



Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-104

SOMERSET 23 KV

2.4 MW Capacity / 4 MW Energy

July 2020

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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), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Mid-Atlantic Interstate Transmission, Inc. (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 Somerset County, Pennsylvania. The installed facilities will have a total capability of 4 MW with 2.4 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 01, 2020. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-104
Project Name	SOMERSET 23 KV
State	Pennsylvania
County	Somerset
Transmission Owner	MAIT (PENELEC Zone)
MFO	4
MWE	4
MWC	2.4
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

AF2-104 will interconnect with the PENELEC distribution system at POI pole RMS-83712, which is located on the 22.86kV McDonaldton Jct. ckt#00010-12 @ Somerset.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF2-104 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.

Customer did not request a secondary point of interconnection.

5 Cost Summary

The AF2-104 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$ 139,600
Total System Network Upgrade Costs	\$ 113,465,160
Total Costs	\$ 113,604,760

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.

6 Transmission Owner Scope of Work

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

Description	Total Cost
Tap the existing 22.86kV McDonaldton Jct. ckt#00010-12 @ Somerset at POI pole RMS-83712 and install a SCADA controlled 22.86kV recloser to interconnect queue project AF2-104. Install 22.86kV metering in customer's facilities. The customer is responsible to build their own line from their site to Penelec's existing facilities.	\$ 100,000
NPs & Cust Dwg Review @ AF2-104	\$ 25,200
Somerset 22.86kV SS. Adjust Remote Relay and Metering Settings.	\$ 14,400
Total Physical Interconnection Costs	\$ 139,600

7 Schedule

Based on the scope of work for the Attachment Facilities and the Direct and/or Non-Direct Connection facilities, it is expected to take a minimum of 9 months after the signing of an Interconnection Construction Service Agreement to complete the installation. This includes the requirement for the IC to make a preliminary payment that compensates FE for the engineering design work that is related to the construction. 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 direct connection and network upgrades, and that all transmission system outages will be allowed when requested.

The schedule for the required Network Impact Reinforcements will be more clearly identified in future study phases.

8 Transmission Owner Analysis

Penelec performed an analysis of its distribution system. The AF2-104 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 Vine St. 13.2kV (AF2-104) 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 they call "Somerset 23kV" that will connect to Penelec's 22.86kV Somerset substation ckt#00010-12 via a customer owned tap to pole RMS-83712.

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 Power Factor

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. 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)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

10.3 Interconnected Transmission Owner Requirements

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 AF2-104 was evaluated as a 4.0 MW (Capacity 2.4 MW) injection at the Somerset 23 kV substation in the PENELEC area. Project AF2-104 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-104 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)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CON T NAME	Type	Ratin g MVA	PRE PROJEC T LOADIN G %	POST PROJEC T LOADIN G %	AC D C	MW IMPAC T
101013445	200741	26SEWARD	115.0	PENELEC	200766	26FLORENCE	115.0	PENELEC	1	PN-P2-3-PN-230-9G-A	break er	282.0	99.99	100.15	DC	0.46
101013450	200766	26FLORENCE	115.0	PENELEC	200740	26BLRSVLE	115.0	PENELEC	1	PN-P2-3-PN-230-9G-A	break er	282.0	99.88	100.04	DC	0.46

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	CK T ID	CON T NAME	Type	Ratin g MVA	PRE PROJEC T LOADIN G %	POST PROJEC T LOADIN G %	AC D C	MW IMPAC T
101013251	200745	26ALLEGHEN	115.0	PENELEC	200884	26NEW BALT	115.0	PENELEC	1	PN-P2-3-PN-115-35E	break er	160.0	152.58	153.9	DC	2.12
101013243	200746	26ROCKWOOD	115.0	PENELEC	202650	26HIGHPOINT	115.0	PENELEC	1	PN-P2-3-PN-115-35E	break er	179.0	147.53	148.59	DC	1.88
101013206	200747	26PENNMAR	115.0	PENELEC	200762	26GARRETT	115.0	PENELEC	1	PN-P2-3-PN-115-35E	break er	167.0	176.34	177.47	DC	1.88
98686823	200762	26GARRETT	115.0	PENELEC	235470	01GARRET	115.0	AP	1	PN-P2-3-PN-115-35E	break er	160.0	194.4	195.58	DC	1.88

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CON T NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
101013211	202650	26HIGHPOINT	115.0	PENELEC	200747	26PENNMAR	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	174.0	165.97	167.05	DC	1.88
101013355	945670	AF1-232 TAP	115.0	PENELEC	200745	26ALLEGHEN	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	121.81	123.13	DC	2.12

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	CK T ID	CON T NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
101013848	200744	26SOMERST	115.0	PENELEC	200802	26RALPHTON	115.0	PENELEC	1	PN-P1-2-PN-115-066	operation	185.0	102.07	103.24	DC	2.17

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
101013355	8	AF1-232 TAP 115.0 kV - 26ALLEGHEN 115.0 kV Ckt 1	<p><u>PENELEC</u> PN-AF2-F-0036A (1773) : Reconductor 1.7 miles of transmission line Project Type : FAC Cost : \$5,196,900 Time Estimate : 24.0 Months</p> <p>PN-AF2-F-0036B (1774) : Replace the bus conductor at Allegheny. Project Type : FAC Cost : \$122,280 Time Estimate : 12.0 Months</p>	\$5,319,180
101013445	1	26SEWARD 115.0 kV - 26FLORENCE 115.0 kV Ckt 1	<p><u>PENELEC</u> PN-AF2-F-0029A (1762) : Replace bus conductor at Seward. Project Type : FAC Cost : \$122,280 Time Estimate : 12.0 Months</p> <p>PN-AF2-F-0029B (1763) : Reconductor 4.15 miles of transmission line Project Type : FAC Cost : \$12,686,550 Time Estimate : 30.0 Months</p>	\$12,808,830
101013450	2	26FLORENCE 115.0 kV - 26BLRSVL E 115.0 kV Ckt 1	<p><u>PENELEC</u> PN-AF2-F-0028A (1759) : Reconductor 9.5 miles of transmission line. Replace line drops at Blairsville East. Project Type : FAC Cost : \$29,041,500 Time Estimate : 36.0 Months</p>	\$29,041,500
101013206	5	26PENN-MAR 115.0 kV - 26GARRETT 115.0 kV Ckt 1	<p><u>PENELEC</u> PN-AF2-F-0038A (1776) : Reconductor 1.76 miles of transmission line Project Type : FAC Cost : \$5,380,320 Time Estimate : 30.0 Months</p>	\$5,380,320
101013243	4	26ROCKWOOD 115.0 kV - 26HIGHPOINT 115.0 kV Ckt 1	<p><u>PENELEC</u> PN-AF2-F-0037 (1775) : Rebuild 10.1 miles of transmission line Project Type : FAC Cost : \$30,875,700 Time Estimate : 36.0 Months</p>	\$30,875,700

ID	Idx	Facility	Upgrade Description	Cost
98686823	6	26GARRETT 115.0 kV - 01GARRET 115.0 kV Ckt 1	<p><u>APS</u> WP-AF1-F-0003 (636) : Reconductor Garrett Tap - Garrett (~2.0 miles) Project Type : FAC Cost : \$3,780,000 Time Estimate : 6.0 Months</p> <p><u>PENELEC</u> PN-AF2-F-0042A (1787) : Replace line trap at Garrett. Project Type : FAC Cost : \$122,280 Time Estimate : 12.0 Months</p> <p>PN-AF2-F-0042B (1788) : Replace bus conductor at Garrett. Project Type : FAC Cost : \$122,280 Time Estimate : 12.0 Months</p>	\$4,024,560
101013211	7	26HIGHPOINT 115.0 kV - 26PENN-MAR 115.0 kV Ckt 1	<p><u>PENELEC</u> PN-AF2-F-0039A (1779) : Replace circuit breaker at Penn Mar Project Type : FAC Cost : \$733,680 Time Estimate : 12.0 Months</p> <p>PN-AF2-F-0039B (1780) : Rebuild 4.67 miles of transmission line Project Type : FAC Cost : \$14,276,190 Time Estimate : 36.0 Months</p> <p>PN-AF2-F-0039C (1781) : Replace bus conductor at Penn Mar. Project Type : FAC Cost : \$122,280 Time Estimate : 12.0 Months</p>	\$15,132,150
101013251	3	26ALLEGHEN 115.0 kV - 26NEW BALT 115.0 kV Ckt 1	<p><u>PENELEC</u> PN-AF2-F-0031A (1766) : Reconductor 3.52 miles of transmission line Project Type : FAC Cost : \$10,760,640 Time Estimate : 30.0 Months</p> <p>PN-AF2-F-0031B (1767) : Replace bus conductor at Allegheny. Project Type : FAC Cost : \$122,280 Time Estimate : 12.0 Months</p>	\$10,882,920
			TOTAL COST	\$113,465,160

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
101013445	200741	26SEWARD	PENELEC	200766	26FLORENCE	PENELEC	1	PN-P2-3-PN-230-9G-A	breaker	282.0	99.99	100.15	DC	0.46

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200503	26C.SLOPE (Deactivation : 07/06/2019)	11.5979	50/50	11.5979
200794	26CONEMAGH	0.3084	50/50	0.3084
200834	26SW_E13_K22	0.0357	50/50	0.0357
200846	26FORWARD	0.1279	50/50	0.1279
200864	K-013 E	2.9661	50/50	2.9661
200883	Q-053 E	4.9843	50/50	4.9843
200888	26HIGHLAND	0.2719	50/50	0.2719
200889	26STNY CRK	0.2121	50/50	0.2121
200915	26CHSTN_FL	0.1361	50/50	0.1361
200925	26R32	0.3138	50/50	0.3138
202225	26SCI_S29B	0.0556	50/50	0.0556
290086	Q-036 E	2.4721	Adder	2.91
292350	K-023	2.7056	Adder	3.18
292542	L-013 1	2.6316	Adder	3.1
293301	N-039 E	4.2209	Adder	4.97
293393	V3-030E	1.8828	Adder	2.22
293432	R-040 E	0.1480	Adder	0.17
293603	O-018 E	6.3060	50/50	6.3060
293902	O-048 E	2.3684	Adder	2.79
294515	O38_P22	3.6933	Adder	4.35
294903	P-060 E	4.9178	50/50	4.9178
296332	R-032 E	7.2762	50/50	7.2762
913142	Y1-033 E OP1	2.1364	Adder	2.51
917672	Z2-108 E	1.4803	Adder	1.74
936991	AD2-133 C	1.1125	Adder	1.31
936992	AD2-133 E	5.0883	Adder	5.99
938351	AE1-053	0.8224	Adder	0.97
938881	AE1-116	0.5181	50/50	0.5181
938991	AE1-128 C	8.6076	50/50	8.6076
938992	AE1-128 E	5.7384	50/50	5.7384
941231	AE2-117 C	0.5318	Adder	0.63
941232	AE2-117 E	0.3546	Adder	0.42
941241	AE2-118 C	0.5318	Adder	0.63
941242	AE2-118 E	0.3546	Adder	0.42
941331	AE2-129 C	0.6019	Adder	0.71
941332	AE2-129 E	0.4013	Adder	0.47
941351	AE2-131 C	0.6019	Adder	0.71
941352	AE2-131 E	0.4013	Adder	0.47
942121	AE2-224 C	4.3901	Adder	5.16
942122	AE2-224 E	2.9267	Adder	3.44

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
942511	AE2-264 C	2.5365	Adder	2.98
942512	AE2-264 E	1.6910	Adder	1.99
943711	AF1-039 C O1	0.5652	Adder	0.66
943712	AF1-039 E O1	0.3768	Adder	0.44
944751	AF1-140 C	1.1215	50/50	1.1215
944752	AF1-140 E	0.7476	50/50	0.7476
944781	AF1-143 C	4.9343	Adder	5.81
944782	AF1-143 E	2.6316	Adder	3.1
945671	AF1-232 C O2	12.1066	50/50	12.1066
945672	AF1-232 E O2	6.5190	50/50	6.5190
946081	AF1-273 C O1	5.9476	50/50	5.9476
946082	AF1-273 E O1	3.9651	50/50	3.9651
946431	AF1-307 C	6.2779	50/50	6.2779
946432	AF1-307 E	4.1852	50/50	4.1852
946571	AF1-321 C O1	1.5589	50/50	1.5589
946572	AF1-321 E O1	1.0393	50/50	1.0393
957001	AF2-001 C O1	1.5589	50/50	1.5589
957002	AF2-001 E O1	1.0393	50/50	1.0393
957011	AF2-002 C O1	0.7795	50/50	0.7795
957012	AF2-002 E O1	0.5196	50/50	0.5196
957512	AF2-045 E	2.1605	50/50	2.1605
957561	AF2-050 C	1.1634	Adder	2.58
957562	AF2-050 E	0.7756	Adder	1.72
957931	AF2-087 C	0.1172	Adder	0.26
957932	AF2-087 E	0.1615	Adder	0.36
957981	AF2-092 C	0.8530	50/50	0.8530
957982	AF2-092 E	0.5687	50/50	0.5687
958101	AF2-104 C	0.2763	50/50	0.2763
958102	AF2-104 E	0.1842	50/50	0.1842
958271	AF2-121 C	0.3190	Adder	0.71
958272	AF2-121 E	0.2127	Adder	0.47
958411	AF2-135 C	0.1308	Adder	0.29
958412	AF2-135 E	0.0872	Adder	0.19
958471	AF2-141	0.3487	Adder	0.77
959301	AF2-221 C	0.8014	50/50	0.8014
959302	AF2-221 E	1.1066	50/50	1.1066
959401	AF2-231 C	0.0705	Adder	0.16
959402	AF2-231 E	0.0470	Adder	0.1
959792	AF2-270 E	0.4448	50/50	0.4448
959802	AF2-271 E	0.1080	Adder	0.24
960211	AF2-312 C	0.3910	Adder	0.87
960212	AF2-312 E	0.2607	Adder	0.58
960391	AF2-330 C	5.4227	50/50	5.4227
960392	AF2-330 E	2.3718	50/50	2.3718
960451	AF2-336 C O1	1.4216	50/50	1.4216
960452	AF2-336 E O1	0.9478	50/50	0.9478
960461	AF2-337 C O1	1.4216	50/50	1.4216
960462	AF2-337 E O1	0.9478	50/50	0.9478
960471	AF2-338 C O1	1.4216	50/50	1.4216
960472	AF2-338 E O1	0.9478	50/50	0.9478
960481	AF2-339 C O1	1.4216	50/50	1.4216
960482	AF2-339 E O1	0.9478	50/50	0.9478

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960901	AF2-381 C	10.2531	50/50	10.2531
960902	AF2-381 E	5.3957	50/50	5.3957
NEWTON	NEWTON	0.5168	Confirmed LTF	0.5168
FARMERCITY	FARMERCITY	0.0266	Confirmed LTF	0.0266
G-007A	G-007A	1.4121	Confirmed LTF	1.4121
VFT	VFT	3.8958	Confirmed LTF	3.8958
CALDERWOOD	CALDERWOOD	0.2212	Confirmed LTF	0.2212
PRAIRIE	PRAIRIE	1.2269	Confirmed LTF	1.2269
CHEOAH	CHEOAH	0.2222	Confirmed LTF	0.2222
EDWARDS	EDWARDS	0.1690	Confirmed LTF	0.1690
TILTON	TILTON	0.3056	Confirmed LTF	0.3056
MADISON	MADISON	0.0403	Confirmed LTF	0.0403
GIBSON	GIBSON	0.2648	Confirmed LTF	0.2648
BLUEG	BLUEG	0.8472	Confirmed LTF	0.8472
TRIMBLE	TRIMBLE	0.2721	Confirmed LTF	0.2721
CATAWBA	CATAWBA	0.1421	Confirmed LTF	0.1421

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
101013450	200766	26FLORENCE	PENELEC	200740	26BLRSVLE	PENELEC	1	PN-P2-3-PN-230-9G-A	breaker	282.0	99.88	100.04	DC	0.46

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200503	26C.SLOPE (Deactivation : 07/06/2019)	11.5979	50/50	11.5979
200794	26CONEMAGH	0.3084	50/50	0.3084
200834	26SW_E13_K22	0.0357	50/50	0.0357
200846	26FORWARD	0.1279	50/50	0.1279
200864	K-013 E	2.9661	50/50	2.9661
200883	Q-053 E	4.9843	50/50	4.9843
200888	26HIGHLAND	0.2719	50/50	0.2719
200889	26STNY CRK	0.2121	50/50	0.2121
200915	26CHSTN_FL	0.1361	50/50	0.1361
200925	26R32	0.3138	50/50	0.3138
202225	26SCI_S29B	0.0556	50/50	0.0556
290086	Q-036 E	2.4721	Adder	2.91
292350	K-023	2.7056	Adder	3.18
292542	L-013 1	2.6316	Adder	3.1
293301	N-039 E	4.2209	Adder	4.97
293393	V3-030E	1.8828	Adder	2.22
293432	R-040 E	0.1480	Adder	0.17
293603	O-018 E	6.3060	50/50	6.3060
293902	O-048 E	2.3684	Adder	2.79
294515	O38_P22	3.6933	Adder	4.35
294903	P-060 E	4.9178	50/50	4.9178
296332	R-032 E	7.2762	50/50	7.2762
913142	Y1-033 E OP1	2.1364	Adder	2.51
917672	Z2-108 E	1.4803	Adder	1.74
936991	AD2-133 C	1.1125	Adder	1.31
936992	AD2-133 E	5.0883	Adder	5.99
938351	AE1-053	0.8224	Adder	0.97
938881	AE1-116	0.5181	50/50	0.5181
938991	AE1-128 C	8.6076	50/50	8.6076
938992	AE1-128 E	5.7384	50/50	5.7384
941231	AE2-117 C	0.5318	Adder	0.63
941232	AE2-117 E	0.3546	Adder	0.42
941241	AE2-118 C	0.5318	Adder	0.63
941242	AE2-118 E	0.3546	Adder	0.42
941331	AE2-129 C	0.6019	Adder	0.71
941332	AE2-129 E	0.4013	Adder	0.47
941351	AE2-131 C	0.6019	Adder	0.71
941352	AE2-131 E	0.4013	Adder	0.47
942121	AE2-224 C	4.3901	Adder	5.16
942122	AE2-224 E	2.9267	Adder	3.44

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
942511	AE2-264 C	2.5365	Adder	2.98
942512	AE2-264 E	1.6910	Adder	1.99
943711	AF1-039 C O1	0.5652	Adder	0.66
943712	AF1-039 E O1	0.3768	Adder	0.44
944751	AF1-140 C	1.1215	50/50	1.1215
944752	AF1-140 E	0.7476	50/50	0.7476
944781	AF1-143 C	4.9343	Adder	5.81
944782	AF1-143 E	2.6316	Adder	3.1
945671	AF1-232 C O2	12.1066	50/50	12.1066
945672	AF1-232 E O2	6.5190	50/50	6.5190
946081	AF1-273 C O1	5.9476	50/50	5.9476
946082	AF1-273 E O1	3.9651	50/50	3.9651
946431	AF1-307 C	6.2779	50/50	6.2779
946432	AF1-307 E	4.1852	50/50	4.1852
946571	AF1-321 C O1	1.5589	50/50	1.5589
946572	AF1-321 E O1	1.0393	50/50	1.0393
957001	AF2-001 C O1	1.5589	50/50	1.5589
957002	AF2-001 E O1	1.0393	50/50	1.0393
957011	AF2-002 C O1	0.7795	50/50	0.7795
957012	AF2-002 E O1	0.5196	50/50	0.5196
957512	AF2-045 E	2.1605	50/50	2.1605
957561	AF2-050 C	1.1634	Adder	2.58
957562	AF2-050 E	0.7756	Adder	1.72
957931	AF2-087 C	0.1172	Adder	0.26
957932	AF2-087 E	0.1615	Adder	0.36
957981	AF2-092 C	0.8530	50/50	0.8530
957982	AF2-092 E	0.5687	50/50	0.5687
958101	AF2-104 C	0.2763	50/50	0.2763
958102	AF2-104 E	0.1842	50/50	0.1842
958271	AF2-121 C	0.3190	Adder	0.71
958272	AF2-121 E	0.2127	Adder	0.47
958411	AF2-135 C	0.1308	Adder	0.29
958412	AF2-135 E	0.0872	Adder	0.19
958471	AF2-141	0.3487	Adder	0.77
959301	AF2-221 C	0.8014	50/50	0.8014
959302	AF2-221 E	1.1066	50/50	1.1066
959401	AF2-231 C	0.0705	Adder	0.16
959402	AF2-231 E	0.0470	Adder	0.1
959792	AF2-270 E	0.4448	50/50	0.4448
959802	AF2-271 E	0.1080	Adder	0.24
960211	AF2-312 C	0.3910	Adder	0.87
960212	AF2-312 E	0.2607	Adder	0.58
960391	AF2-330 C	5.4227	50/50	5.4227
960392	AF2-330 E	2.3718	50/50	2.3718
960451	AF2-336 C O1	1.4216	50/50	1.4216
960452	AF2-336 E O1	0.9478	50/50	0.9478
960461	AF2-337 C O1	1.4216	50/50	1.4216
960462	AF2-337 E O1	0.9478	50/50	0.9478
960471	AF2-338 C O1	1.4216	50/50	1.4216
960472	AF2-338 E O1	0.9478	50/50	0.9478
960481	AF2-339 C O1	1.4216	50/50	1.4216
960482	AF2-339 E O1	0.9478	50/50	0.9478

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960901	AF2-381 C	10.2531	50/50	10.2531
960902	AF2-381 E	5.3957	50/50	5.3957
NEWTON	NEWTON	0.5168	Confirmed LTF	0.5168
FARMERCITY	FARMERCITY	0.0266	Confirmed LTF	0.0266
G-007A	G-007A	1.4121	Confirmed LTF	1.4121
VFT	VFT	3.8958	Confirmed LTF	3.8958
CALDERWOOD	CALDERWOOD	0.2212	Confirmed LTF	0.2212
PRAIRIE	PRAIRIE	1.2269	Confirmed LTF	1.2269
CHEOAH	CHEOAH	0.2222	Confirmed LTF	0.2222
EDWARDS	EDWARDS	0.1690	Confirmed LTF	0.1690
TILTON	TILTON	0.3056	Confirmed LTF	0.3056
MADISON	MADISON	0.0403	Confirmed LTF	0.0403
GIBSON	GIBSON	0.2648	Confirmed LTF	0.2648
BLUEG	BLUEG	0.8472	Confirmed LTF	0.8472
TRIMBLE	TRIMBLE	0.2721	Confirmed LTF	0.2721
CATAWBA	CATAWBA	0.1421	Confirmed LTF	0.1421

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
101013251	200745	26ALLEGHEN	PENELEC	200884	26NEW BALT	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	152.58	153.9	DC	2.12

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUUGH	0.3199	50/50	0.3199
200834	26SW_E13_K22	0.1642	50/50	0.1642
200835	26DSGENWIN	0.8086	50/50	0.8086
200840	26DEEPCRK1	0.2957	50/50	0.2957
200841	26DEEPCRK2	0.2957	50/50	0.2957
200890	26BF_G21_K23	0.3965	50/50	0.3965
200891	26CSLMN_L13	0.6220	50/50	0.6220
200892	26LOOKOUT	0.5909	50/50	0.5909
202225	26SCI_S29B	0.2555	50/50	0.2555
202652	26RGH_Y1-033	0.3036	50/50	0.3036
235013	01AB1-065 C	0.0725	50/50	0.0725
292350	K-023	14.8290	50/50	14.8290
292542	L-013 1	14.4234	50/50	14.4234
293432	R-040 E	0.8113	50/50	0.8113
293902	O-048 E	12.9810	50/50	12.9810
913142	Y1-033 E OP1	12.0233	50/50	12.0233
917672	Z2-108 E	8.1131	50/50	8.1131
930262	AB1-065 E (Suspended)	0.6975	50/50	0.6975
938351	AE1-053	4.5073	50/50	4.5073
938881	AE1-116	2.3804	50/50	2.3804
943301	AF1-001 C	0.6667	50/50	0.6667
943302	AF1-001 E	0.7436	50/50	0.7436
943711	AF1-039 C O1	3.1808	50/50	3.1808
943712	AF1-039 E O1	2.1205	50/50	2.1205
944781	AF1-143 C	27.0438	50/50	27.0438
944782	AF1-143 E	14.4234	50/50	14.4234
945671	AF1-232 C O2	64.6058	50/50	64.6058
945672	AF1-232 E O2	34.7878	50/50	34.7878
946081	AF1-273 C O1	32.4793	50/50	32.4793
946082	AF1-273 E O1	21.6529	50/50	21.6529
958101	AF2-104 C	1.2696	50/50	1.2696
958102	AF2-104 E	0.8464	50/50	0.8464
958411	AF2-135 C	1.3522	50/50	1.3522
958412	AF2-135 E	0.9015	50/50	0.9015
958471	AF2-141	3.6058	50/50	3.6058
959793	AF2-270 BAT	0.2258	50/50	0.2258
WEC	WEC	0.0589	Confirmed LTF	0.0589
LGEE	LGEE	0.1124	Confirmed LTF	0.1124
CPL	CPL	0.1568	Confirmed LTF	0.1568
CBM-W2	CBM-W2	1.6544	Confirmed LTF	1.6544
NY	NY	0.3290	Confirmed LTF	0.3290

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CBM-W1	CBM-W1	2.1642	Confirmed LTF	2.1642
TVA	TVA	0.2954	Confirmed LTF	0.2954
O-066	O-066	2.1907	Confirmed LTF	2.1907
CBM-S2	CBM-S2	1.3352	Confirmed LTF	1.3352
CBM-S1	CBM-S1	1.7807	Confirmed LTF	1.7807
G-007	G-007	0.3276	Confirmed LTF	0.3276
MADISON	MADISON	0.0020	Confirmed LTF	0.0020
MEC	MEC	0.3051	Confirmed LTF	0.3051

11.6.4 Index 4

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
101013243	200746	26ROCKWOOD	PENELEC	202650	26HIGHPOINT	PENELEC	1	PN-P2-3-PN-115-35E	breaker	179.0	147.53	148.59	DC	1.88

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200834	26SW_E13_K22	0.1462	50/50	0.1462
200835	26DSGENWIN	0.9850	50/50	0.9850
200864	K-013 E	1.7949	Adder	2.11
200889	26STNY CRK	0.5957	50/50	0.5957
200890	26BF_G21_K23	0.4830	50/50	0.4830
200891	26CSLMN_L13	0.7577	50/50	0.7577
200892	26LOOKOUT	0.7198	50/50	0.7198
202225	26SCI_S29B	0.2274	50/50	0.2274
292350	K-023	18.0647	50/50	18.0647
292542	L-013 1	17.5706	50/50	17.5706
293432	R-040 E	0.9883	50/50	0.9883
293902	O-048 E	15.8135	50/50	15.8135
294903	P-060 E	13.8130	50/50	13.8130
917672	Z2-108 E	9.8834	50/50	9.8834
938351	AE1-053	5.4908	50/50	5.4908
938881	AE1-116	2.1188	50/50	2.1188
938991	AE1-128 C	10.8245	50/50	10.8245
938992	AE1-128 E	7.2163	50/50	7.2163
944751	AF1-140 C	0.6698	Adder	0.79
944752	AF1-140 E	0.4465	Adder	0.53
944781	AF1-143 C	32.9448	50/50	32.9448
944782	AF1-143 E	17.5706	50/50	17.5706
945671	AF1-232 C O2	39.3744	50/50	39.3744
945672	AF1-232 E O2	21.2016	50/50	21.2016
946081	AF1-273 C O1	18.5115	50/50	18.5115
946082	AF1-273 E O1	12.3410	50/50	12.3410
957981	AF2-092 C	0.9707	50/50	0.9707
957982	AF2-092 E	0.6471	50/50	0.6471
958101	AF2-104 C	1.1300	50/50	1.1300
958102	AF2-104 E	0.7533	50/50	0.7533
958411	AF2-135 C	1.6472	50/50	1.6472
958412	AF2-135 E	1.0982	50/50	1.0982
958471	AF2-141	4.3926	50/50	4.3926
959792	AF2-270 E	0.5594	50/50	0.5594
960451	AF2-336 C O1	1.6178	50/50	1.6178
960452	AF2-336 E O1	1.0786	50/50	1.0786
960461	AF2-337 C O1	1.6178	50/50	1.6178
960462	AF2-337 E O1	1.0786	50/50	1.0786
960471	AF2-338 C O1	1.6178	50/50	1.6178
960472	AF2-338 E O1	1.0786	50/50	1.0786

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960481	AF2-339 C O1	1.6178	50/50	1.6178
960482	AF2-339 E O1	1.0786	50/50	1.0786
960901	AF2-381 C	9.0082	50/50	9.0082
960902	AF2-381 E	4.7406	50/50	4.7406
NEWTON	NEWTON	0.2278	Confirmed LTF	0.2278
FARMERCITY	FARMERCITY	0.0119	Confirmed LTF	0.0119
G-007A	G-007A	0.7121	Confirmed LTF	0.7121
VFT	VFT	1.9672	Confirmed LTF	1.9672
CALDERWOOD	CALDERWOOD	0.1173	Confirmed LTF	0.1173
PRAIRIE	PRAIRIE	0.5553	Confirmed LTF	0.5553
CHEOAH	CHEOAH	0.1186	Confirmed LTF	0.1186
EDWARDS	EDWARDS	0.0721	Confirmed LTF	0.0721
TILTON	TILTON	0.1310	Confirmed LTF	0.1310
GIBSON	GIBSON	0.1158	Confirmed LTF	0.1158
BLUEG	BLUEG	0.3732	Confirmed LTF	0.3732
TRIMBLE	TRIMBLE	0.1191	Confirmed LTF	0.1191
CATAWBA	CATAWBA	0.0872	Confirmed LTF	0.0872

11.6.5 Index 5

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
101013206	200747	26PENN-MAR	PENELEC	200762	26GARRETT	PENELEC	1	PN-P2-3-PN-115-35E	breaker	167.0	176.34	177.47	DC	1.88

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUUGH	0.7148	50/50	0.7148
200834	26SW_E13_K22	0.1462	50/50	0.1462
200835	26DSGENWIN	0.9849	50/50	0.9849
200864	K-013 E	1.7937	Adder	2.11
200889	26STNY CRK	0.5956	50/50	0.5956
200890	26BF_G21_K23	0.4830	50/50	0.4830
200891	26CSLMN_L13	0.7576	50/50	0.7576
200892	26LOOKOUT	0.7198	50/50	0.7198
202225	26SCI_S29B	0.2274	50/50	0.2274
202652	26RGH_Y1-033	0.5552	50/50	0.5552
292350	K-023	18.0631	50/50	18.0631
292542	L-013 1	17.5690	50/50	17.5690
293432	R-040 E	0.9883	50/50	0.9883
293902	O-048 E	15.8121	50/50	15.8121
294903	P-060 E	13.8104	50/50	13.8104
913142	Y1-033 E OP1	21.9885	50/50	21.9885
917672	Z2-108 E	9.8825	50/50	9.8825
938351	AE1-053	5.4903	50/50	5.4903
938881	AE1-116	2.1185	50/50	2.1185
938991	AE1-128 C	10.8202	50/50	10.8202
938992	AE1-128 E	7.2134	50/50	7.2134
943711	AF1-039 C O1	5.8171	50/50	5.8171
943712	AF1-039 E O1	3.8780	50/50	3.8780
944781	AF1-143 C	32.9418	50/50	32.9418
944782	AF1-143 E	17.5690	50/50	17.5690
945671	AF1-232 C O2	39.3692	50/50	39.3692
945672	AF1-232 E O2	21.1988	50/50	21.1988
946081	AF1-273 C O1	18.5084	50/50	18.5084
946082	AF1-273 E O1	12.3389	50/50	12.3389
957981	AF2-092 C	0.9703	50/50	0.9703
957982	AF2-092 E	0.6468	50/50	0.6468
958101	AF2-104 C	1.1299	50/50	1.1299
958102	AF2-104 E	0.7532	50/50	0.7532
958411	AF2-135 C	1.6471	50/50	1.6471
958412	AF2-135 E	1.0981	50/50	1.0981
958471	AF2-141	4.3922	50/50	4.3922
959792	AF2-270 E	0.5592	50/50	0.5592
960451	AF2-336 C O1	1.6171	50/50	1.6171
960452	AF2-336 E O1	1.0781	50/50	1.0781
960461	AF2-337 C O1	1.6171	50/50	1.6171
960462	AF2-337 E O1	1.0781	50/50	1.0781

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960471	AF2-338 C O1	1.6171	50/50	1.6171
960472	AF2-338 E O1	1.0781	50/50	1.0781
960481	AF2-339 C O1	1.6171	50/50	1.6171
960482	AF2-339 E O1	1.0781	50/50	1.0781
960901	AF2-381 C	9.0041	50/50	9.0041
960902	AF2-381 E	4.7384	50/50	4.7384
NEWTON	NEWTON	0.2342	Confirmed LTF	0.2342
FARMERCITY	FARMERCITY	0.0123	Confirmed LTF	0.0123
G-007A	G-007A	0.6977	Confirmed LTF	0.6977
VFT	VFT	1.9285	Confirmed LTF	1.9285
CALDERWOOD	CALDERWOOD	0.1203	Confirmed LTF	0.1203
PRAIRIE	PRAIRIE	0.5708	Confirmed LTF	0.5708
CHEOAH	CHEOAH	0.1216	Confirmed LTF	0.1216
EDWARDS	EDWARDS	0.0742	Confirmed LTF	0.0742
TILTON	TILTON	0.1348	Confirmed LTF	0.1348
GIBSON	GIBSON	0.1190	Confirmed LTF	0.1190
BLUEG	BLUEG	0.3837	Confirmed LTF	0.3837
TRIMBLE	TRIMBLE	0.1224	Confirmed LTF	0.1224
CATAWBA	CATAWBA	0.0893	Confirmed LTF	0.0893

11.6.6 Index 6

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
98686823	200762	26GARRETT	PENELEC	235470	01GARRET	AP	1	PN-P2-3-PN-115-35E	breaker	160.0	194.4	195.58	DC	1.88

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUUGH	0.7147	50/50	0.7147
200834	26SW_E13_K22	0.1461	50/50	0.1461
200835	26DSGENWIN	0.9847	50/50	0.9847
200840	26DEEPCRK1	1.4114	50/50	1.4114
200841	26DEEPCRK2	1.4114	50/50	1.4114
200889	26STNY CRK	0.5954	50/50	0.5954
200890	26BF_G21_K23	0.4829	50/50	0.4829
200891	26CSLMN_L13	0.7575	50/50	0.7575
200892	26LOOKOUT	0.7196	50/50	0.7196
202225	26SCI_S29B	0.2273	50/50	0.2273
202652	26RGH_Y1-033	0.5551	50/50	0.5551
292350	K-023	18.0595	50/50	18.0595
292542	L-013 1	17.5654	50/50	17.5654
293432	R-040 E	0.9881	50/50	0.9881
293902	O-048 E	15.8089	50/50	15.8089
294903	P-060 E	13.8062	50/50	13.8062
913142	Y1-033 E OP1	21.9847	50/50	21.9847
917672	Z2-108 E	9.8806	50/50	9.8806
938351	AE1-053	5.4892	50/50	5.4892
938881	AE1-116	2.1181	50/50	2.1181
938991	AE1-128 C	10.8130	50/50	10.8130
938992	AE1-128 E	7.2086	50/50	7.2086
943711	AF1-039 C O1	5.8161	50/50	5.8161
943712	AF1-039 E O1	3.8774	50/50	3.8774
944781	AF1-143 C	32.9352	50/50	32.9352
944782	AF1-143 E	17.5654	50/50	17.5654
945671	AF1-232 C O2	39.3588	50/50	39.3588
945672	AF1-232 E O2	21.1932	50/50	21.1932
946081	AF1-273 C O1	18.5033	50/50	18.5033
946082	AF1-273 E O1	12.3355	50/50	12.3355
957981	AF2-092 C	0.9696	50/50	0.9696
957982	AF2-092 E	0.6464	50/50	0.6464
958101	AF2-104 C	1.1296	50/50	1.1296
958102	AF2-104 E	0.7531	50/50	0.7531
958411	AF2-135 C	1.6468	50/50	1.6468
958412	AF2-135 E	1.0978	50/50	1.0978
958471	AF2-141	4.3914	50/50	4.3914
959792	AF2-270 E	0.5588	50/50	0.5588
960451	AF2-336 C O1	1.6159	50/50	1.6159
960452	AF2-336 E O1	1.0773	50/50	1.0773
960461	AF2-337 C O1	1.6159	50/50	1.6159

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960462	AF2-337 E O1	1.0773	50/50	1.0773
960471	AF2-338 C O1	1.6159	50/50	1.6159
960472	AF2-338 E O1	1.0773	50/50	1.0773
960481	AF2-339 C O1	1.6159	50/50	1.6159
960482	AF2-339 E O1	1.0773	50/50	1.0773
960901	AF2-381 C	8.9959	50/50	8.9959
960902	AF2-381 E	4.7341	50/50	4.7341
NEWTON	NEWTON	0.2450	Confirmed LTF	0.2450
FARMERCITY	FARMERCITY	0.0128	Confirmed LTF	0.0128
G-007A	G-007A	0.6737	Confirmed LTF	0.6737
VFT	VFT	1.8640	Confirmed LTF	1.8640
CALDERWOOD	CALDERWOOD	0.1252	Confirmed LTF	0.1252
PRAIRIE	PRAIRIE	0.5967	Confirmed LTF	0.5967
CHEOAH	CHEOAH	0.1266	Confirmed LTF	0.1266
EDWARDS	EDWARDS	0.0777	Confirmed LTF	0.0777
TILTON	TILTON	0.1411	Confirmed LTF	0.1411
GIBSON	GIBSON	0.1245	Confirmed LTF	0.1245
BLUEG	BLUEG	0.4010	Confirmed LTF	0.4010
TRIMBLE	TRIMBLE	0.1280	Confirmed LTF	0.1280
CATAWBA	CATAWBA	0.0927	Confirmed LTF	0.0927

11.6.7 Index 7

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
101013211	202650	26HIGHPOINT	PENELEC	200747	26PENN-MAR	PENELEC	1	PN-P2-3-PN-115-35E	breaker	174.0	165.97	167.05	DC	1.88

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200834	26SW_E13_K22	0.1462	50/50	0.1462
200835	26DSGENWIN	0.9850	50/50	0.9850
200864	K-013 E	1.7945	Adder	2.11
200889	26STNY CRK	0.5956	50/50	0.5956
200890	26BF_G21_K23	0.4830	50/50	0.4830
200891	26CSLMN_L13	0.7577	50/50	0.7577
200892	26LOOKOUT	0.7198	50/50	0.7198
202225	26SCI_S29B	0.2274	50/50	0.2274
202652	26RGH_Y1-033	0.5552	50/50	0.5552
292350	K-023	18.0641	50/50	18.0641
292542	L-013 1	17.5699	50/50	17.5699
293432	R-040 E	0.9883	50/50	0.9883
293902	O-048 E	15.8129	50/50	15.8129
294903	P-060 E	13.8117	50/50	13.8117
913142	Y1-033 E OP1	21.9895	50/50	21.9895
917672	Z2-108 E	9.8831	50/50	9.8831
938351	AE1-053	5.4906	50/50	5.4906
938881	AE1-116	2.1186	50/50	2.1186
938991	AE1-128 C	10.8223	50/50	10.8223
938992	AE1-128 E	7.2149	50/50	7.2149
943711	AF1-039 C O1	5.8173	50/50	5.8173
943712	AF1-039 E O1	3.8782	50/50	3.8782
944781	AF1-143 C	32.9436	50/50	32.9436
944782	AF1-143 E	17.5699	50/50	17.5699
945671	AF1-232 C O2	39.3723	50/50	39.3723
945672	AF1-232 E O2	21.2005	50/50	21.2005
946081	AF1-273 C O1	18.5099	50/50	18.5099
946082	AF1-273 E O1	12.3400	50/50	12.3400
957981	AF2-092 C	0.9706	50/50	0.9706
957982	AF2-092 E	0.6470	50/50	0.6470
958101	AF2-104 C	1.1299	50/50	1.1299
958102	AF2-104 E	0.7533	50/50	0.7533
958411	AF2-135 C	1.6472	50/50	1.6472
958412	AF2-135 E	1.0981	50/50	1.0981
958471	AF2-141	4.3925	50/50	4.3925
959792	AF2-270 E	0.5593	50/50	0.5593
960451	AF2-336 C O1	1.6176	50/50	1.6176
960452	AF2-336 E O1	1.0784	50/50	1.0784
960461	AF2-337 C O1	1.6176	50/50	1.6176
960462	AF2-337 E O1	1.0784	50/50	1.0784
960471	AF2-338 C O1	1.6176	50/50	1.6176

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960472	AF2-338 E O1	1.0784	50/50	1.0784
960481	AF2-339 C O1	1.6176	50/50	1.6176
960482	AF2-339 E O1	1.0784	50/50	1.0784
960901	AF2-381 C	9.0065	50/50	9.0065
960902	AF2-381 E	4.7397	50/50	4.7397
NEWTON	NEWTON	0.2310	Confirmed LTF	0.2310
FARMERCITY	FARMERCITY	0.0121	Confirmed LTF	0.0121
G-007A	G-007A	0.7049	Confirmed LTF	0.7049
VFT	VFT	1.9479	Confirmed LTF	1.9479
CALDERWOOD	CALDERWOOD	0.1188	Confirmed LTF	0.1188
PRAIRIE	PRAIRIE	0.5631	Confirmed LTF	0.5631
CHEOAH	CHEOAH	0.1201	Confirmed LTF	0.1201
EDWARDS	EDWARDS	0.0732	Confirmed LTF	0.0732
TILTON	TILTON	0.1329	Confirmed LTF	0.1329
GIBSON	GIBSON	0.1174	Confirmed LTF	0.1174
BLUEG	BLUEG	0.3784	Confirmed LTF	0.3784
TRIMBLE	TRIMBLE	0.1208	Confirmed LTF	0.1208
CATAWBA	CATAWBA	0.0882	Confirmed LTF	0.0882

11.6.8 Index 8

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
101013355	945670	AF1-232 TAP	PENELEC	200745	26ALLEGHEN	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	121.81	123.13	DC	2.12

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUUGH	0.3199	50/50	0.3199
200834	26SW_E13_K22	0.1642	50/50	0.1642
200835	26DSGENWIN	0.8086	50/50	0.8086
200840	26DEEPCRK1	0.2957	50/50	0.2957
200841	26DEEPCRK2	0.2957	50/50	0.2957
200890	26BF_G21_K23	0.3965	50/50	0.3965
200891	26CSLMN_L13	0.6220	50/50	0.6220
200892	26LOOKOUT	0.5909	50/50	0.5909
202225	26SCI_S29B	0.2555	50/50	0.2555
202652	26RGH_Y1-033	0.3036	50/50	0.3036
235013	01AB1-065 C	0.0725	50/50	0.0725
292350	K-023	14.8290	50/50	14.8290
292542	L-013 1	14.4234	50/50	14.4234
293432	R-040 E	0.8113	50/50	0.8113
293902	O-048 E	12.9810	50/50	12.9810
913142	Y1-033 E OP1	12.0233	50/50	12.0233
917672	Z2-108 E	8.1131	50/50	8.1131
930262	AB1-065 E (Suspended)	0.6975	50/50	0.6975
938351	AE1-053	4.5073	50/50	4.5073
938881	AE1-116	2.3804	50/50	2.3804
943301	AF1-001 C	0.6667	50/50	0.6667
943302	AF1-001 E	0.7436	50/50	0.7436
943711	AF1-039 C O1	3.1808	50/50	3.1808
943712	AF1-039 E O1	2.1205	50/50	2.1205
944781	AF1-143 C	27.0438	50/50	27.0438
944782	AF1-143 E	14.4234	50/50	14.4234
945671	AF1-232 C O2	64.6058	50/50	64.6058
945672	AF1-232 E O2	34.7878	50/50	34.7878
958101	AF2-104 C	1.2696	50/50	1.2696
958102	AF2-104 E	0.8464	50/50	0.8464
958411	AF2-135 C	1.3522	50/50	1.3522
958412	AF2-135 E	0.9015	50/50	0.9015
958471	AF2-141	3.6058	50/50	3.6058
959793	AF2-270 BAT	0.2258	50/50	0.2258
WEC	WEC	0.0589	Confirmed LTF	0.0589
LGEE	LGEE	0.1124	Confirmed LTF	0.1124
CPL	CPL	0.1568	Confirmed LTF	0.1568
CBM-W2	CBM-W2	1.6544	Confirmed LTF	1.6544
NY	NY	0.3290	Confirmed LTF	0.3290
CBM-W1	CBM-W1	2.1642	Confirmed LTF	2.1642
TVA	TVA	0.2954	Confirmed LTF	0.2954

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
O-066	O-066	2.1907	Confirmed LTF	2.1907
CBM-S2	CBM-S2	1.3352	Confirmed LTF	1.3352
CBM-S1	CBM-S1	1.7807	Confirmed LTF	1.7807
G-007	G-007	0.3276	Confirmed LTF	0.3276
MADISON	MADISON	0.0020	Confirmed LTF	0.0020
MEC	MEC	0.3051	Confirmed LTF	0.3051

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
AB1-065	Jennings-Hoyes 34.5kV	Suspended
AD2-133	Eagle Valley 115kV	Active
AE1-053	Meyersdale North	Active
AE1-116	Somerset Windpower 23 kV	Active
AE1-128	Bedford North-Wills Mounain 115 kV	Active
AE2-117	ABW Tap-Alexandria 46 kV	Active
AE2-118	ABW Tap-Williamsburg 46 kV	Active
AE2-129	Philipsburg-Clarence 34.5 kV	Active
AE2-131	Philipsburg-Karthaus 34.5	Active
AE2-224	Bearrock-Johnstown 230 kV	Active
AE2-264	Altoona-Raystown 230 kV	Active
AF1-001	Thayerville 34.5 kV	Engineering and Procurement
AF1-039	Listonburg-Highpoint 24.9 kV	Active
AF1-140	Claysburg 23 kV	Engineering and Procurement
AF1-143	Lick Run 115 kV	Active
AF1-232	Allegheny-Somerset 115 kV	Active
AF1-273	Allegheny 115 kV	Active
AF1-307	Seward-Jackson Rd 115 kV	Active
AF1-321	Hooversville 115 kV I	Active
AF2-001	Hooversville 115 kV II	Active
AF2-002	Hooversville 115 kV III	Active
AF2-045	Cambria Nug 115 kV	Active
AF2-050	Bearrock-Johnstown 230 kV	Active
AF2-087	East Altoona-Pinecroft 12.47 kV	Active
AF2-092	Snake Spring-Bedford Area 23 kV	Active
AF2-104	Somerset 23 kV	Active
AF2-121	Philipsburg-Shawville 34.5 kV	Active
AF2-135	Rockwood-Confluence 23 kV	Active
AF2-141	Lick Run 115 kV	Active
AF2-221	Scalp Level 22.9 kV	Active
AF2-231	Belleville 12.47 kV	Active
AF2-270	Bedford South RCB-Bedford Area 23 kV	Active
AF2-271	Pemberton-Sinking Valley 12.47 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

Queue Number	Project Name	Status
AF2-381	Bedford North-Central City West 115 kV	Active
V3-030	St. Benedict-Patton 46kV	In Service
Y1-033	Penn Mar-Rock Wood 115kV	In Service
Z2-108	Meyersdale North 115kV	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
PN-P2-3-PN-115-35E	CONTINGENCY 'PN-P2-3-PN-115-35E' /* #14 STUCK TIE BREAKER BETWEEN BUSES 1 AND 2 DISCONNECT BRANCH FROM BUS 200734 TO BUS 200743 CKT 1 /* 26SCALP L. 115 26HOOVERSV 115 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200802 CKT 1 /* 26HOOVERSV 115 26RALPHTON 115 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200776 CKT 1 /* 26HOOVERSV 115 26HOOVER#1 23 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200744 CKT 1 /* 26HOOVERSV 115 26SOMERST 115 DISCONNECT BRANCH FROM BUS 200742 TO BUS 200743 CKT 1 /* 26TOWER 51 115 26HOOVERSV 115 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200789 CKT 2 /* 26HOOVERSV 115 26HOOVER#2 23 END
PN-P1-2-PN-115-066	CONTINGENCY 'PN-P1-2-PN-115-066' /* HOOVERSVILLE - SOMERSET 115KV DISCONNECT BRANCH FROM BUS 200743 TO BUS 200744 CKT 1 /* 26HOOVERSV 115 26SOMERST 115 END
PN-P2-3-PN-230-9G-A	CONTINGENCY 'PN-P2-3-PN-230-9G-A' /* HOMER CITY 230 KV STUCK BREAKER 208 (HOOVERSVILLE/SHELOCTA) DISCONNECT BRANCH FROM BUS 200767 TO BUS 200768 CKT 1 /* 26HOMER CT 230 26QUEMAHON 230 DISCONNECT BRANCH FROM BUS 200768 TO BUS 200796 CKT 1 /* 26QUEMAHON 230 26HOOVRSVL 230 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200796 CKT 3 /* 26HOOVERSV 115 26HOOVRSVL 230 DISCONNECT BRANCH FROM BUS 200767 TO BUS 200795 CKT 1 /* 26HOMER CT 230 26SHELOCTA 230 END

12 Short Circuit Analysis

Short circuit analysis will be provided in the System Impact Study report.

13 Affected Systems

13.1 NYISO

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

14 Attachment 1: One Line Diagram