit to which it is connected prior to reclosing of any (FE) automatic reclosing devices.

Owners/Developer's electrical protection and control schematics shall be provided to FE for consideration. FE may request modifications, if required, to meet the technical requirements.

9.4 Compliance Issues

The IC will be responsible for meeting a power factor between 0.95 lagging (producing MVARs) to 0.95 leading (absorbing MVARs) and assure that voltage deviation will be less than 1.0 volt as measured at the POI under all Solar Gen operating conditions due to the inherent dynamic reactive power capability of this solar/storage facility.

Generators with no inherent VAR (reactive power) control capability, or those that have a restricted VAR capability less than the defined requirements, must provide dynamic supplementary reactive support located at the generation facility with electrical characteristics equivalent to that provided by a similar sized synchronous generator. A Dynamic Reactive Compensation (either Static VAR Compensator (SVC) or STATCOM) or other method be applied in order to maintain the required specifications at the POI. The IC is responsible for the installation of equipment on its side of the POI in order to adhere to the criteria stated above by FirstEnergy.

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:

- Back Panel temperature (Fahrenheit)
- Irradiance (Watts/meter2)
- Ambient air temperature (Fahrenheit) – (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)

10.3 Penelec Requirements

The IC will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. These FE requirements are the following:

The FE operating company (Penelec) shall provide, own, operate, test, and maintain the revenue metering equipment at the Interconnection Customer's (IC) expense. The revenue metering equipment includes, but is not limited to, current transformers, voltage transformers, secondary wires, meter socket, bidirectional revenue meter, and associated devices. The IC shall mount the instrument transformers unless otherwise agreed to by Penelec. The instrument transformers and meter socket shall be installed in a location that is readily accessible to authorized Penelec representatives. Penelec will provide the IC access to bidirectional kWh and kVARh pulses from the Penelec meter at the IC's expense if requested. The IC shall, at its expense, install, own, operate, test, and maintain any metering and telemetry equipment that may be required to provide real-time meter data to FE or PJM.

11 Summer Peak - Load Flow Analysis

The Queue Project AF2-148 was evaluated as a 13.5 MW (Capacity 8.1 MW) injection at the Shade Gap 23 kV substation in the PENELEC area. Project AF2-148 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-148 was studied with a commercial probability of 53.0 %. 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)

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
99249772	200513	26LEWISTWN	230.0	PENELEC	208005	JUNI BU2	230.0	PPL	1	PN-P2-3-PN-115-55A	breaker	624.0	158.3	159.52	DC	7.55
101074805	200522	26SHADEGP	115.0	PENELEC	938380	AE1-071 TAP	115.0	PENELEC	1	PL_P42_100548	breaker	160.0	167.8	172.46	DC	7.45
101075194	200522	26SHADEGP	115.0	PENELEC	938380	AE1-071 TAP	115.0	PENELEC	1	PL_P12_100618	single	160.0	133.79	136.58	DC	4.47
101075195	200522	26SHADEGP	115.0	PENELEC	938380	AE1-071 TAP	115.0	PENELEC	1	PN-P1-2-PN-230-103T	single	160.0	131.7	134.49	DC	4.47
101074555	938380	AE1-071 TAP	115.0	PENELEC	200520	26ROXBURY	115.0	PENELEC	1	PL_P22_100582	bus	160.0	206.43	211.08	DC	7.45
101074557	938380	AE1-071 TAP	115.0	PENELEC	200520	26ROXBURY	115.0	PENELEC	1	AP-P2-2-WP-230-001T	bus	160.0	127.69	131.96	DC	6.83

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
99250179	200513	26LEWISTWN	230.0	PENELEC	208005	JUNI BU2	230.0	PPL	1	PN-P1-2-PN-115-094-A	operation	624.0	158.21	159.43	DC	7.55
101075192	200522	26SHADEGP	115.0	PENELEC	938380	AE1-071 TAP	115.0	PENELEC	1	PL_P12_100618	operation	160.0	165.69	170.35	DC	7.45
101075316	938380	AE1-071 TAP	115.0	PENELEC	200520	26ROXBURY	115.0	PENELEC	1	Base Case	operation	133.0	120.0	125.11	DC	6.79

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
101075317	938380	AE1-071 TAP	115.0	PENELEC	200520	26ROXBURY	115.0	PENELEC	1	TS P1-2_#1	operation	160.0	115.65	119.88	DC	6.77

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
99249772	1	26LEWISTWN 230.0 kV - JUNI BU2 230.0 kV Ckt 1	**PENELEC** **PN-AF2-F-0018B (1734) : Rebuild 24.59 miles of transmission line** **Project Type : FAC** **Cost : $105,240,282** **Time Estimate : 48.0 Months** **PN-AF2-F-0018C (1735) : Adjust/replace the relays, CT, and meters** **Project Type : FAC** **Cost : $1,467,360** **Time Estimate : 12.0 Months** **PPL** **R-PL-0006 (1928) : Rebuild PPL's ~0.9mi LEWI-JUNI 230kV Line and replace terminal equipment at Juniata 230kV** **Project Type : FAC** **Cost : $7,000,000** **Time Estimate : 24.0 Months** **R-PL-0007 (1929) : Replace two (2) CB's MOD switches** **Project Type : FAC** **Cost : $600,000** **Time Estimate : 24.0 Months**	$114,307,642
101075195,101075194,101074805	2	26SHADE GP 115.0 kV - AE1-071 TAP 115.0 kV Ckt 1	**PENELEC** **PN-AF2-F-0015A (1721) : Reconductor 6.4 miles of line.** **Project Type : FAC** **Cost : $19,564,800** **Time Estimate : 30.0 Months** **PN-AF2-F-0015B (1722) : Replace line trap at Shade Gap** **Project Type : FAC** **Cost : $122,280** **Time Estimate : 12.0 Months** **PN-AF2-F-0015C (1723) : Replace transmission line drop at Shade Gap** **Project Type : FAC** **Cost : $122,280** **Time Estimate : 12.0 Months** **PN-AF2-F-0015D (1724) : Replace adjust CTs at Shade Gap** **Project Type : FAC** **Cost : $733,680** **Time Estimate : 12.0 Months** **PN-AF2-F-0015E (1725) : Replace substation conductor at Shade Gap** **Project Type : FAC** **Cost : $122,280** **Time Estimate : 12.0 Months**	$20,665,320

ID	Idx	Facility	Upgrade Description	Cost
101074555,101074557	3	AE1-071 TAP 115.0 kV - 26ROXBURY 115.0 kV Ckt 1	**PENELEC** **PN-AF2-F-0014A (1717) : Reconductor 6.4 miles of line.** **Project Type : FAC** **Cost : $15,651,840** **Time Estimate : 36.0 Months** **PN-AF2-F-0014B (1718) : Replace substation conductor at Roxbury** **Project Type : FAC** **Cost : $91,710** **Time Estimate : 12.0 Months** **PN-AF2-F-0014C (1719) : Replace transmission line drop at Roxbury** **Project Type : FAC** **Cost : $91,710** **Time Estimate : 12.0 Months** **PN-AF2-F-0014D (1720) : Replace circuit breaker and CTs at Roxbury** **Project Type : FAC** **Cost : $733,680** **Time Estimate : 12.0 Months** **Note: It should be noted that some of the contingencies taken in the analysis may not be valid due to system condition changes that were not captured in the model. This will be re-evaluated for validity in the System Impact phase.**	$16,568,940
			TOTAL COST	**$151,541,902**[1]

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".

11.6.1 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
99249772	200513	26LEWISTWN	PENELEC	208005	JUNI BU2	PPL	1	PN-P2-3-PN-115-55A	breaker	624.0	158.3	159.52	DC	7.55

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200649	26PENNTECH	1.3440	50/50	1.3440
200665	26SHAWVL 3	7.5857	50/50	7.5857
200666	26SHAWVL 4	7.5605	50/50	7.5605
200715	26SHAWVL 1	5.0273	50/50	5.0273
200722	26SHAWVL 2	5.1561	50/50	5.1561
200812	26ALY HYDR	1.4504	50/50	1.4504
200852	26WARR RDG	0.4144	50/50	0.4144
200883	Q-053 E	6.9533	50/50	6.9533
200886	26ARWF_N39	0.5592	50/50	0.5592
200894	26K02	7.5566	50/50	7.5566
200905	26Q36	0.3212	50/50	0.3212
200913	26SHAW-D	0.2283	50/50	0.2283
200915	26CHSTN_FL	0.1899	50/50	0.1899
201477	26Y2-055	2.7645	Adder	3.25
203034	26NA_O38_P22	0.4893	50/50	0.4893
235003	AC1-025 E	0.5632	50/50	0.5632
236828	01GRAYMONT	1.4477	50/50	1.4477
290086	Q-036 E	7.4480	50/50	7.4480
293301	N-039 E	12.9664	50/50	12.9664
293393	V3-030E	2.8182	Adder	3.32
293603	O-018 E	4.7612	Adder	5.6
294515	O38_P22	11.3456	50/50	11.3456
296332	R-032 E	5.4937	Adder	6.46
919491	AA2-000	93.2852	50/50	93.2852
930511	AB1-092	3.4252	50/50	3.4252
936421	AD2-055	7.0518	50/50	7.0518
936991	AD2-133 C	3.3516	50/50	3.3516
936992	AD2-133 E	15.3298	50/50	15.3298
938381	AE1-071 C	34.6617	50/50	34.6617
938382	AE1-071 E	21.2101	50/50	21.2101
939171	AE1-147 C	4.3175	50/50	4.3175
939172	AE1-147 E	2.8783	50/50	2.8783
940201	AE2-001 C	4.3319	50/50	4.3319
940202	AE2-001 E	2.8879	50/50	2.8879
940681	**AE2-055 C (Suspended)**	**4.5526**	**50/50**	**4.5526**
940682	**AE2-055 E (Suspended)**	**3.0350**	**50/50**	**3.0350**
941191	AE2-113 C	9.1621	50/50	9.1621
941192	AE2-113 E	9.8647	50/50	9.8647
941231	AE2-117 C	4.8049	50/50	4.8049
941232	AE2-117 E	3.2033	50/50	3.2033
941241	AE2-118 C	4.8049	50/50	4.8049

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941242	AE2-118 E	3.2033	50/50	3.2033
941261	AE2-120 C	4.3398	50/50	4.3398
941262	AE2-120 E	2.8932	50/50	2.8932
941271	AE2-121 C	2.2821	50/50	2.2821
941272	AE2-121 E	1.5238	50/50	1.5238
941321	AE2-126 C	2.4082	50/50	2.4082
941322	AE2-126 E	1.6054	50/50	1.6054
941331	AE2-129 C	2.4204	50/50	2.4204
941332	AE2-129 E	1.6136	50/50	1.6136
941351	AE2-131 C	2.4204	50/50	2.4204
941352	AE2-131 E	1.6136	50/50	1.6136
942121	AE2-224 C	7.8468	50/50	7.8468
942122	AE2-224 E	5.2312	50/50	5.2312
942351	AE2-248 C	3.5684	50/50	3.5684
942352	AE2-248 E	2.3789	50/50	2.3789
942491	AE2-262 C	14.9385	50/50	14.9385
942492	AE2-262 E	10.0387	50/50	10.0387
942501	AE2-263 C	14.0422	50/50	14.0422
942502	AE2-263 E	9.3754	50/50	9.3754
942511	AE2-264 C	15.7541	50/50	15.7541
942512	AE2-264 E	10.5027	50/50	10.5027
942961	AE2-316 C	6.0886	50/50	6.0886
942962	AE2-316 E	8.6824	50/50	8.6824
943751	AF1-043	21.1554	50/50	21.1554
944001	AF1-068 C O1	4.7875	50/50	4.7875
944002	AF1-068 E O1	2.6929	50/50	2.6929
944181	AF1-086 C O1	2.7357	50/50	2.7357
944182	AF1-086 E O1	11.9019	50/50	11.9019
944311	AF1-099 C	22.6766	50/50	22.6766
944312	AF1-099 E	15.1178	50/50	15.1178
944321	AF1-100 C	38.2035	50/50	38.2035
944322	AF1-100 E	25.4690	50/50	25.4690
944381	AF1-103 O1	1.9052	Adder	2.24
944471	AF1-112 C	4.7322	50/50	4.7322
944472	AF1-112 E	2.6618	50/50	2.6618
944671	AF1-132 C O1	4.5038	50/50	4.5038
944672	AF1-132 E O1	3.0026	50/50	3.0026
944691	AF1-134 C O1	2.0483	50/50	2.0483
944692	AF1-134 E O1	1.3655	50/50	1.3655
944751	AF1-140 C	1.0127	Adder	1.19
944752	AF1-140 E	0.6751	Adder	0.79
944771	AF1-142 C	36.2826	50/50	36.2826
944772	AF1-142 E	24.1884	50/50	24.1884
944841	AF1-149 C	4.3408	50/50	4.3408
944842	AF1-149 E	2.8938	50/50	2.8938
944881	AF1-153 C O1	2.3069	50/50	2.3069
944882	AF1-153 E O1	1.5379	50/50	1.5379
944901	AF1-155 C	2.2932	50/50	2.2932
944902	AF1-155 E	1.5288	50/50	1.5288
945121	AF1-177	0.4763	Adder	0.56
945161	AF1-181	0.2045	50/50	0.2045
945171	AF1-182	1.0253	50/50	1.0253

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945181	AF1-183	0.2389	50/50	0.2389
945491	AF1-214 C	4.3393	50/50	4.3393
945492	AF1-214 E	2.8929	50/50	2.8929
945551	AF1-220 C	17.0161	50/50	17.0161
945552	AF1-220 E	11.3503	50/50	11.3503
946111	AF1-276 C	6.4074	Adder	7.54
946112	AF1-276 E	3.1559	Adder	3.71
946121	AF1-277 C	6.4074	Adder	7.54
946122	AF1-277 E	3.1559	Adder	3.71
946131	AF1-278 C	5.1068	Adder	6.01
946132	AF1-278 E	2.5400	Adder	2.99
946381	AF1-302 C	2.6588	50/50	2.6588
946382	AF1-302 E	3.5450	50/50	3.5450
946421	AF1-306 C	10.0128	50/50	10.0128
946422	AF1-306 E	40.0513	50/50	40.0513
957451	AF2-039 C	1.7865	50/50	1.7865
957452	AF2-039 E	1.1910	50/50	1.1910
957512	AF2-045 E	0.9316	Adder	2.07
957561	AF2-050 C	3.9234	50/50	3.9234
957562	AF2-050 E	2.6156	50/50	2.6156
957581	AF2-052 C	2.0784	Adder	4.61
957582	AF2-052 E	1.0111	Adder	2.24
957681	AF2-062 C	5.9580	Adder	13.23
957682	AF2-062 E	3.9720	Adder	8.82
957931	AF2-087 C	0.6633	50/50	0.6633
957932	AF2-087 E	0.9135	50/50	0.9135
957941	AF2-088 C	0.8602	50/50	0.8602
957942	AF2-088 E	0.5735	50/50	0.5735
957981	AF2-092 C	0.3509	Adder	0.78
957982	AF2-092 E	0.2339	Adder	0.52
958271	AF2-121 C	2.4204	50/50	2.4204
958272	AF2-121 E	1.6136	50/50	1.6136
958551	AF2-146 C	6.7078	50/50	6.7078
958552	AF2-146 E	4.4718	50/50	4.4718
958561	AF2-147 C	4.4149	50/50	4.4149
958562	AF2-147 E	2.9433	50/50	2.9433
958571	AF2-148 C	4.5277	50/50	4.5277
958572	AF2-148 E	3.0185	50/50	3.0185
959401	AF2-231 C	1.2012	50/50	1.2012
959402	AF2-231 E	0.8008	50/50	0.8008
959802	AF2-271 E	0.5341	50/50	0.5341
960022	AF2-293 E	0.4189	50/50	0.4189
960041	AF2-295 C	2.2932	50/50	2.2932
960042	AF2-295 E	1.5288	50/50	1.5288
960051	AF2-296 C	2.0483	50/50	2.0483
960052	AF2-296 E	1.3655	50/50	1.3655
960211	AF2-312 C	0.5747	Adder	1.28
960212	AF2-312 E	0.3832	Adder	0.85
960391	AF2-330 C	6.3179	50/50	6.3179
960392	AF2-330 E	2.7632	50/50	2.7632
960451	AF2-336 C O1	0.5848	Adder	1.3
960452	AF2-336 E O1	0.3898	Adder	0.87

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960461	AF2-337 C O1	0.5848	Adder	1.3
960462	AF2-337 E O1	0.3898	Adder	0.87
960471	AF2-338 C O1	0.5848	Adder	1.3
960472	AF2-338 E O1	0.3898	Adder	0.87
960481	AF2-339 C O1	0.5848	Adder	1.3
960482	AF2-339 E O1	0.3898	Adder	0.87
WEC	WEC	0.3947	Confirmed LTF	0.3947
LGEE	LGEE	0.6840	Confirmed LTF	0.6840
CPLE	CPLE	0.3565	Confirmed LTF	0.3565
CBM-W2	CBM-W2	9.0827	Confirmed LTF	9.0827
CBM-W1	CBM-W1	16.5007	Confirmed LTF	16.5007
TVA	TVA	1.4182	Confirmed LTF	1.4182
O-066	O-066	22.6061	Confirmed LTF	22.6061
CBM-S2	CBM-S2	3.9477	Confirmed LTF	3.9477
CBM-S1	CBM-S1	8.9290	Confirmed LTF	8.9290
G-007	G-007	3.5079	Confirmed LTF	3.5079
MEC	MEC	1.9052	Confirmed LTF	1.9052

11.6.2 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
101074805	200522	26SHADE GP	PENELEC	938380	AE1-071 TAP	PENELEC	1	PL_P42_100548	breaker	160.0	167.8	172.46	DC	7.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200812	26ALY HYDR	0.4644	50/50	0.4644
200852	26WARR RDG	0.1327	50/50	0.1327
235003	AC1-025 E	0.1808	50/50	0.1808
236828	01GRAYMONT	0.4650	50/50	0.4650
290086	Q-036 E	2.0584	Adder	2.42
293301	N-039 E	3.5773	Adder	4.21
294515	O38_P22	3.1302	Adder	3.68
919491	AA2-000	26.2026	Adder	30.83
930511	AB1-092	0.9621	Adder	1.13
936421	AD2-055	1.9808	Adder	2.33
936991	AD2-133 C	0.9263	Adder	1.09
936992	AD2-133 E	4.2366	Adder	4.98
939171	AE1-147 C	1.3871	50/50	1.3871
939172	AE1-147 E	0.9247	50/50	0.9247
940201	AE2-001 C	1.3916	50/50	1.3916
940202	AE2-001 E	0.9278	50/50	0.9278
940671	**AE2-054 C (Suspended)**	**-0.5519**	**Adder**	**-0.65**
940681	**AE2-055 C (Suspended)**	**1.4610**	**50/50**	**1.4610**
940682	**AE2-055 E (Suspended)**	**0.9740**	**50/50**	**0.9740**
941231	AE2-117 C	1.5383	50/50	1.5383
941232	AE2-117 E	1.0255	50/50	1.0255
941241	AE2-118 C	1.5383	50/50	1.5383
941242	AE2-118 E	1.0255	50/50	1.0255
941261	AE2-120 C	1.3942	50/50	1.3942
941262	AE2-120 E	0.9294	50/50	0.9294
941271	AE2-121 C	0.7333	50/50	0.7333
941272	AE2-121 E	0.4896	50/50	0.4896
941321	AE2-126 C	0.6656	Adder	0.78
941322	AE2-126 E	0.4437	Adder	0.52
941331	AE2-129 C	0.6682	Adder	0.79
941332	AE2-129 E	0.4455	Adder	0.52
941351	AE2-131 C	0.6682	Adder	0.79
941352	AE2-131 E	0.4455	Adder	0.52
942351	AE2-248 C	1.1457	50/50	1.1457
942352	AE2-248 E	0.7638	50/50	0.7638
942491	AE2-262 C	4.0978	Adder	4.82
942492	AE2-262 E	2.7538	Adder	3.24
942501	AE2-263 C	3.8520	Adder	4.53
942502	AE2-263 E	2.5718	Adder	3.03
942511	AE2-264 C	5.0592	50/50	5.0592
942512	AE2-264 E	3.3728	50/50	3.3728

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943751	AF1-043	5.9423	Adder	6.99
944001	AF1-068 C O1	1.5369	50/50	1.5369
944002	AF1-068 E O1	0.8645	50/50	0.8645
944311	AF1-099 C	6.2205	Adder	7.32
944312	AF1-099 E	4.1470	Adder	4.88
944321	AF1-100 C	10.5162	Adder	12.37
944322	AF1-100 E	7.0108	Adder	8.25
944471	AF1-112 C	1.5195	50/50	1.5195
944472	AF1-112 E	0.8547	50/50	0.8547
944671	AF1-132 C O1	1.4458	50/50	1.4458
944672	AF1-132 E O1	0.9638	50/50	0.9638
944691	AF1-134 C O1	0.5674	Adder	0.67
944692	AF1-134 E O1	0.3783	Adder	0.45
944771	AF1-142 C	9.9529	Adder	11.71
944772	AF1-142 E	6.6352	Adder	7.81
944841	AF1-149 C	1.3944	50/50	1.3944
944842	AF1-149 E	0.9296	50/50	0.9296
944881	AF1-153 C O1	0.6372	Adder	0.75
944882	AF1-153 E O1	0.4248	Adder	0.5
944901	AF1-155 C	0.6334	Adder	0.75
944902	AF1-155 E	0.4223	Adder	0.5
945161	AF1-181	0.0563	Adder	0.07
945171	AF1-182	0.2821	Adder	0.33
945181	AF1-183	0.0658	Adder	0.08
945491	AF1-214 C	1.3940	50/50	1.3940
945492	AF1-214 E	0.9294	50/50	0.9294
945551	AF1-220 C	4.7114	Adder	5.54
945552	AF1-220 E	3.1427	Adder	3.7
946421	AF1-306 C	2.7653	Adder	3.25
946422	AF1-306 E	11.0612	Adder	13.01
957451	AF2-039 C	0.2611	Adder	0.58
957452	AF2-039 E	0.1741	Adder	0.39
957931	AF2-087 C	0.0966	Adder	0.21
957932	AF2-087 E	0.1331	Adder	0.3
957941	AF2-088 C	0.1257	Adder	0.28
957942	AF2-088 E	0.0838	Adder	0.19
958271	AF2-121 C	0.3541	Adder	0.79
958272	AF2-121 E	0.2361	Adder	0.52
958551	AF2-146 C	6.6212	50/50	6.6212
958552	AF2-146 E	4.4142	50/50	4.4142
958561	AF2-147 C	1.4079	50/50	1.4079
958562	AF2-147 E	0.9386	50/50	0.9386
958571	AF2-148 C	4.4693	50/50	4.4693
958572	AF2-148 E	2.9796	50/50	2.9796
959401	AF2-231 C	0.3846	50/50	0.3846
959402	AF2-231 E	0.2564	50/50	0.2564
959802	AF2-271 E	0.0783	Adder	0.17
959843	AF2-275 BAT	0.0524	Merchant Transmission	0.0524
959853	AF2-276 BAT	0.0524	Merchant Transmission	0.0524
960022	AF2-293 E	0.1346	50/50	0.1346
960041	AF2-295 C	0.3357	Adder	0.75
960042	AF2-295 E	0.2238	Adder	0.5

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960051	AF2-296 C	0.3007	Adder	0.67
960052	AF2-296 E	0.2005	Adder	0.45
WEC	WEC	0.0447	Confirmed LTF	0.0447
LGEE	LGEE	0.0673	Confirmed LTF	0.0673
CALDERWOOD	CALDERWOOD	0.0040	Confirmed LTF	0.0040
CBM-W2	CBM-W2	0.6061	Confirmed LTF	0.6061
CBM-W1	CBM-W1	2.1392	Confirmed LTF	2.1392
TVA	TVA	0.0406	Confirmed LTF	0.0406
O-066	O-066	1.8480	Confirmed LTF	1.8480
CHEOAH	CHEOAH	0.0055	Confirmed LTF	0.0055
CBM-S1	CBM-S1	0.3919	Confirmed LTF	0.3919
G-007	G-007	0.3214	Confirmed LTF	0.3214
MEC	MEC	0.1843	Confirmed LTF	0.1843
CATAWBA	CATAWBA	0.0395	Confirmed LTF	0.0395

11.6.3 Index 3

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
101074555	938380	AE1-071 TAP	PENELEC	200520	26ROXBURY	PENELEC	1	PL_P22_100582	bus	160.0	206.43	211.08	DC	7.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200812	26ALY HYDR	0.4641	50/50	0.4641
200852	26WARR RDG	0.1326	50/50	0.1326
235003	AC1-025 E	0.1807	50/50	0.1807
236828	01GRAYMONT	0.4648	50/50	0.4648
290086	Q-036 E	2.0550	Adder	2.42
293301	N-039 E	3.5719	Adder	4.2
294515	O38_P22	3.1254	Adder	3.68
919491	AA2-000	26.1671	Adder	30.78
930511	AB1-092	0.9608	Adder	1.13
936421	AD2-055	1.9781	Adder	2.33
936991	AD2-133 C	0.9247	Adder	1.09
936992	AD2-133 E	4.2296	Adder	4.98
938381	AE1-071 C	41.3027	50/50	41.3027
938382	AE1-071 E	25.2738	50/50	25.2738
939171	AE1-147 C	1.3862	50/50	1.3862
939172	AE1-147 E	0.9242	50/50	0.9242
940201	AE2-001 C	1.3908	50/50	1.3908
940202	AE2-001 E	0.9272	50/50	0.9272
940671	**AE2-054 C (Suspended)**	**-0.5511**	**Adder**	**-0.65**
940681	**AE2-055 C (Suspended)**	**1.4602**	**50/50**	**1.4602**
940682	**AE2-055 E (Suspended)**	**0.9734**	**50/50**	**0.9734**
941231	AE2-117 C	1.5374	50/50	1.5374
941232	AE2-117 E	1.0250	50/50	1.0250
941241	AE2-118 C	1.5374	50/50	1.5374
941242	AE2-118 E	1.0250	50/50	1.0250
941261	AE2-120 C	1.3933	50/50	1.3933
941262	AE2-120 E	0.9289	50/50	0.9289
941271	AE2-121 C	0.7328	50/50	0.7328
941272	AE2-121 E	0.4893	50/50	0.4893
941321	AE2-126 C	0.6646	Adder	0.78
941322	AE2-126 E	0.4431	Adder	0.52
941331	AE2-129 C	0.6672	Adder	0.78
941332	AE2-129 E	0.4448	Adder	0.52
941351	AE2-131 C	0.6672	Adder	0.78
941352	AE2-131 E	0.4448	Adder	0.52
942351	AE2-248 C	1.1450	50/50	1.1450
942352	AE2-248 E	0.7633	50/50	0.7633
942491	AE2-262 C	4.0945	Adder	4.82
942492	AE2-262 E	2.7515	Adder	3.24
942501	AE2-263 C	3.8488	Adder	4.53
942502	AE2-263 E	2.5697	Adder	3.02

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
942511	AE2-264 C	5.0554	50/50	5.0554
942512	AE2-264 E	3.3702	50/50	3.3702
943751	AF1-043	5.9342	Adder	6.98
944001	AF1-068 C O1	1.5360	50/50	1.5360
944002	AF1-068 E O1	0.8640	50/50	0.8640
944311	AF1-099 C	6.2154	Adder	7.31
944312	AF1-099 E	4.1436	Adder	4.87
944321	AF1-100 C	10.5060	Adder	12.36
944322	AF1-100 E	7.0040	Adder	8.24
944471	AF1-112 C	1.5186	50/50	1.5186
944472	AF1-112 E	0.8542	50/50	0.8542
944671	AF1-132 C O1	1.4449	50/50	1.4449
944672	AF1-132 E O1	0.9633	50/50	0.9633
944691	AF1-134 C O1	0.5665	Adder	0.67
944692	AF1-134 E O1	0.3777	Adder	0.44
944771	AF1-142 C	9.9446	Adder	11.7
944772	AF1-142 E	6.6297	Adder	7.8
944841	AF1-149 C	1.3936	50/50	1.3936
944842	AF1-149 E	0.9290	50/50	0.9290
944881	AF1-153 C O1	0.6363	Adder	0.75
944882	AF1-153 E O1	0.4242	Adder	0.5
944901	AF1-155 C	0.6326	Adder	0.74
944902	AF1-155 E	0.4217	Adder	0.5
945161	AF1-181	0.0562	Adder	0.07
945171	AF1-182	0.2818	Adder	0.33
945181	AF1-183	0.0657	Adder	0.08
945491	AF1-214 C	1.3932	50/50	1.3932
945492	AF1-214 E	0.9288	50/50	0.9288
945551	AF1-220 C	4.7044	Adder	5.53
945552	AF1-220 E	3.1380	Adder	3.69
946421	AF1-306 C	2.7615	Adder	3.25
946422	AF1-306 E	11.0462	Adder	13.0
957451	AF2-039 C	0.2608	Adder	0.58
957452	AF2-039 E	0.1738	Adder	0.39
957931	AF2-087 C	0.0965	Adder	0.21
957932	AF2-087 E	0.1329	Adder	0.3
957941	AF2-088 C	0.1256	Adder	0.28
957942	AF2-088 E	0.0837	Adder	0.19
958271	AF2-121 C	0.3536	Adder	0.78
958272	AF2-121 E	0.2357	Adder	0.52
958551	AF2-146 C	6.6223	50/50	6.6223
958552	AF2-146 E	4.4149	50/50	4.4149
958561	AF2-147 C	1.4075	50/50	1.4075
958562	AF2-147 E	0.9383	50/50	0.9383
958571	AF2-148 C	4.4701	50/50	4.4701
958572	AF2-148 E	2.9800	50/50	2.9800
959401	AF2-231 C	0.3844	50/50	0.3844
959402	AF2-231 E	0.2562	50/50	0.2562
959802	AF2-271 E	0.0781	Adder	0.17
959843	AF2-275 BAT	0.0523	Merchant Transmission	0.0523
959853	AF2-276 BAT	0.0523	Merchant Transmission	0.0523
960022	AF2-293 E	0.1345	50/50	0.1345

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960041	AF2-295 C	0.3353	Adder	0.74
960042	AF2-295 E	0.2235	Adder	0.5
960051	AF2-296 C	0.3002	Adder	0.67
960052	AF2-296 E	0.2002	Adder	0.44
WEC	WEC	0.0438	Confirmed LTF	0.0438
LGEE	LGEE	0.0656	Confirmed LTF	0.0656
CALDERWOOD	CALDERWOOD	0.0045	Confirmed LTF	0.0045
CBM-W2	CBM-W2	0.5897	Confirmed LTF	0.5897
CBM-W1	CBM-W1	2.0892	Confirmed LTF	2.0892
TVA	TVA	0.0378	Confirmed LTF	0.0378
O-066	O-066	1.8614	Confirmed LTF	1.8614
CHEOAH	CHEOAH	0.0065	Confirmed LTF	0.0065
CBM-S1	CBM-S1	0.3664	Confirmed LTF	0.3664
G-007	G-007	0.3214	Confirmed LTF	0.3214
MEC	MEC	0.1796	Confirmed LTF	0.1796
CATAWBA	CATAWBA	0.0395	Confirmed LTF	0.0395

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.

Queue Number	Project Name	Status
AA2-000	N/A	N/A
AB1-092	Moshannon-East Towanda 230kV	Active
AC1-025	Dale Summit	In Service
AD2-055	Moshannon-East Towanda 230 kV	Active
AD2-133	Eagle Valley 115kV	Active
AE1-071	Shade Gap-Roxbury 115 kV	Active
AE1-147	Bellefonte 46 kV	Engineering and Procurement
AE2-001	Nittany-Zion 46 kV	Active
AE2-054	Warfordsburg 34 kV	Suspended
AE2-055	Shingletown-Boalsburg 46 kV	Suspended
AE2-113	Farmers Valley-Ridgeway 115 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
AE2-126	Dubois-Curwensville 34.5 kV	Active
AE2-129	Philipsburg-Clarence 34.5 kV	Active
AE2-131	Philipsburg-Karthaus 34.5	Active
AE2-224	Bearrock-Johnstown 230 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
AE2-316	Brookville-Squab Hollow 138 kV	Active
AF1-043	Moshannon-East Towanda 230 kV	Active
AF1-068	Boalsburg-Centre Hall 46 kV	Active
AF1-086	Madera-Westover South 115 kV	Active
AF1-099	Moshannon-Milesburg 230 kV	Active
AF1-100	Shawville-Moshannon 230 kV	Active
AF1-103	Warren 34.5 kV	Active
AF1-112	Centre Hall-Boalsburg 46 kV	Active
AF1-132	Shingletown-Boalsburg 46 kV	Active
AF1-134	Philipsburg-Madera 34.5 kV	Active
AF1-140	Claysburg 23 kV	Engineering and Procurement
AF1-142	Moshannon-Milesburg 230 kV	Active
AF1-149	Graymont-Zion 46 kV	Active
AF1-153	Motion-Ridgeway 46 kV	Active
AF1-155	Paper City-Wilcox 46 kV	Engineering and Procurement
AF1-177	Warren 115 kV	Partially in Service - Under Construction

Queue Number	Project Name	Status
AF1-181	Shawville 3 230 kV	Partially in Service - Under Construction
AF1-182	Shawville 4 230 kV	Partially in Service - Under Construction
AF1-183	Shawville 1 230 kV	Partially in Service - Under Construction
AF1-214	Nittany-Zion 46 kV	Active
AF1-220	Ridgway-Whetstone 115 kV	Active
AF1-276	Lewis Run-Pierce Brook 230 kV	Active
AF1-277	Lewis Run-Pierce Brook 2 230 kV	Active
AF1-278	Lewis Run-Pierce Brook 3 230 kV	Active
AF1-302	Brookville-Squab Hollow 138 kV	Active
AF1-306	Squab Hollow 230 kV	Active
AF2-039	Shawville-Clearfield 34.5 kV	Active
AF2-045	Cambria Nug 115 kV	Active
AF2-050	Bearrock-Johnstown 230 kV	Active
AF2-052	Farmers Valley-Ridgeway 115 kV	Active
AF2-062	Lewis Run-Pierce Brook 230 kV	Active
AF2-087	East Altoona-Pinecroft 12.47 kV	Active
AF2-088	Shawville-Clearfield 34.5 kV II	Active
AF2-092	Snake Spring-Bedford Area 23 kV	Active
AF2-121	Philipsburg-Shawville 34.5 kV	Active
AF2-146	Hill Valley-Valley REC 46 kV	Active
AF2-147	McVeytown-Strodes Mill 46 kV	Active
AF2-148	Shade Gap-Three Springs KTS 23 kV	Active
AF2-231	Belleville 12.47 kV	Active
AF2-271	Pemberton-Sinking Valley 12.47 kV	Active
AF2-275	Guilford 34.5 kV	Active
AF2-276	Guilford 34.5 kV	Active
AF2-293	Beech Creek 46 kV	Active
AF2-295	Wilcox-Paper City 46 kV	Active
AF2-296	Madera 34.5 kV	Active
AF2-312	Carrolltown-Patton 46 kV	Active
AF2-330	Claysburg-Summit 115 kV	Active
AF2-336	Snake Spring 115 kV I	Active
AF2-337	Snake Spring 115 kV II	Active
AF2-338	Snake Spring 115 kV III	Active
AF2-339	Snake Spring 115 kV IV	Active
V3-030	St. Benedict-Patton 46kV	In Service
Y2-055	Elm Street 34.5kV	Withdrawn

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
PN-P1-2-PN-115-094-A	CONTINGENCY 'PN-P1-2-PN-115-094-A' /* ROXBURY - SHADE GAP 115KV DISCONNECT BRANCH FROM BUS 200520 TO BUS 938380 CKT 1 /* 26ROXBURY 115 AE1-071 TAP 115 END
PL_P22_100582	CONTINGENCY 'PL_P22_100582' /* JUNIATA 230KV BUS 2 DISCONNECT BUS 208005 /* END
PN-P1-2-PN-230-103T	CONTINGENCY 'PN-P1-2-PN-230-103T' /** 26LEWISTWN - JUNI BU2 230.00 LINE DISCONNECT BRANCH FROM BUS 200513 TO BUS 208005 CKT 1 /* 26LEWISTWN - JUNI BU2 230.00 LINE END
PL_P42_100548	CONTINGENCY 'PL_P42_100548' /* AT JUNIATA SUB 230KV BUS TIE CB FAILED" DISCONNECT BUS 208005 /* DISCONNECT BUS 208004 /* END
AP-P2-2-WP-230-001T	CONTINGENCY 'AP-P2-2-WP-230-001T' /* ELKO #2 230KV BUS DISCONNECT BRANCH FROM BUS 235175 TO BUS 235158 CKT 1 /* 01ELKO 230 01CARB 230 DISCONNECT BRANCH FROM BUS 235175 TO BUS 235236 CKT 1 /* 01ELKO 230 01QUEHAN 230 DISCONNECT BRANCH FROM BUS 235175 TO BUS 200726 CKT 1 /* 01ELKO 230 26SHAWVL 2 230 REDUCE BUS 237007 SHUNT BY 100 PERCENT /* 01ELKO CAP 138 DISCONNECT BUS 237007 /* 01ELKO CAP 138 END
PL_P12_100618	CONTINGENCY 'PL_P12_100618' /* JUNIATA 230/69KV TR4 OUT" DISCONNECT BRANCH FROM BUS 208005 TO BUS 209997 CKT 4 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 207955 CKT 1 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 200009 CKT 2 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 208006 CKT 1 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 208004 CKT 1 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 200513 CKT 1 /* END
Base Case	

Contingency Name	Contingency Definition
PN-P2-3-PN-115-55A	CONTINGENCY 'PN-P2-3-PN-115-55A' /* 683 DISCONNECT BRANCH FROM BUS 200520 TO BUS 938380 CKT 1 /* 26ROXBURY 115 AE1-071 TAP 115 DISCONNECT BRANCH FROM BUS 200860 TO BUS 200520 CKT 3 /* 26ROXB SB2 23 26ROXBURY 115 DISCONNECT BRANCH FROM BUS 961480 TO BUS 200520 CKT 1 /* AF2-439 TAP 115 26ROXBURY 115 DISCONNECT BRANCH FROM BUS 200532 TO BUS 200520 CKT 2 /* 26ROXBURY 138 26ROXBURY 115 DISCONNECT BRANCH FROM BUS 200520 TO BUS 200554 CKT 1 /* 26ROXBURY 115 26ROXB SB1 23 END
TS P1-2_#1	CONTINGENCY 'TS P1-2_#1' OPEN BRANCH FROM BUS 270071 TO BUS 235506 CKT 1 / 270071 RICE_230 230 TO 235506 01RINGLD 230 1 END

12 Short Circuit Analysis

Short circuit analysis will be performed in the System Impact phase.

13 Affected Systems

13.1 NYISO

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

14 Attachment 1: One Line Diagram:

AF2-148 Shade Gap - Three Springs KTS 23kV