Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-002

HOOVERSVILLE 115 KV III

6 MW Capacity / 10 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, 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 Somerset County, Pennsylvania. The installed facilities will have a total capability of 10 MW with 6 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is March 01, 2022. This study does not imply a TO commitment to this in-service date.

Due to a miscommunication, FirstEnergy prepared the physical interconnection costs considering the AF2-002 project as an uprate to the AF2-001 and AF1-321 projects. Project AF2-002 was submitted by the Interconnection Customer as a stand-alone project and not an uprate. Therefore, the physical interconnection costs will need to be re-evaluated in the System Impact Study phase. It should be noted that PJM's analysis results starting in Section 11 of this report are valid as they were based on AF2-002 as a stand-alone project.

Queue Number	AF2-002
Project Name	HOOVERSVILLE 115 KV III
State	Pennsylvania
County	Somerset
Transmission Owner	MAIT-PENELEC Zone
MFO	10
MWE	10
MWC	6
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

Due to a miscommunication, FirstEnergy prepared the physical interconnection costs considering the AF2-002 project as an uprate to the AF2-001 and AF1-321 projects. Project AF2-002 was submitted by the Interconnection Customer as a stand-alone project and not an uprate. Therefore, the physical interconnection costs will need to be re-evaluated in the System Impact Study phase. It should be noted that PJM's analysis results starting in Section 11 of this report are valid as they were based on AF2-002 as a stand-alone project.

The AF2-002 project is an uprate to the proposed AF1-321 and AF2-001 projects and the Point of Interconnection will remain unchanged. The IC will not incur any connection facility upgrade costs for this project as long as both projects are constructed concurrently, as has been proposed by the IC.

Attachment 1 shows a one-line diagram of the proposed primary Direct Connection facilities for the AF2-002 generation project to connect to the FirstEnergy ("FE") Transmission System. The IC will be responsible for constructing the facilities on its side of the POI, including the Attachment Facilities which connect the generator to the FE Transmission System's Direct Connection facilities.

5 Cost Summary

The AF2-002 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$0[1]
Total System Network Upgrade Costs	$46,007,850[2]
Total Costs	**$46,007,850**

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] **Project AF2-002 was submitted by the Interconnection Customer as a stand-alone project and not an uprate. The physical connection costs will need to be re-evaluated in the System Impact Study phase as there was a miscommunication with how FirstEnergy prepared the connection costs versus how PJM studied this project.**

[2] 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

Due to a miscommunication, FirstEnergy prepared the physical interconnection costs considering the AF2-002 project as an uprate to the AF2-001 and AF1-321 projects. Project AF2-002 was submitted by the Interconnection Customer as a stand-alone project and not an uprate. Therefore, the physical interconnection costs will need to be re-evaluated in the System Impact Study phase. It should be noted that PJM's analysis results starting in Section 11 of this report are valid as they were based on AF2-002 as a stand-alone project.

The AF2-002 project is an uprate to the proposed AF1-321 and AF2-001 projects and the Point of Interconnection will remain unchanged. The IC will not incur any connection facility upgrade costs for this project as long as both projects are constructed concurrently, as has been proposed by the IC.

7 Schedule

Due to a miscommunication, FirstEnergy prepared the physical interconnection costs considering the AF2-002 project as an uprate to the AF2-001 and AF1-321 projects. Project AF2-002 was submitted by the Interconnection Customer as a stand-alone project and not an uprate. Therefore, the physical interconnection costs will need to be re-evaluated in the System Impact Study phase. It should be noted that PJM's analysis results starting in Section 11 of this report are valid as they were based on AF2-002 as a stand-alone project.

The project is an upgrade to the proposed AF1-321 and AF2-001 projects and point of interconnection will remain unchanged. There is no Attachment Facilities or Direct and/or Non-Direct Connection facilities scope of work.

The schedule for the required Network Impact Reinforcements will be more clearly identified in future study phases. The estimated time to complete each of the required reinforcements is identified in the "System Reinforcements" section of the report.

8 Transmission Owner Analysis

8.1 Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AF2-002 project did not contribute to any overloads on the <100 kV FE transmission system.

9 Interconnection Customer Requirements

9.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in FE's "Requirements for Transmission Connected Facilities" document located at: http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx.

Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

The IC has requested a non-standard GSU transformer winding configuration. This transformer is in violation of section 14.2.6 of FE's "Requirements for Transmission Connected Facilities" document and will not be accepted. The GSU transformer must have a grounded wye connection on the high (utility) side and a delta connection on the low (generator) side.

9.2 Compliance Issues and Interconnection Customer Requirements

The proposed Customer Facilities must be designed in accordance with FE's "Requirements for Transmission Connected Facilities" document located at: http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx.. In particular, the IC is responsible for the following:

1. The purchase and installation of a fully rated 115 kV circuit breaker to protect the AF2-002 generator lead line. A single circuit breaker must be used to protect this line; if the project has several GSU transformers, the individual GSU transformer breakers cannot be used to protect this line.

2. The purchase and installation of the minimum required FE generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.

3. The purchase and installation of supervisory control and data acquisition ("SCADA") equipment to provide information in a compatible format to the FE Transmission System Control Center.

4. Compliance with the FE and PJM generator power factor and voltage control requirements.

5. The execution of a back-up service agreement to serve the customer load supplied from the AF2-002 generation project metering point when the units are out-of-service. This assumes the intent of the IC is to net the generation with the load.

The IC will also be required to meet all PJM, ReliabilityFirst, and NERC reliability criteria and operating procedures for standards compliance. For example, the IC will need to properly locate and report the over and under voltage and over and under frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and ReliabilityFirst audits. Failure to

comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the FE Transmission System.

9.3 Power Factor Requirements

The IC shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the high-side of the facility substation transformer(s) connected to the FE Transmission System.

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/meter^2)
- 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 FirstEnergy Requirements

The IC will be required to comply with all FE revenue metering requirements for generation interconnection customers which can be found in FE's "Requirements for Transmission Connected Facilities" document located at: http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx.

11 Summer Peak - Load Flow Analysis - Primary POI

The Queue Project AF2-002 was evaluated as a 10.0 MW (Capacity 6.0 MW) injection at the Hooversville 115 kV substation in the PENELEC area. Project AF2-002 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-002 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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
10087655 8	200743	26HOOVERS V	115.0	PENELEC	200734	26SCAL P L.	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	190.0	98.48	101.14	DC	5.05

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
1008765 32	200746	26ROCKWOOD	115.0	PENELEC	202650	26HIGHPOINT	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	126.05	127.22	DC	2.1
1008765 27	202650	26HIGHPOINT	115.0	PENELEC	200747	26PENN-MAR	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	174.0	140.83	142.04	DC	2.1

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
100875849	200742	26TOWER 51	115.0	PENELEC	200741	26SEWARD	115.0	PENELEC	1	AP-P1-3-PN-115-010	operation	185.0	108.64	110.59	DC	3.6
100875802	200743	26HOOVERSV	115.0	PENELEC	200742	26TOWER 51	115.0	PENELEC	1	AP-P1-3-PN-115-010	operation	172.0	130.33	132.45	DC	3.64
100875807	200743	26HOOVERSV	115.0	PENELEC	200742	26TOWER 51	115.0	PENELEC	1	Base Case	operation	137.0	109.04	111.45	DC	3.3

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
100876532	2	**26ROCKWOOD 115.0 kV - 26HIGHPOINT 115.0 kV Ckt 1**	**PENELEC** **PN-AF2-F-0037 (1776) : Rebuild 10.1 miles of transmission line** **Project Type : FAC** **Cost : $30,875,700** **Time Estimate : 36.0 Months**	$30,875,700
100876558	1	**26HOOVERSV 115.0 kV - 26SCALP L. 115.0 kV Ckt 1**	**PENELEC** **s2046_s2046.1_s2046.2 (1894) : Hooversville115 kV Substation Replace line relaying and line trap (s2046.1)** **Scalp Level 115 kV Substation Replace substation conductor (s2046.2)** **Rachel Hill 115 kV Substation Replace line relaying, line trap, and substation conductor (s2046.3)** **Project Type : FAC** **Cost : $0**	$0
100876527	3	**26HIGHPOINT 115.0 kV - 26PENN-MAR 115.0 kV Ckt 1**	**PENELEC** **PN-AF2-F-0039A (1780) : Replace circuit breaker at Penn Mar** **Project Type : FAC** **Cost : $733,680** **Time Estimate : 12.0 Months** **PN-AF2-F-0039B (1781) : Rebuild 4.67 miles of transmission line** **Project Type : FAC** **Cost : $14,276,190** **Time Estimate : 36.0 Months** **PN-AF2-F-0039C (1782) : Replace bus conductor at Penn Mar.** **Project Type : FAC** **Cost : $122,280** **Time Estimate : 12.0 Months**	$15,132,150
			TOTAL COST	**$46,007,850**

11.6 Flow Gate Details - Primary POI

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
100876558	200743	26HOOVERSV	PENELEC	200734	26SCALPL.	PENELEC	1	PN-P7-1-PN-230-001	tower	190.0	98.48	101.14	DC	5.05

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	0.2537	50/50	0.2537
200834	26SW_E13_K22	0.1303	50/50	0.1303
200835	26DSGENWIN	0.6414	50/50	0.6414
200840	26DEEPCRK1	0.2343	50/50	0.2343
200841	26DEEPCRK2	0.2343	50/50	0.2343
200846	26FORWARD	0.4573	50/50	0.4573
200864	K-013 E	10.6047	50/50	10.6047
200889	26STNY CRK	0.6356	50/50	0.6356
200890	26BF_G21_K23	0.3146	50/50	0.3146
200891	26CSLMN_L13	0.4934	50/50	0.4934
200892	26LOOKOUT	0.4687	50/50	0.4687
202225	26SCI_S29B	0.2027	50/50	0.2027
202652	26RGH_Y1-033	0.2408	50/50	0.2408
292350	K-023	11.7637	50/50	11.7637
292542	L-013 1	11.4419	50/50	11.4419
293432	R-040 E	0.6436	50/50	0.6436
293902	O-048 E	10.2977	50/50	10.2977
294903	P-060 E	14.7386	50/50	14.7386
913142	Y1-033 E OP1	9.5361	50/50	9.5361
917672	Z2-108 E	6.4361	50/50	6.4361
930262	**AB1-065 E (Suspended)**	**0.4692**	**Adder**	**0.55**
938351	AE1-053	3.5756	50/50	3.5756
938881	AE1-116	1.8885	50/50	1.8885
938991	AE1-128 C	19.0411	50/50	19.0411
938992	AE1-128 E	12.6941	50/50	12.6941
943301	AF1-001 C	0.4485	Adder	0.53
943302	AF1-001 E	0.5002	Adder	0.59
943711	AF1-039 C O1	2.5228	50/50	2.5228
943712	AF1-039 E O1	1.6819	50/50	1.6819
944781	AF1-143 C	21.4536	50/50	21.4536
944782	AF1-143 E	11.4419	50/50	11.4419
945671	AF1-232 C O2	39.0010	50/50	39.0010
945672	AF1-232 E O2	21.0006	50/50	21.0006
946081	AF1-273 C O1	18.7389	50/50	18.7389
946082	AF1-273 E O1	12.4926	50/50	12.4926
946571	AF1-321 C O1	6.0611	50/50	6.0611
946572	AF1-321 E O1	4.0407	50/50	4.0407
957001	AF2-001 C O1	6.0611	50/50	6.0611
957002	AF2-001 E O1	4.0407	50/50	4.0407
957011	AF2-002 C O1	3.0305	50/50	3.0305
957012	AF2-002 E O1	2.0204	50/50	2.0204

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957981	AF2-092 C	1.5727	50/50	1.5727
957982	AF2-092 E	1.0485	50/50	1.0485
958101	AF2-104 C	1.0072	50/50	1.0072
958102	AF2-104 E	0.6715	50/50	0.6715
958411	AF2-135 C	1.0727	50/50	1.0727
958412	AF2-135 E	0.7151	50/50	0.7151
958471	AF2-141	2.8605	50/50	2.8605
959792	AF2-270 E	0.9841	50/50	0.9841
960451	AF2-336 C O1	2.6212	50/50	2.6212
960452	AF2-336 E O1	1.7474	50/50	1.7474
960461	AF2-337 C O1	2.6212	50/50	2.6212
960462	AF2-337 E O1	1.7474	50/50	1.7474
960471	AF2-338 C O1	2.6212	50/50	2.6212
960472	AF2-338 E O1	1.7474	50/50	1.7474
960481	AF2-339 C O1	2.6212	50/50	2.6212
960482	AF2-339 E O1	1.7474	50/50	1.7474
960901	AF2-381 C	32.3898	50/50	32.3898
960902	AF2-381 E	17.0452	50/50	17.0452
WEC	WEC	0.0410	Confirmed LTF	0.0410
LGEE	LGEE	0.0787	Confirmed LTF	0.0787
CPLE	CPLE	0.1131	Confirmed LTF	0.1131
CBM-W2	CBM-W2	1.1630	Confirmed LTF	1.1630
NY	NY	0.2300	Confirmed LTF	0.2300
CBM-W1	CBM-W1	1.4887	Confirmed LTF	1.4887
TVA	TVA	0.2086	Confirmed LTF	0.2086
O-066	O-066	1.5994	Confirmed LTF	1.5994
CBM-S2	CBM-S2	0.9595	Confirmed LTF	0.9595
CBM-S1	CBM-S1	1.2524	Confirmed LTF	1.2524
G-007	G-007	0.2392	Confirmed LTF	0.2392
MEC	MEC	0.2129	Confirmed LTF	0.2129

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
100876532	200746	26ROCKWOOD	PENELEC	202650	26HIGHPOINT	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	126.05	127.22	DC	2.1

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200834	26SW_E13_K22	0.0866	50/50	0.0866
200835	26DSGENWIN	0.6918	50/50	0.6918
200846	26FORWARD	0.2029	50/50	0.2029
200864	K-013 E	4.7045	50/50	4.7045
200883	Q-053 E	3.2917	Adder	3.87
200888	26HIGHLAND	0.2565	50/50	0.2565
200889	26STNY CRK	0.4216	50/50	0.4216
200890	26BF_G21_K23	0.3393	50/50	0.3393
200891	26CSLMN_L13	0.5322	50/50	0.5322
200892	26LOOKOUT	0.5056	50/50	0.5056
200925	26R32	0.2960	50/50	0.2960
202225	26SCI_S29B	0.1348	50/50	0.1348
292350	K-023	12.6879	50/50	12.6879
292542	L-013 1	12.3408	50/50	12.3408
293432	R-040 E	0.6942	50/50	0.6942
293603	O-018 E	5.9483	50/50	5.9483
293902	O-048 E	11.1067	50/50	11.1067
294903	P-060 E	9.7768	50/50	9.7768
296332	R-032 E	6.8634	50/50	6.8634
917672	Z2-108 E	6.9417	50/50	6.9417
938351	AE1-053	3.8565	50/50	3.8565
938881	AE1-116	1.2556	50/50	1.2556
938991	AE1-128 C	12.5719	50/50	12.5719
938992	AE1-128 E	8.3813	50/50	8.3813
944751	AF1-140 C	1.1220	50/50	1.1220
944752	AF1-140 E	0.7480	50/50	0.7480
944781	AF1-143 C	23.1390	50/50	23.1390
944782	AF1-143 E	12.3408	50/50	12.3408
945671	AF1-232 C O2	25.8939	50/50	25.8939
945672	AF1-232 E O2	13.9429	50/50	13.9429
946081	AF1-273 C O1	12.4379	50/50	12.4379
946082	AF1-273 E O1	8.2919	50/50	8.2919
946571	AF1-321 C O1	2.5176	50/50	2.5176
946572	AF1-321 E O1	1.6784	50/50	1.6784
957001	AF2-001 C O1	2.5176	50/50	2.5176
957002	AF2-001 E O1	1.6784	50/50	1.6784
957011	AF2-002 C O1	1.2588	50/50	1.2588
957012	AF2-002 E O1	0.8392	50/50	0.8392
957512	AF2-045 E	0.5650	Adder	1.25
957981	AF2-092 C	1.1613	50/50	1.1613

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957982	AF2-092 E	0.7742	50/50	0.7742
958101	AF2-104 C	0.6697	50/50	0.6697
958102	AF2-104 E	0.4464	50/50	0.4464
958411	AF2-135 C	1.1570	50/50	1.1570
958412	AF2-135 E	0.7713	50/50	0.7713
958471	AF2-141	3.0852	50/50	3.0852
959301	AF2-221 C	0.9989	50/50	0.9989
959302	AF2-221 E	1.3795	50/50	1.3795
959792	AF2-270 E	0.6497	50/50	0.6497
960391	AF2-330 C	1.9956	Adder	4.43
960392	AF2-330 E	0.8728	Adder	1.94
960451	AF2-336 C O1	1.9355	50/50	1.9355
960452	AF2-336 E O1	1.2903	50/50	1.2903
960461	AF2-337 C O1	1.9355	50/50	1.9355
960462	AF2-337 E O1	1.2903	50/50	1.2903
960471	AF2-338 C O1	1.9355	50/50	1.9355
960472	AF2-338 E O1	1.2903	50/50	1.2903
960481	AF2-339 C O1	1.9355	50/50	1.9355
960482	AF2-339 E O1	1.2903	50/50	1.2903
960901	AF2-381 C	15.8698	50/50	15.8698
960902	AF2-381 E	8.3515	50/50	8.3515
NEWTON	NEWTON	0.3084	Confirmed LTF	0.3084
FARMERCITY	FARMERCITY	0.0161	Confirmed LTF	0.0161
G-007A	G-007A	1.0141	Confirmed LTF	1.0141
VFT	VFT	2.7993	Confirmed LTF	2.7993
CALDERWOOD	CALDERWOOD	0.1580	Confirmed LTF	0.1580
PRAIRIE	PRAIRIE	0.7517	Confirmed LTF	0.7517
CHEOAH	CHEOAH	0.1597	Confirmed LTF	0.1597
EDWARDS	EDWARDS	0.0973	Confirmed LTF	0.0973
TILTON	TILTON	0.1770	Confirmed LTF	0.1770
GIBSON	GIBSON	0.1567	Confirmed LTF	0.1567
BLUEG	BLUEG	0.5034	Confirmed LTF	0.5034
TRIMBLE	TRIMBLE	0.1614	Confirmed LTF	0.1614
CATAWBA	CATAWBA	0.1169	Confirmed LTF	0.1169

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
100876527	202650	26HIGHPOINT	PENELEC	200747	26PENN-MAR	PENELEC	1	PN-P7-1-PN-230-001	tower	174.0	140.83	142.04	DC	2.1

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200834	26SW_E13_K22	0.0866	50/50	0.0866
200835	26DSGENWIN	0.6918	50/50	0.6918
200846	26FORWARD	0.2029	50/50	0.2029
200864	K-013 E	4.7040	50/50	4.7040
200883	Q-053 E	3.2909	Adder	3.87
200888	26HIGHLAND	0.2564	50/50	0.2564
200889	26STNY CRK	0.4216	50/50	0.4216
200890	26BF_G21_K23	0.3392	50/50	0.3392
200891	26CSLMN_L13	0.5321	50/50	0.5321
200892	26LOOKOUT	0.5055	50/50	0.5055
200925	26R32	0.2959	50/50	0.2959
202225	26SCI_S29B	0.1348	50/50	0.1348
202652	26RGH_Y1-033	0.4452	50/50	0.4452
292350	K-023	12.6872	50/50	12.6872
292542	L-013 1	12.3402	50/50	12.3402
293432	R-040 E	0.6941	50/50	0.6941
293603	O-018 E	5.9467	50/50	5.9467
293902	O-048 E	11.1061	50/50	11.1061
294903	P-060 E	9.7755	50/50	9.7755
296332	R-032 E	6.8616	50/50	6.8616
913142	Y1-033 E OP1	17.6302	50/50	17.6302
917672	Z2-108 E	6.9413	50/50	6.9413
938351	AE1-053	3.8563	50/50	3.8563
938881	AE1-116	1.2555	50/50	1.2555
938991	AE1-128 C	12.5698	50/50	12.5698
938992	AE1-128 E	8.3798	50/50	8.3798
943711	AF1-039 C O1	4.6641	50/50	4.6641
943712	AF1-039 E O1	3.1094	50/50	3.1094
944751	AF1-140 C	1.1217	50/50	1.1217
944752	AF1-140 E	0.7478	50/50	0.7478
944781	AF1-143 C	23.1378	50/50	23.1378
944782	AF1-143 E	12.3402	50/50	12.3402
945671	AF1-232 C O2	25.8908	50/50	25.8908
945672	AF1-232 E O2	13.9412	50/50	13.9412
946081	AF1-273 C O1	12.4369	50/50	12.4369
946082	AF1-273 E O1	8.2912	50/50	8.2912
946571	AF1-321 C O1	2.5172	50/50	2.5172
946572	AF1-321 E O1	1.6782	50/50	1.6782
957001	AF2-001 C O1	2.5172	50/50	2.5172
957002	AF2-001 E O1	1.6782	50/50	1.6782
957011	AF2-002 C O1	1.2586	50/50	1.2586

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957012	AF2-002 E O1	0.8391	50/50	0.8391
957512	AF2-045 E	0.5648	Adder	1.25
957981	AF2-092 C	1.1611	50/50	1.1611
957982	AF2-092 E	0.7740	50/50	0.7740
958101	AF2-104 C	0.6696	50/50	0.6696
958102	AF2-104 E	0.4464	50/50	0.4464
958411	AF2-135 C	1.1569	50/50	1.1569
958412	AF2-135 E	0.7713	50/50	0.7713
958471	AF2-141	3.0850	50/50	3.0850
959301	AF2-221 C	0.9988	50/50	0.9988
959302	AF2-221 E	1.3793	50/50	1.3793
959792	AF2-270 E	0.6496	50/50	0.6496
960391	AF2-330 C	1.9949	Adder	4.43
960392	AF2-330 E	0.8725	Adder	1.94
960451	AF2-336 C O1	1.9351	50/50	1.9351
960452	AF2-336 E O1	1.2901	50/50	1.2901
960461	AF2-337 C O1	1.9351	50/50	1.9351
960462	AF2-337 E O1	1.2901	50/50	1.2901
960471	AF2-338 C O1	1.9351	50/50	1.9351
960472	AF2-338 E O1	1.2901	50/50	1.2901
960481	AF2-339 C O1	1.9351	50/50	1.9351
960482	AF2-339 E O1	1.2901	50/50	1.2901
960901	AF2-381 C	15.8673	50/50	15.8673
960902	AF2-381 E	8.3502	50/50	8.3502
NEWTON	NEWTON	0.3105	Confirmed LTF	0.3105
FARMERCITY	FARMERCITY	0.0162	Confirmed LTF	0.0162
G-007A	G-007A	1.0093	Confirmed LTF	1.0093
VFT	VFT	2.7864	Confirmed LTF	2.7864
CALDERWOOD	CALDERWOOD	0.1590	Confirmed LTF	0.1590
PRAIRIE	PRAIRIE	0.7568	Confirmed LTF	0.7568
CHEOAH	CHEOAH	0.1607	Confirmed LTF	0.1607
EDWARDS	EDWARDS	0.0980	Confirmed LTF	0.0980
TILTON	TILTON	0.1783	Confirmed LTF	0.1783
GIBSON	GIBSON	0.1578	Confirmed LTF	0.1578
BLUEG	BLUEG	0.5069	Confirmed LTF	0.5069
TRIMBLE	TRIMBLE	0.1625	Confirmed LTF	0.1625
CATAWBA	CATAWBA	0.1176	Confirmed LTF	0.1176

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
AE1-053	Meyersdale North	Active
AE1-116	Somerset Windpower 23 kV	Active
AE1-128	Bedford North-Wills Mounain 115 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
AF1-321	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
AF2-092	Snake Spring-Bedford Area 23 kV	Active
AF2-104	Somerset 23 kV	Active
AF2-135	Rockwood-Confluence 23 kV	Active
AF2-141	Lick Run 115 kV	Active
AF2-221	Scalp Level 22.9 kV	Active
AF2-270	Bedford South RCB-Bedford Area 23 kV	Active
AF2-330	Claysburg-Summit 115 kV	Active
AF2-336	Snake Spring 115 kV	Active
AF2-337	Snake Spring 115 kV	Active
AF2-338	Snake Spring-Saxton 115 kV	Active
AF2-339	Snake Spring-Saxton 115 kV	Active
AF2-381	Bedford North-Central City West 115 kV	Active
Y1-033	Penn Mar-Rock Wood 115kV	In Service
Z2-108	Meyersdale North 115kV	In Service

11.8 Contingency Descriptions - Primary POI

Contingency Name	Contingency Definition
Base Case	
PN-P7-1-PN-230-001	CONTINGENCY 'PN-P7-1-PN-230-001' /* HOMER CITY - HOOVERSVILLE 230KV & SEWARD - TOWER 51 115KV 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 200796 TO BUS 200743 CKT 3 /* 26HOOVRSVL 230 26HOOVERSV 115 DISCONNECT BRANCH FROM BUS 200741 TO BUS 200742 CKT 1 /* 26SEWARD 115 26TOWER 51 115 END
AP-P1-3-PN-115-010	CONTINGENCY 'AP-P1-3-PN-115-010' /* GARRETT 138/115KV XFMR FAULT OPEN BRANCH FROM BUS 235469 TO BUS 235470 CKT 1 /* 01GARRET 138.00 01GARRET 115.00 END

12 Short Circuit Analysis - Primary POI

To be performed in System Impact phase.

13 Summer Peak - Load Flow Analysis - Secondary POI

The Queue Project AF2-002 was evaluated as a 10.0 MW (Capacity 6.0 MW) injection tapping the Hooversville to Somerset 115 kV line in the PENELEC area. Project AF2-002 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-002 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

13.1 Generation Deliverability

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

None.

13.2 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
10087655 8	200743	26HOOVERSV	115.0	PENELEC	200734	26SCALP L.	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	190.0	98.38	100.99	DC	4.95

13.3 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
100875447	200745	26ALLEGHEN	115.0	PENELEC	200884	26NEW BALT	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	159.19	162.49	DC	5.29
100875439	200746	26ROCKWOOD	115.0	PENELEC	202650	26HIGHPOINT	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	179.0	151.27	153.9	DC	4.71
100876532	200746	26ROCKWOOD	115.0	PENELEC	202650	26HIGHPOINT	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	126.13	127.35	DC	2.18
100875402	200747	26PENN-MAR	115.0	PENELEC	200762	26GARRETT	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	167.0	179.93	182.75	DC	4.71
98602787	200762	26GARRETT	115.0	PENELEC	235470	01GARRET	115.0	AP	1	PN-P2-3-PN-115-35E	breaker	160.0	199.27	202.22	DC	4.71
100875412	200884	26NEW BALT	115.0	PENELEC	200501	26BDFORDN	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	182.81	186.12	DC	5.29
100875407	202650	26HIGHPOINT	115.0	PENELEC	200747	26PENN-MAR	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	174.0	170.45	173.16	DC	4.71

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
100876527	202650	26HIGHPOINT	115.0	PENELEC	200747	26PENN-MAR	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	174.0	140.92	142.17	DC	2.18
100424916	235469	01GARRET	138.0	AP	934440	AD1-068 TAP	138.0	AP	1	PN-P2-3-PN-115-35E	breaker	191.0	125.74	127.4	DC	3.16
100424858	235470	01GARRET	115.0	AP	235469	01GARRET	138.0	AP	1	PN-P2-3-PN-115-35E	breaker	196.0	162.67	165.07	DC	4.71
100875551	945670	AF1-232 TAP	115.0	PENELEC	200745	26ALLEGHEN	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	128.42	131.72	DC	5.29

13.4 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
100875849	200742	26TOWER 51	115.0	PENELEC	200741	26SEWARD	115.0	PENELEC	1	AP-P1-3-PN-115-010	operation	185.0	108.62	110.55	DC	3.57
100875802	200743	26HOOVERSV	115.0	PENELEC	200742	26TOWER 51	115.0	PENELEC	1	AP-P1-3-PN-115-010	operation	172.0	130.3	132.41	DC	3.62
100875807	200743	26HOOVERSV	115.0	PENELEC	200742	26TOWER 51	115.0	PENELEC	1	Base Case	operation	137.0	108.95	111.32	DC	3.25
152468316	200744	26SOMERST	115.0	PENELEC	200802	26RALPHTON	115.0	PENELEC	1	PN-P1-2-PN-115-066-A	operation	185.0	103.73	106.66	DC	5.42

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
152468092	200746	26ROCKWOOD	115.0	PENELEC	202650	26HIGHPOINT	115.0	PENELEC	1	PN-P1-3-PN-115-029-A	operation	179.0	123.72	125.18	DC	2.61
152468188	957000	AF2-001 TAP	115.0	PENELEC	200743	26HOOVERSV	115.0	PENELEC	1	AP-P1-3-PN-115-010	operation	190.0	121.05	125.9	DC	9.21

13.5 Flow Gate Details - Secondary POI

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".

13.5.1 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
100876558	200743	26HOOVERSV	PENELEC	200734	26SCALPL.	PENELEC	1	PN-P7-1-PN-230-001	tower	190.0	98.38	100.99	DC	4.95

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	0.2537	50/50	0.2537
200834	26SW_E13_K22	0.1303	50/50	0.1303
200835	26DSGENWIN	0.6414	50/50	0.6414
200840	26DEEPCRK1	0.2343	50/50	0.2343
200841	26DEEPCRK2	0.2343	50/50	0.2343
200846	26FORWARD	0.4573	50/50	0.4573
200864	K-013 E	10.6047	50/50	10.6047
200889	26STNY CRK	0.6356	50/50	0.6356
200890	26BF_G21_K23	0.3146	50/50	0.3146
200891	26CSLMN_L13	0.4934	50/50	0.4934
200892	26LOOKOUT	0.4687	50/50	0.4687
202225	26SCI_S29B	0.2027	50/50	0.2027
202652	26RGH_Y1-033	0.2408	50/50	0.2408
292350	K-023	11.7637	50/50	11.7637
292542	L-013 1	11.4419	50/50	11.4419
293432	R-040 E	0.6436	50/50	0.6436
293902	O-048 E	10.2977	50/50	10.2977
294903	P-060 E	14.7386	50/50	14.7386
913142	Y1-033 E OP1	9.5361	50/50	9.5361
917672	Z2-108 E	6.4361	50/50	6.4361
930262	**AB1-065 E (Suspended)**	**0.4692**	**Adder**	**0.55**
938351	AE1-053	3.5756	50/50	3.5756
938881	AE1-116	1.8885	50/50	1.8885
938991	AE1-128 C	19.0411	50/50	19.0411
938992	AE1-128 E	12.6941	50/50	12.6941
943301	AF1-001 C	0.4485	Adder	0.53
943302	AF1-001 E	0.5002	Adder	0.59
943711	AF1-039 C O1	2.5228	50/50	2.5228
943712	AF1-039 E O1	1.6819	50/50	1.6819
944781	AF1-143 C	21.4536	50/50	21.4536
944782	AF1-143 E	11.4419	50/50	11.4419
945671	AF1-232 C O2	39.0010	50/50	39.0010
945672	AF1-232 E O2	21.0006	50/50	21.0006
946081	AF1-273 C O1	18.7389	50/50	18.7389
946082	AF1-273 E O1	12.4926	50/50	12.4926
946571	AF1-321 C O1	6.0611	50/50	6.0611
946572	AF1-321 E O1	4.0407	50/50	4.0407
957001	AF2-001 C O2	5.9447	50/50	5.9447
957002	AF2-001 E O2	3.9631	50/50	3.9631
957011	AF2-002 C O2	2.9723	50/50	2.9723
957012	AF2-002 E O2	1.9816	50/50	1.9816

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957981	AF2-092 C	1.5727	50/50	1.5727
957982	AF2-092 E	1.0485	50/50	1.0485
958101	AF2-104 C	1.0072	50/50	1.0072
958102	AF2-104 E	0.6715	50/50	0.6715
958411	AF2-135 C	1.0727	50/50	1.0727
958412	AF2-135 E	0.7151	50/50	0.7151
958471	AF2-141	2.8605	50/50	2.8605
959792	AF2-270 E	0.9841	50/50	0.9841
960451	AF2-336 C O2	2.6678	50/50	2.6678
960452	AF2-336 E O2	1.7786	50/50	1.7786
960461	AF2-337 C O2	2.6678	50/50	2.6678
960462	AF2-337 E O2	1.7786	50/50	1.7786
960471	AF2-338 C O2	2.6678	50/50	2.6678
960472	AF2-338 E O2	1.7786	50/50	1.7786
960481	AF2-339 C O2	2.6678	50/50	2.6678
960482	AF2-339 E O2	1.7786	50/50	1.7786
960901	AF2-381 C	32.3898	50/50	32.3898
960902	AF2-381 E	17.0452	50/50	17.0452
WEC	WEC	0.0410	Confirmed LTF	0.0410
LGEE	LGEE	0.0787	Confirmed LTF	0.0787
CPLE	CPLE	0.1131	Confirmed LTF	0.1131
CBM-W2	CBM-W2	1.1630	Confirmed LTF	1.1630
NY	NY	0.2300	Confirmed LTF	0.2300
CBM-W1	CBM-W1	1.4887	Confirmed LTF	1.4887
TVA	TVA	0.2086	Confirmed LTF	0.2086
O-066	O-066	1.5994	Confirmed LTF	1.5994
CBM-S2	CBM-S2	0.9595	Confirmed LTF	0.9595
CBM-S1	CBM-S1	1.2524	Confirmed LTF	1.2524
G-007	G-007	0.2392	Confirmed LTF	0.2392
MEC	MEC	0.2129	Confirmed LTF	0.2129

13.5.2 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
100875447	200745	26ALLEGHEN	PENELEC	200884	26NEW BALT	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	159.19	162.49	DC	5.29

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	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
957001	AF2-001 C O2	6.3467	50/50	6.3467
957002	AF2-001 E O2	4.2311	50/50	4.2311
957011	AF2-002 C O2	3.1733	50/50	3.1733
957012	AF2-002 E O2	2.1156	50/50	2.1156
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
960191	AF2-310 O2	0.8328	Adder	1.85

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
WEC	WEC	0.0589	Confirmed LTF	0.0589
LGEE	LGEE	0.1124	Confirmed LTF	0.1124
CPLE	CPLE	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
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

13.5.3 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
100875439	200746	26ROCKWOOD	PENELEC	202650	26HIGHPOINT	PENELEC	1	PN-P2-3-PN-115-35E	breaker	179.0	151.27	153.9	DC	4.71

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
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
957001	AF2-001 C O2	5.6510	50/50	5.6510
957002	AF2-001 E O2	3.7674	50/50	3.7674
957011	AF2-002 C O2	2.8255	50/50	2.8255
957012	AF2-002 E O2	1.8837	50/50	1.8837
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
960192	AF2-310 BAT	0.9817	Merchant Transmission	0.9817
960451	AF2-336 C O2	1.6336	50/50	1.6336
960452	AF2-336 E O2	1.0890	50/50	1.0890
960461	AF2-337 C O2	1.6336	50/50	1.6336

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960462	AF2-337 E O2	1.0890	50/50	1.0890
960471	AF2-338 C O2	1.6336	50/50	1.6336
960472	AF2-338 E O2	1.0890	50/50	1.0890
960481	AF2-339 C O2	1.6336	50/50	1.6336
960482	AF2-339 E O2	1.0890	50/50	1.0890
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

13.5.4 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
100875402	200747	26PENN-MAR	PENELEC	200762	26GARRETT	PENELEC	1	PN-P2-3-PN-115-35E	breaker	167.0	179.93	182.75	DC	4.71

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	0.7148	50/50	0.7148
200834	26SW_E13_K22	0.1462	50/50	0.1462
200835	26DSGENWIN	0.9849	50/50	0.9849
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
957001	AF2-001 C O2	5.6503	50/50	5.6503
957002	AF2-001 E O2	3.7669	50/50	3.7669
957011	AF2-002 C O2	2.8252	50/50	2.8252
957012	AF2-002 E O2	1.8834	50/50	1.8834
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
960192	AF2-310 BAT	0.9823	Merchant Transmission	0.9823

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960451	AF2-336 C O2	1.6330	50/50	1.6330
960452	AF2-336 E O2	1.0886	50/50	1.0886
960461	AF2-337 C O2	1.6330	50/50	1.6330
960462	AF2-337 E O2	1.0886	50/50	1.0886
960471	AF2-338 C O2	1.6330	50/50	1.6330
960472	AF2-338 E O2	1.0886	50/50	1.0886
960481	AF2-339 C O2	1.6330	50/50	1.6330
960482	AF2-339 E O2	1.0886	50/50	1.0886
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

13.5.5 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
98602787	200762	26GARRETT	PENELEC	235470	01GARRET	AP	1	PN-P2-3-PN-115-35E	breaker	160.0	199.27	202.22	DC	4.71

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	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
957001	AF2-001 C O2	5.6491	50/50	5.6491
957002	AF2-001 E O2	3.7661	50/50	3.7661
957011	AF2-002 C O2	2.8246	50/50	2.8246
957012	AF2-002 E O2	1.8830	50/50	1.8830
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

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959792	AF2-270 E	0.5588	50/50	0.5588
960451	AF2-336 C O2	1.6316	50/50	1.6316
960452	AF2-336 E O2	1.0878	50/50	1.0878
960461	AF2-337 C O2	1.6316	50/50	1.6316
960462	AF2-337 E O2	1.0878	50/50	1.0878
960471	AF2-338 C O2	1.6316	50/50	1.6316
960472	AF2-338 E O2	1.0878	50/50	1.0878
960481	AF2-339 C O2	1.6316	50/50	1.6316
960482	AF2-339 E O2	1.0878	50/50	1.0878
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

13.5.6 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
100875412	200884	26NEW BALT	PENELEC	200501	26BDFORD N	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	182.81	186.12	DC	5.29

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	0.3199	50/50	0.3199
200834	26SW_E13_K22	0.1642	50/50	0.1642
200835	26DSGENWIN	0.8085	50/50	0.8085
200840	26DEEPCRK1	0.2956	50/50	0.2956
200841	26DEEPCRK2	0.2956	50/50	0.2956
200889	26STNY CRK	1.2151	50/50	1.2151
200890	26BF_G21_K23	0.3965	50/50	0.3965
200891	26CSLMN_L13	0.6219	50/50	0.6219
200892	26LOOKOUT	0.5908	50/50	0.5908
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	14.8274	50/50	14.8274
292542	L-013 1	14.4218	50/50	14.4218
293432	R-040 E	0.8112	50/50	0.8112
293902	O-048 E	12.9796	50/50	12.9796
294903	P-060 E	28.1770	50/50	28.1770
913142	Y1-033 E OP1	12.0216	50/50	12.0216
917672	Z2-108 E	8.1122	50/50	8.1122
930262	**AB1-065 E (Suspended)**	**0.6971**	**50/50**	**0.6971**
938351	AE1-053	4.5068	50/50	4.5068
938881	AE1-116	2.3801	50/50	2.3801
943301	AF1-001 C	0.6663	50/50	0.6663
943302	AF1-001 E	0.7432	50/50	0.7432
943711	AF1-039 C O1	3.1803	50/50	3.1803
943712	AF1-039 E O1	2.1202	50/50	2.1202
944781	AF1-143 C	27.0408	50/50	27.0408
944782	AF1-143 E	14.4218	50/50	14.4218
945671	AF1-232 C O2	64.6006	50/50	64.6006
945672	AF1-232 E O2	34.7850	50/50	34.7850
946081	AF1-273 C O1	32.4763	50/50	32.4763
946082	AF1-273 E O1	21.6509	50/50	21.6509
957001	AF2-001 C O2	6.3461	50/50	6.3461
957002	AF2-001 E O2	4.2307	50/50	4.2307
957011	AF2-002 C O2	3.1730	50/50	3.1730
957012	AF2-002 E O2	2.1154	50/50	2.1154
958101	AF2-104 C	1.2694	50/50	1.2694
958102	AF2-104 E	0.8463	50/50	0.8463
958411	AF2-135 C	1.3520	50/50	1.3520
958412	AF2-135 E	0.9014	50/50	0.9014
958471	AF2-141	3.6054	50/50	3.6054

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959793	AF2-270 BAT	0.2259	50/50	0.2259
960191	AF2-310 O2	0.8323	Adder	1.85
WEC	WEC	0.0570	Confirmed LTF	0.0570
LGEE	LGEE	0.1090	Confirmed LTF	0.1090
CPLE	CPLE	0.1528	Confirmed LTF	0.1528
CBM-W2	CBM-W2	1.6052	Confirmed LTF	1.6052
NY	NY	0.3318	Confirmed LTF	0.3318
CBM-W1	CBM-W1	2.0892	Confirmed LTF	2.0892
TVA	TVA	0.2870	Confirmed LTF	0.2870
O-066	O-066	2.2310	Confirmed LTF	2.2310
CBM-S2	CBM-S2	1.3005	Confirmed LTF	1.3005
CBM-S1	CBM-S1	1.7296	Confirmed LTF	1.7296
G-007	G-007	0.3338	Confirmed LTF	0.3338
MADISON	MADISON	0.0020	Confirmed LTF	0.0020
MEC	MEC	0.2956	Confirmed LTF	0.2956

13.5.7 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
100875407	202650	26HIGHPOINT	PENELEC	200747	26PENN-MAR	PENELEC	1	PN-P2-3-PN-115-35E	breaker	174.0	170.45	173.16	DC	4.71

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
957001	AF2-001 C O2	5.6508	50/50	5.6508
957002	AF2-001 E O2	3.7672	50/50	3.7672
957011	AF2-002 C O2	2.8254	50/50	2.8254
957012	AF2-002 E O2	1.8836	50/50	1.8836
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
960192	AF2-310 BAT	0.9820	Merchant Transmission	0.9820

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960451	AF2-336 C O2	1.6333	50/50	1.6333
960452	AF2-336 E O2	1.0889	50/50	1.0889
960461	AF2-337 C O2	1.6333	50/50	1.6333
960462	AF2-337 E O2	1.0889	50/50	1.0889
960471	AF2-338 C O2	1.6333	50/50	1.6333
960472	AF2-338 E O2	1.0889	50/50	1.0889
960481	AF2-339 C O2	1.6333	50/50	1.6333
960482	AF2-339 E O2	1.0889	50/50	1.0889
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

13.5.8 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
100424916	235469	01GARRET	AP	934440	AD1-068 TAP	AP	1	PN-P2-3-PN-115-35E	breaker	191.0	125.74	127.4	DC	3.16

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	0.4798	50/50	0.4798
200834	26SW_E13_K22	0.0980	50/50	0.0980
200835	26DSGENWIN	0.6608	50/50	0.6608
200840	26DEEPCRK1	0.9479	50/50	0.9479
200841	26DEEPCRK2	0.9479	50/50	0.9479
200889	26STNY CRK	0.3988	50/50	0.3988
200890	26BF_G21_K23	0.3240	50/50	0.3240
200891	26CSLMN_L13	0.5083	50/50	0.5083
200892	26LOOKOUT	0.4829	50/50	0.4829
202225	26SCI_S29B	0.1525	50/50	0.1525
202652	26RGH_Y1-033	0.3727	50/50	0.3727
235013	01AB1-065 C	0.4262	50/50	0.4262
235098	U2-073A E	9.3465	Adder	11.0
235099	U2-073B E	3.7595	Adder	4.42
235526	01WR_AA1-100	1.3826	50/50	1.3826
236001	01WARRIOR RN	3.9025	50/50	3.9025
237312	01DANS_S-014	3.0611	50/50	3.0611
290229	S-014 E	12.2444	50/50	12.2444
292350	K-023	12.1187	50/50	12.1187
292542	L-013 1	11.7872	50/50	11.7872
293432	R-040 E	0.6630	50/50	0.6630
293902	O-048 E	10.6085	50/50	10.6085
294903	P-060 E	9.2484	50/50	9.2484
913142	Y1-033 E OP1	14.7586	50/50	14.7586
917672	Z2-108 E	6.6303	50/50	6.6303
923971	AB2-038	0.3381	Adder	0.4
924001	AB2-041 C	0.2979	Adder	0.35
924002	AB2-041 E	1.2639	Adder	1.49
930262	**AB1-065 E (Suspended)**	**4.0977**	**50/50**	**4.0977**
933951	**AD1-018 C (Suspended)**	**1.0813**	**50/50**	**1.0813**
933952	**AD1-018 E (Suspended)**	**1.7643**	**50/50**	**1.7643**
938351	AE1-053	3.6835	50/50	3.6835
938881	AE1-116	1.4207	50/50	1.4207
938991	AE1-128 C	7.2058	50/50	7.2058
938992	AE1-128 E	4.8038	50/50	4.8038
940461	AE2-030 C	0.8251	50/50	0.8251
940462	AE2-030 E	1.1290	50/50	1.1290
942731	AE2-289 C	0.9467	Adder	1.11
942732	AE2-289 E	5.4936	Adder	6.46
942901	AE2-309 C	2.3174	50/50	2.3174
942902	AE2-309 E	0.4423	50/50	0.4423

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943301	AF1-001 C	3.9169	50/50	3.9169
943302	AF1-001 E	4.3688	50/50	4.3688
943711	AF1-039 C O1	3.9044	50/50	3.9044
943712	AF1-039 E O1	2.6029	50/50	2.6029
944781	AF1-143 C	22.1010	50/50	22.1010
944782	AF1-143 E	11.7872	50/50	11.7872
945671	AF1-232 C O2	26.3806	50/50	26.3806
945672	AF1-232 E O2	14.2050	50/50	14.2050
946081	AF1-273 C O1	12.3996	50/50	12.3996
946082	AF1-273 E O1	8.2664	50/50	8.2664
957001	AF2-001 C O2	3.7892	50/50	3.7892
957002	AF2-001 E O2	2.5262	50/50	2.5262
957011	AF2-002 C O2	1.8946	50/50	1.8946
957012	AF2-002 E O2	1.2631	50/50	1.2631
957981	AF2-092 C	0.2908	Adder	0.65
957982	AF2-092 E	0.1939	Adder	0.43
958101	AF2-104 C	0.7577	50/50	0.7577
958102	AF2-104 E	0.5051	50/50	0.5051
958411	AF2-135 C	1.1050	50/50	1.1050
958412	AF2-135 E	0.7367	50/50	0.7367
958471	AF2-141	2.9468	50/50	2.9468
959792	AF2-270 E	0.3724	50/50	0.3724
960191	AF2-310 O2	10.6764	50/50	10.6764
960451	AF2-336 C O2	0.4894	Adder	1.09
960452	AF2-336 E O2	0.3263	Adder	0.72
960461	AF2-337 C O2	0.4894	Adder	1.09
960462	AF2-337 E O2	0.3263	Adder	0.72
960471	AF2-338 C O2	0.4894	Adder	1.09
960472	AF2-338 E O2	0.3263	Adder	0.72
960481	AF2-339 C O2	0.4894	Adder	1.09
960482	AF2-339 E O2	0.3263	Adder	0.72
NEWTON	NEWTON	0.3976	Confirmed LTF	0.3976
FARMERCITY	FARMERCITY	0.0201	Confirmed LTF	0.0201
G-007A	G-007A	0.9326	Confirmed LTF	0.9326
VFT	VFT	2.5219	Confirmed LTF	2.5219
CALDERWOOD	CALDERWOOD	0.1471	Confirmed LTF	0.1471
PRAIRIE	PRAIRIE	0.9221	Confirmed LTF	0.9221
CHEOAH	CHEOAH	0.1466	Confirmed LTF	0.1466
EDWARDS	EDWARDS	0.1316	Confirmed LTF	0.1316
TILTON	TILTON	0.2388	Confirmed LTF	0.2388
MADISON	MADISON	0.0605	Confirmed LTF	0.0605
GIBSON	GIBSON	0.2047	Confirmed LTF	0.2047
BLUEG	BLUEG	0.6579	Confirmed LTF	0.6579
TRIMBLE	TRIMBLE	0.2120	Confirmed LTF	0.2120
CATAWBA	CATAWBA	0.0759	Confirmed LTF	0.0759

13.5.9 Index 9

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
100424858	235470	01GARRET	AP	235469	01GARRET	AP	1	PN-P2-3-PN-115-35E	breaker	196.0	162.67	165.07	DC	4.71

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	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
957001	AF2-001 C O2	5.6491	50/50	5.6491
957002	AF2-001 E O2	3.7661	50/50	3.7661
957011	AF2-002 C O2	2.8246	50/50	2.8246
957012	AF2-002 E O2	1.8830	50/50	1.8830
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

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959792	AF2-270 E	0.5588	50/50	0.5588
960451	AF2-336 C O2	1.6316	50/50	1.6316
960452	AF2-336 E O2	1.0878	50/50	1.0878
960461	AF2-337 C O2	1.6316	50/50	1.6316
960462	AF2-337 E O2	1.0878	50/50	1.0878
960471	AF2-338 C O2	1.6316	50/50	1.6316
960472	AF2-338 E O2	1.0878	50/50	1.0878
960481	AF2-339 C O2	1.6316	50/50	1.6316
960482	AF2-339 E O2	1.0878	50/50	1.0878
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

13.5.10 Index 10

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
100875551	945670	AF1-232 TAP	PENELEC	200745	26ALLEGHEN	PENELEC	1	PN-P2-3-PN-115-35E	breaker	160.0	128.42	131.72	DC	5.29

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	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
957001	AF2-001 C O2	6.3467	50/50	6.3467
957002	AF2-001 E O2	4.2311	50/50	4.2311
957011	AF2-002 C O2	3.1733	50/50	3.1733
957012	AF2-002 E O2	2.1156	50/50	2.1156
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
960191	AF2-310 O2	0.8328	Adder	1.85
WEC	WEC	0.0589	Confirmed LTF	0.0589
LGEE	LGEE	0.1124	Confirmed LTF	0.1124

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CPLE	CPLE	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
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

13.6 Contingency Descriptions - Secondary POI

Contingency Name	Contingency Definition
AP-P1-3-PN-115-010	CONTINGENCY 'AP-P1-3-PN-115-010' /* GARRETT 138/115KV XFMR FAULT OPEN BRANCH FROM BUS 235469 TO BUS 235470 CKT 1 /* 01GARRET 138.00 01GARRET 115.00 END
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 957000 CKT 1 /* 26HOOVERSV 115 AF2-001 TAP 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-P1-3-PN-115-029-A	CONTINGENCY 'PN-P1-3-PN-115-029-A' /* HOOVERSVILLE #2 XFMR FAULT DISCONNECT BRANCH FROM BUS 200743 TO BUS 200789 CKT 2 /* 26HOOVERSV 115 26HOOVER#2 23 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200742 CKT 1 /* 26HOOVERSV 115 26TOWER 51 115 DISCONNECT BRANCH FROM BUS 200743 TO BUS 957000 CKT 1 /* 26HOOVERSV 115 AF2-001 TAP 115 END
Base Case	
PN-P7-1-PN-230-001	CONTINGENCY 'PN-P7-1-PN-230-001' /* HOMER CITY - HOOVERSVILLE 230KV & SEWARD - TOWER 51 115KV 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 200796 TO BUS 200743 CKT 3 /* 26HOOVRSVL 230 26HOOVERSV 115 DISCONNECT BRANCH FROM BUS 200741 TO BUS 200742 CKT 1 /* 26SEWARD 115 26TOWER 51 115 END

Contingency Name	Contingency Definition
PN-P1-2-PN-115-066-A	CONTINGENCY 'PN-P1-2-PN-115-066-A' /* HOOVERSVILLE - SOMERSET 115KV DISCONNECT BRANCH FROM BUS 200743 TO BUS 957000 CKT 1 /* 26HOOVERSV 115 AF2-001 TAP 115 END

14 Affected Systems

14.1 NYISO

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

15 Attachment 1: One Line Diagram