



**Generation Interconnection
Feasibility Study Report
for
Queue Project AF1-307
SEWARD-JACKSON RD 115 KV
39.9 MW Capacity / 66.5 MW Energy**

January, 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 (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.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model.

The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

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 Indiana County, Pennsylvania. The installed facilities will have a total capability of 66.5 MW with 39.9 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 12/31/2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF1-307
Project Name	SEWARD-JACKSON RD 115 KV
State	Pennsylvania
County	Indiana
Transmission Owner	PENELEC
MFO	66.5
MWE	66.5
MWC	39.9
Fuel	Solar
Basecase Study Year	2023

3.1 Primary Point of Interconnection

The interconnection of the project at the Primary Point of Interconnection (POI) will be accomplished by constructing a new 115 kV three (3) breaker ring bus substation and looping the Seward – Jackson Road 115 kV line into the new station. The new substation will be located approximately 9.5 miles from Jackson Road 115 kV substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection switching station and the associated facilities. The IC will also be responsible for the rough grade of the property and an access road to the proposed three breaker ring bus site. The project will also require non-direct connection upgrades at Jackson Road 115 kV and Seward 115 kV substations.

3.2 Secondary Point of Interconnection

The interconnection of the project at a Secondary POI can be accomplished by constructing a new 230 kV three (3) breaker ring bus substation and looping the Homer City – Johnstown 230 kV line into the new station. The

new substation would be located approximately 5.2 miles from Johnstown 230 kV substation. A full scope of work or estimated cost is not provided for the proposed Secondary POI.

3.3 Cost Summary

The AF1-307 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$ 242,700
Direct Connection Network Upgrade	\$ 7,324,000
Non-Direct Connection Network Upgrades	\$ 2,500,800
Total Costs	\$ 10,067,500

In addition, the AF1-307 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$ 31,255,350

Cost allocations for these upgrades will be provided in the System Impact Study Report.

The costs provided above exclude the Contribution in Aid of Construction ("CIAC") Federal Income Tax Gross Up charge. If, at a future date, it is determined that the CIAC Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

The Feasibility Study is used to make a preliminary determination of the type and scope of Attachment Facilities, Local Upgrades, and Network Upgrades that will be necessary to accommodate the Interconnection Request and to provide the Interconnection Customer a preliminary estimate of the time that will be required to construct any necessary facilities and upgrades and the Interconnection Customer's cost responsibility. The System Impact Study provides refined and comprehensive estimates of cost responsibility and construction lead times for new facilities and system upgrades. Facilities Studies will include, commensurate with the degree of engineering specificity as provided in the Facilities Study Agreement, good faith estimates of the cost, determined in accordance with Section 217 of the Tariff,

- (a) to be charged to each affected New Service Customer for the Facilities and System Upgrades that are necessary to accommodate this queue project;
- (b) the time required to complete detailed design and construction of the facilities and upgrades; and
- (c) a description of any site-specific environmental issues or requirements that could reasonably be anticipated to affect the cost or time required to complete construction of such facilities and upgrades.

The required Attachment Facilities and Direct and Non-Direct Connection work for the interconnection of the AF1-307 generation project to the FE Transmission System is detailed in the following sections. The associated

one-line with the generation project Attachment Facilities and the Primary Direct and Non-Direct Connection facilities are shown in Attachment 1.

4 Attachment Facilities

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

Description	Total Cost
Construct new three breaker 115 kV Ring Bus	\$ 242,700
Total Attachment Facility Costs	\$ 242,700

5 Direct Connection Cost Estimate

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

Description	Total Cost
Construct new three breaker 115 kV Ring Bus	\$ 7,324,000
Total Direct Connection Facility Costs	\$ 7,324,000

6 Non-Direct Connection Cost Estimate

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

Description	Total Cost
Loop the Jackson Road-Seward 115 kV line to the new three breaker ring bus.	\$ 606,600
Relay upgrades and anti-islanding at Jackson Road	\$ 609,100
Anti-islanding relaying at Cambria Slope	\$ 609,100
Relay upgrades and anti-islanding at Seward	\$ 609,100
Review nameplates and Drawings	\$ 66,900
Total Non-Direct Connection Facility Costs	\$ 2,500,800

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 19 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 first three months of the engineering design work that is related to the construction of the interconnection substation. 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. The estimate elapsed 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 AF1-307 project did not contribute to any overloads on the FE transmission < 100 kV 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 AF1-307 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 AF1-307 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 system.

9.3 Power Factor Requirements

The IC shall design its 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.

10.1.1 Meteorological Data Reporting Requirement

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)

- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

10.2 FE 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 Network Impacts – Primary Point of Interconnection

The Queue Project AF1-307 was evaluated as a 66.5 MW (Capacity 39.9 MW) injection tapping the Seward to Jackson 115 kV line in the Penelec area. Project AF1-307 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-307 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

11.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41407601	200740	26BLRSVLE	115.0	PENELEC	200763	26BLAIRSVL	138.0	PENELEC	1	PN-P1_2-PN-230-0103	single	364.0	99.45	100.94	DC	5.43
41407603	200740	26BLRSVLE	115.0	PENELEC	200763	26BLAIRSVL	138.0	PENELEC	1	Base Case	single	291.0	98.93	100.43	DC	4.36

11.2 Multiple Facility Contingency

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

None

11.3 Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41407600	200740	26BLRSVLE	115.0	PENELEC	200763	26BLAIRSVL	138.0	PENELEC	1	PJM_P1_APS_B_G692	single	364.0	106.12	107.36	DC	4.53
41712928	200740	26BLRSVLE	115.0	PENELEC	200763	26BLAIRSVL	138.0	PENELEC	1	PN_P4-500-001J	breaker	364.0	114.44	116.62	DC	7.94
41712922	200766	26FLORENCE	115.0	PENELEC	200740	26BLRSVLE	115.0	PENELEC	1	PN-P2-3-PN-230-9H-A	breaker	282.0	108.85	112.56	DC	10.47
42308054	200767	26HOME RCT	230.0	PENELEC	200795	26SHELOCTA	230.0	PENELEC	1	PN_P4-500-002A	breaker	917.0	176.8	179.02	DC	20.03
42308055	200767	26HOME RCT	230.0	PENELEC	200795	26SHELOCTA	230.0	PENELEC	1	PN_P4-500-002F	breaker	917.0	176.81	179.03	DC	20.03
42627120	200767	26HOME RCT	230.0	PENELEC	200795	26SHELOCTA	230.0	PENELEC	1	Base Case	single	731.0	128.66	129.74	DC	7.75
42627121	200767	26HOME RCT	230.0	PENELEC	200795	26SHELOCTA	230.0	PENELEC	1	PN-P1-3-PN-230-001T	single	917.0	122.79	124.12	DC	12.03
42627122	200767	26HOME RCT	230.0	PENELEC	200795	26SHELOCTA	230.0	PENELEC	1	PN-P1-2-PN-230-025	single	917.0	122.79	124.12	DC	12.03
42308064	200795	26SHELOCTA	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	PN_P4-500-002F	breaker	917.0	162.15	164.76	DC	23.56
42308065	200795	26SHELOCTA	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	PN_P4-500-002A	breaker	917.0	162.15	164.76	DC	23.56
42627135	200795	26SHELOCTA	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	AP-P1-2-WP-345-311T	single	917.0	111.42	112.6	DC	10.71
42627136	200795	26SHELOCTA	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	Base Case	single	731.0	107.72	109.05	DC	9.64
42627139	200795	26SHELOCTA	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	PJM_P1_P1_20A_CON EMAGH-KEYSTONE	single	917.0	111.28	112.41	DC	10.21
42308170	200810	26KEYSTONE	230.0	PENELEC	999401	STAR592	1.0	PJM	4	PJM500_PN_P4-500-001A	breaker	635.0	134.82	136.72	DC	11.9
42308171	200810	26KEYSTONE	230.0	PENELEC	999401	STAR592	1.0	PJM	4	PJM500_PN_P4-500-001D	breaker	635.0	134.81	136.71	DC	11.9
41712601	999401	STAR592	1.0	PJM	200011	KEYSTONE	500.0	PJM	4	PJM500_PN_P4-500-001D	breaker	634.0	134.29	136.2	DC	11.9
41712602	999401	STAR592	1.0	PJM	200011	KEYSTONE	500.0	PJM	4	PJM500_PN_P4-500-001A	breaker	634.0	134.29	136.2	DC	11.9

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	CONT NAME	Type	Rating MVA	PRE PROJE CT LOAD NG %	POST PROJE CT LOAD NG %	AC DC	MW IMPA CT
414075 97	2007 40	26BLRSVL E	115. 0	PENEL EC	2007 63	26BLAIRSV L	138. 0	PENEL EC	1	PJM_P1_APS_B_ G692	operati on	364. 0	113.27	115.34	DC	7.55
414075 98	2007 40	26BLRSVL E	115. 0	PENEL EC	2007 63	26BLAIRSV L	138. 0	PENEL EC	1	Base Case	operati on	291. 0	106.67	109.17	DC	7.26
414076 36	2007 41	26SEWARD	115. 0	PENEL EC	2007 66	26FLOREN CE	115. 0	PENEL EC	1	PN-P1_2-PN- 230-0104	operati on	282. 0	107.89	111.52	DC	10.25
414076 40	2007 66	26FLOREN CE	115. 0	PENEL EC	2007 40	26BLRSVL E	115. 0	PENEL EC	1	PN-P1_2-PN- 230-0104	operati on	282. 0	107.67	111.31	DC	10.25
426271 14	2007 67	26HOMER CT	230. 0	PENEL EC	2007 95	26SHELOCT A	230. 0	PENEL EC	1	PN-P1-3-PN-230- 001T	operati on	917. 0	172.13	174.35	DC	20.05
426271 15	2007 67	26HOMER CT	230. 0	PENEL EC	2007 95	26SHELOCT A	230. 0	PENEL EC	1	PN-P1-2-PN-230- 025	operati on	917. 0	172.13	174.35	DC	20.05
426271 16	2007 67	26HOMER CT	230. 0	PENEL EC	2007 95	26SHELOCT A	230. 0	PENEL EC	1	Base Case	operati on	731. 0	173.34	175.14	DC	12.91
426277 17	2007 93	26SEWARD 2	230. 0	PENEL EC	2009 12	26CONEM AGH	230. 0	PENEL EC	1	PN-P1_2-PN- 230-0103	operati on	1147 .0	98.23	100.25	DC	22.88
426271 30	2007 95	26SHELOCT A	230. 0	PENEL EC	2008 10	26KEYSTO NE	230. 0	PENEL EC	1	PN-P1-2-PN-230- 025	operati on	917. 0	156.84	159.45	DC	23.58
426271 31	2007 95	26SHELOCT A	230. 0	PENEL EC	2008 10	26KEYSTO NE	230. 0	PENEL EC	1	PN-P1-3-PN-230- 001T	operati on	917. 0	156.84	159.45	DC	23.58
426271 32	2007 95	26SHELOCT A	230. 0	PENEL EC	2008 10	26KEYSTO NE	230. 0	PENEL EC	1	Base Case	operati on	731. 0	157.36	159.59	DC	16.06
426273 30	2008 10	26KEYSTO NE	230. 0	PENEL EC	9994 01	STAR592	1.0	PJM	4	PN-P1-3-PN-500- 001AT	operati on	635. 0	128.47	130.38	DC	11.92
426273 33	2008 10	26KEYSTO NE	230. 0	PENEL EC	9994 01	STAR592	1.0	PJM	4	Base Case	operati on	494. 0	108.59	110.23	DC	7.97
414075 79	2009 12	26CONEM AGH	230. 0	PENEL EC	2000 05	CONEM- GH	500. 0	PJM	3	PN-P1_2-PN- 230-0103	operati on	1066 .0	105.7	107.87	DC	22.88
414073 20	9994 01	STAR592	1.0	PJM	2000 11	KEYSTONE	500. 0	PJM	4	PN-P1-3-PN-500- 001AT	operati on	634. 0	127.95	129.86	DC	11.92
414073 23	9994 01	STAR592	1.0	PJM	2000 11	KEYSTONE	500. 0	PJM	4	Base Case	operati on	493. 0	107.88	109.52	DC	7.97

11.5 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
42308171,42308170	5	26KEYSTONE 230.0 kV - STAR592 1.0 kV Ckt 4	PENELEC PN-AF1-F-0046a : Replace transformer Replace substation conductor at Keystone (3A) Project Type : FAC Cost : \$26,180,000 Time Estimate : 24.0 Months	\$26,537,000
41712601,41712602	6	STAR592 1.0 kV - KEYSTONE 500.0 kV Ckt 4	PN-AF1-F-0046b : Replace relay at Keystone (3A) Project Type : FAC Cost : \$357,000 Time Estimate : 12.0 Months	
41407603,41407600, 41407601,41712928	1	26BLRSVL E 115.0 kV - 26BLAIRSVL 138.0 kV Ckt 1	PENELEC PN-AF1-F-0088a: At Blairsville East substation, replace the 138/115 kV transformer. Project Type : FAC Cost : \$4,165,000 Time Estimate : 24.0 Months PN-AF1-F-0088b: At Blairsville East, replace the transformer circuit breaker. Project Type : FAC Cost : \$595,000 Time Estimate : 12.0 Months PN-AF1-F-0088c: At Blairsville, replace disconnect switches. Project Type : FAC Cost : \$714,000 Time Estimate : 12.0 Months PN-AF1-F-0088d: At Blairsville East, replace disconnect switches and bus conductor. Project Type : FAC Cost : \$714,000 Time Estimate : 12.0 Months Note: AF1-307 currently has a cost responsibility for the above upgrade. The following baseline project is "on-hold"; if the following baseline project is approved for construction, then AF1-307 will not have a cost responsibility and can take advantage of the following baseline project. If additional mitigations beyond the following baseline project are needed, AF1-307 will have a cost responsibility for those additional mitigations. b3073 : PJM Baseline Upgrade b3073: Replace the Blairsville East 138/115 kV transformer and associated equipment such as breaker disconnects and bus conductor. The baseline project has a projected in-service date of 06/01/2022.	\$6,188,000
41712922	2	26FLORENCE 115.0 kV - 26BLRSVL E 115.0 kV Ckt 1	PENELEC PN-AF1-F-0039 : Replace circuit breaker at Blairsville East Project Type : FAC Cost : \$595,000 Time Estimate : 12.0 Months	\$595,000

ID	Index	Facility	Upgrade Description	Cost
42308054,42308055, 42627120,42627122, 42627121	3	26HOMER CT 230.0 kV - 26SHELOCTA 230.0 kV Ckt 1	PENELEC PN-AF1-F-0040a : Replace wave trap at Homer City Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months PN-AF1-F-0040b : Reconductor Homer City - Sheloctoa 230 kV (~11 miles) Project Type : FAC Cost : \$19,188,750 Time Estimate : 6.0 Months PN-AF1-F-0040c : Replace line drops at Shelocta Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months PN-AF1-F-0040d : Replace disconnect switch at Shelocta Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months PN-AF1-F-0040e : Replace substation conductor at Shelocta Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months	\$19,664,750
42308065,42308064, 42627139,42627136, 42627135	4	26SHELOCTA 230.0 kV - 26KEYSTONE 230.0 kV Ckt 1	PENELEC PN-AF1-F-0044a : Replace wave trap at Keystone Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months PN-AF1-F-0044b : Reconductor Shelocta - Keystone 230 kV (~3 miles) Project Type : FAC Cost : \$4,034,100 Time Estimate : 6.0 Months PN-AF1-F-0044c : Replace substation conductor at Shelocta and Keystone Project Type : FAC Cost : \$178,500 Time Estimate : 6.0 Months PN-AF1-F-0044d : Replace disconnect switch at Shelocta Project Type : FAC Cost : \$178,500 Time Estimate : 6.0 Months PN-AF1-F-0044e : Replace relays at Keystone Project Type : FAC Cost : \$297,500 Time Estimate : 12.0 Months	\$4,807,600
			TOTAL COST	\$ 31,255,350

11.6 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

11.6.1 Contingency Descriptions

Contingency Name	Contingency Definition
PJM500_PN_P4-500-001A	CONTINGENCY 'PJM500_PN_P4-500-001A' /* KEYSTONE 500KV BKR 1 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 CKT 3 /* KEYSTONE 500 26KEYSTONE 230 REMOVE MACHINE H FROM BUS 200033 /* KEYS G2 20 REMOVE MACHINE L FROM BUS 200033 /* KEYS G2 20 DISCONNECT BUS 200033 /* KEYS G2 20 END
PJM500_PN_P4-500-001D	CONTINGENCY 'PJM500_PN_P4-500-001D' /* KEYSTONE 500KV BKR 4 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 CKT 3 /* KEYSTONE 500 26KEYSTONE 230 REMOVE MACHINE H FROM BUS 200032 /* KEYS G1 20 REMOVE MACHINE L FROM BUS 200032 /* KEYS G1 20 DISCONNECT BUS 200032 /* KEYS G1 20 END
PJM_P1_P1_20A_CONEMAGH-KEYSTONE	CONTINGENCY 'PJM_P1_P1_20A_CONEMAGH-KEYSTONE' DISCONNECT BRANCH FROM BUS 200005 TO BUS 200011 CKT 1 /* CONEMAGH KEYSTONE 500 500 END
AP-P1-2-WP-345-311T	CONTINGENCY 'AP-P1-2-WP-345-311T' /* ARMSTRONG -HOMERCITY 345KV DISCONNECT BRANCH FROM BUS 235129 TO BUS 200769 CKT 1 /* 01ARMSTRONG 345 26HOMER CY 345 END
PJM_P1_APS_B_G692	CONTINGENCY 'PJM_P1_APS_B_G692' / 200011 KEYSTONE 500 235104 01CABOT 500 1 OPEN BRANCH FROM BUS 200011 TO BUS 235104 CKT 1 END
PN-P2-3-PN-230-9H-A	CONTINGENCY 'PN-P2-3-PN-230-9H-A' /* HOMER CITY 230 KV STUCK BREAKER 209 (SHELOCTA/SOUTH BUS) DISCONNECT BRANCH FROM BUS 200767 TO BUS 200769 TO BUS 202641 CKT S/* 26HOMER CT 230 26HOMER CY 345 26HOMERCITYS 23.00 DISCONNECT BRANCH FROM BUS 200767 TO BUS 200795 CKT 1 /* 26HOMER CT 230 26SHELOCTA 230 END

Contingency Name	Contingency Definition
PN-P1_2-PN-230-0103	CONTINGENCY 'PN-P1_2-PN-230-0103' /* SHELOCTA - KEYSTONE 230 KV LINE OPEN BRANCH FROM BUS 200795 TO BUS 200810 CKT 1 /* 26SHELOCTA 230.00 26KEYSTONE 230.00 END
PN-P1-3-PN-230-001T	CONTINGENCY 'PN-P1-3-PN-230-001T' /* CONEMAUGH #1 500/230KV XFMR DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 END
PN-P1-3-PN-500-001AT	CONTINGENCY 'PN-P1-3-PN-500-001AT' /* KEYSTONE #3 500/230 KV XFMR OPEN BRANCH FROM BUS 200011 TO BUS 200810 CKT 3 /* KEYSTONE 500.00 26KEYSTONE 230.00 END
PN_P4-500-001J	CONTINGENCY 'PN_P4-500-001J' /* KEYSTONE 500KV BKR 16 DISCONNECT BRANCH FROM BUS 200011 TO BUS 235104 CKT 1 /* KEYSTONE 500 01CABOT 500 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 TO BUS 200907 CKT 4/* KEYSTONE 500 26KEYSTONE 230 26KEYSTN#4 20.00 REDUCE BUS 200011 SHUNT BY 100 PERCENT /* KEYSTONE 500 END
Base Case	
PN_P4-500-002A	CONTINGENCY 'PN_P4-500-002A' /* CONEMAUGH 500KV BKR 1 DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 DISCONNECT BUS 200031 /* CONE G2 22 END
PN-P1_2-PN-230-0104	CONTINGENCY 'PN-P1_2-PN-230-0104' /* SHELOCTA - HOMER CITY 230 KV LINE OPEN BRANCH FROM BUS 200795 TO BUS 200767 CKT 1 /* 26SHELOCTA 230.00 26HOMER CT 230.00 END
PN-P1-2-PN-230-025	CONTINGENCY 'PN-P1-2-PN-230-025' /* CONEMAUGH - SEWARD 230KV DISCONNECT BRANCH FROM BUS 200912 TO BUS 200793 CKT 1 /* 26CONEMAGH 230 26SEWARD 2 230 END
PN_P4-500-002F	CONTINGENCY 'PN_P4-500-002F' /* CONEMAUGH 500KV BKR 6 DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 DISCONNECT BUS 200030 /* CONE G1 22 END

11.6.2 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
41712928	200740	26BLRSVL E	PENELEC	200763	26BLAIRSVL	PENELEC	1	PN_P4-500-001J	breaker	364.0	114.44	116.62	DC	7.94

Bus #	Bus	MW Impact
200636	26IUP CO-G	0.2723
200794	26CONEMAGH	0.1881
200805	26COLVER13 (Deactivation : 09/01/20)	11.8140
200864	K-013 E	1.7770
200883	Q-053 E	3.4276
202158	26CON.GEN1	0.0485
202160	26CON.GEN2	0.0989
290086	Q-036 E	2.2304
292350	K-023	1.8658
292542	L-013 1	1.8148
293301	N-039 E	3.6481
293393	V3-030E	2.3416
293432	R-040 E	0.1021
293603	O-018 E	4.0717
293902	O-048 E	1.6333
294515	O38_P22	3.1921
294903	P-060 E	2.9877
296332	R-032 E	4.6981
917672	Z2-108 E	1.0208
935191	AD1-154	1.0416
936991	AD2-133 C	1.0037
936992	AD2-133 E	4.5907
938351	AE1-053	0.5671
938362	AE1-054 BAT	1.0105
938881	AE1-116	0.3078
938991	AE1-128 C	5.3691
938992	AE1-128 E	3.5794
941331	AE2-129 C	0.5873
941332	AE2-129 E	0.3915
941351	AE2-131 C	0.5873
941352	AE2-131 E	0.3915
942121	AE2-224 C	3.7475
942122	AE2-224 E	2.4983
942361	AE2-249 C	0.6040
942362	AE2-249 E	0.4027
942511	AE2-264 C	2.2636
942512	AE2-264 E	1.5091
944181	AF1-086 C O1	0.8374
944182	AF1-086 E O1	3.6432
944691	AF1-134 C O1	0.3250
944692	AF1-134 E O1	0.3250

Bus #	Bus	MW Impact
944701	AF1-135 C	0.3900
944702	AF1-135 E	0.2600
944751	AF1-140 C	0.3899
944752	AF1-140 E	0.2599
944781	AF1-143 C	1.8034
944782	AF1-143 E	1.2023
945481	AF1-213 C	2.4767
945482	AF1-213 E	1.6511
945671	AF1-232 C O1	3.8850
945672	AF1-232 E O1	2.0919
945751	AF1-240 C O1	0.3312
945752	AF1-240 E O1	0.2208
945901	AF1-255 C	0.2249
945902	AF1-255 E	0.3105
946071	AF1-272 C O1	12.2977
946072	AF1-272 E O1	8.1985
946081	AF1-273 C O1	2.2413
946082	AF1-273 E O1	1.4942
946241	AF1-289 C O1	0.9560
946242	AF1-289 E O1	0.6373
946431	AF1-307 C	4.7625
946432	AF1-307 E	3.1750
946571	AF1-321 C O1	0.4904
946572	AF1-321 E O1	0.3269
DUCKCREEK	DUCKCREEK	1.1250
NEWTON	NEWTON	1.0358
FARMERCITY	FARMERCITY	0.0530
G-007A	G-007A	2.9489
VFT	VFT	7.9980
PRAIRIE	PRAIRIE	2.4306
COFFEEN	COFFEEN	0.5089
EDWARDS	EDWARDS	0.3433
CHEOAH	CHEOAH	0.4114
TILTON	TILTON	0.6180
MADISON	MADISON	0.0907
GIBSON	GIBSON	0.5302
CALDERWOOD	CALDERWOOD	0.4110
BLUEG	BLUEG	1.6909
TRIMBLE	TRIMBLE	0.5426
CATAWBA	CATAWBA	0.2460

11.6.3 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
41712922	200766	26FLORENCE	PENELEC	200740	26BLRSVL E	PENELEC	1	PN-P2-3-PN-230-9H-A	breaker	282.0	108.85	112.56	DC	10.47

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	11.3225
200794	26CONEMAGH	0.2498
200834	26SW_E13_K22	0.0262
200846	26FORWARD	0.0940
200864	K-013 E	2.6940
200883	Q-053 E	4.8898
200888	26HIGHLAND	0.2125
200889	26STNY CRK	0.1577
200915	26CHSTN_FL	0.1081
200925	26R32	0.2451
202225	26SCI_S29B	0.0408
290086	Q-036 E	2.4283
292350	K-023	2.4511
292542	L-013 1	2.3841
293301	N-039 E	4.4108
293393	V3-030E	1.8653
293432	R-040 E	0.1341
293603	O-018 E	6.0882
293902	O-048 E	2.1457
294515	O38_P22	3.8594
294903	P-060 E	4.5184
296332	R-032 E	7.0248
913142	Y1-033 E OP1	1.9314
917672	Z2-108 E	1.3410
936991	AD2-133 C	1.0927
936992	AD2-133 E	4.9980
938351	AE1-053	0.7450
938881	AE1-116	0.4699
938991	AE1-128 C	8.0323
938992	AE1-128 E	5.3549
941231	AE2-117 C	0.5474
941232	AE2-117 E	0.3650
941241	AE2-118 C	0.5474
941242	AE2-118 E	0.3650
941331	AE2-129 C	0.5910
941332	AE2-129 E	0.3940
941351	AE2-131 C	0.5910
941352	AE2-131 E	0.3940
942121	AE2-224 C	4.6170
942122	AE2-224 E	3.0780
942361	AE2-249 C	0.9036

Bus #	Bus	MW Impact
942362	AE2-249 E	0.6024
942511	AE2-264 C	2.6181
942512	AE2-264 E	1.7454
943711	AF1-039 C O1	0.2708
943712	AF1-039 E O1	0.1805
944731	AF1-138 C O1	0.2901
944732	AF1-138 E O1	0.1934
944751	AF1-140 C	1.0815
944752	AF1-140 E	0.7210
944781	AF1-143 C	2.3692
944782	AF1-143 E	1.5795
945671	AF1-232 C O1	11.1103
945672	AF1-232 E O1	5.9825
945901	AF1-255 C	0.6304
945902	AF1-255 E	0.8705
946081	AF1-273 C O1	6.4098
946082	AF1-273 E O1	4.2732
946241	AF1-289 C O1	2.6563
946242	AF1-289 E O1	1.7709
946431	AF1-307 C	6.2803
946432	AF1-307 E	4.1868
946571	AF1-321 C O1	1.4070
946572	AF1-321 E O1	0.9380
DUCKCREEK	DUCKCREEK	0.5953
NEWTON	NEWTON	0.5534
FARMERCITY	FARMERCITY	0.0284
G-007A	G-007A	1.3210
VFT	VFT	3.6120
PRAIRIE	PRAIRIE	1.3096
COFFEEN	COFFEEN	0.2716
EDWARDS	EDWARDS	0.1813
CHEOAH	CHEOAH	0.2342
TILTON	TILTON	0.3276
MADISON	MADISON	0.0444
GIBSON	GIBSON	0.2834
CALDERWOOD	CALDERWOOD	0.2336
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2910
CATAWBA	CATAWBA	0.1484

11.6.4 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
42308055	200767	26HOMER CT	PENELEC	200795	26SHELOCTA	PENELEC	1	PN_P4-500-002F	breaker	917.0	176.81	179.03	DC	20.03

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	28.9164
200794	26CONEMAGH	0.4629
200805	26COLVER13 (Deactivation : 09/01/20)	14.5103
200809	26SITHE	2.2348
200823	26MHP_X3-003	1.9016
200833	26SEWRDB34	27.2507
200834	26SW_E13_K22	0.0724
200835	26DSGENWIN	0.3532
200837	26HOMER C1	38.4884
200838	26HOMER C2	32.0070
200839	26HOMER C3	33.8836
200846	26FORWARD	0.2587
200864	K-013 E	7.4126
200883	Q-053 E	13.4971
200886	26ARWF_N39	0.6904
200888	26HIGHLAND	0.5687
200889	26STNY CRK	0.4333
200890	26BF_G21_K23	0.1732
200891	26CSLMN_L13	0.2717
200892	26LOOKOUT	0.2581
200894	26K02	7.0234
200898	26AA1-106	2.6973
200905	26Q36	0.3168
200915	26CHSTN_FL	0.2983
200925	26R32	0.6562
201144	W3-099 C OP1	1.4662
201477	26Y2-055	4.1676
202225	26SCI_S29B	0.1127
203034	26NA_O38_P22	0.6041
203909	26Z1-038	1.8767
203910	26Z1-091	2.4569
203999	P-047 E	12.9768
235003	AC1-025 E	0.1729
236828	01GRAYMONT	0.4680
290086	Q-036 E	9.0772
292350	K-023	8.0052
292542	L-013 1	7.7862
293301	N-039 E	19.7843
293393	V3-030E	5.3060
293432	R-040 E	0.4380
293603	O-018 E	16.2963

Bus #	Bus	MW Impact
293902	O-048 E	7.0076
294515	O38_P22	17.3113
294573	P-028 E	11.4097
294903	P-060 E	12.4160
296332	R-032 E	18.8034
903644	W3-099 E OP1	9.8124
913142	Y1-033 E OP1	5.4199
915951	Y3-092 FTIR	107.9900
916202	Z1-069 E	10.3402
917672	Z2-108 E	4.3798
918682	AA1-082 E	6.9637
919201	AA1-144 OP	19.7891
919491	AA2-000	59.5323
920341	AA2-132	2.7294
922932	AB1-082 OP	3.7512
923443	AB1-160 E	2.9544
930511	AB1-092	2.1859
935191	AD1-154	2.5503
936421	AD2-055	4.5003
936991	AD2-133 C	4.0847
936992	AD2-133 E	18.6831
938351	AE1-053	2.4332
938881	AE1-116	1.2972
938951	AE1-123	2.2336
938991	AE1-128 C	21.9514
938992	AE1-128 E	14.6342
939171	AE1-147 C	1.4073
939172	AE1-147 E	0.9382
939291	AE1-160 C	1.5320
939292	AE1-160 E	0.8806
939381	AE1-169 C O1	6.2038
939382	AE1-169 E O1	4.1359
940201	AE2-001 C	1.4055
940202	AE2-001 E	0.9370
940681	AE2-055 C	1.3775
940682	AE2-055 E	0.9183
940861	AE2-074 C	2.8483
940862	AE2-074 E	3.7494
941191	AE2-113 C	10.9112
941192	AE2-113 E	11.7479
941231	AE2-117 C	1.9816
941232	AE2-117 E	1.3210
941241	AE2-118 C	1.9816
941242	AE2-118 E	1.3210
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.7524
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.1682
941261	AE2-120 C	1.4044
941262	AE2-120 E	0.9363
941271	AE2-121 C	0.7499
941272	AE2-121 E	0.5007
941321	AE2-126 C	1.7879
941322	AE2-126 E	1.1919

Bus #	Bus	MW Impact
941331	AE2-129 C	2.0624
941332	AE2-129 E	1.3750
941351	AE2-131 C	2.0624
941352	AE2-131 E	1.3750
941421	AE2-139 C	7.4089
941422	AE2-139 E	4.9393
942121	AE2-224 C	21.1962
942122	AE2-224 E	14.1308
942351	AE2-248 C	1.1113
942352	AE2-248 E	0.7409
942361	AE2-249 C	2.4695
942362	AE2-249 E	1.6464
942491	AE2-262 C	6.2505
942492	AE2-262 E	4.2003
942501	AE2-263 C	5.8754
942502	AE2-263 E	3.9228
942511	AE2-264 C	11.2229
942512	AE2-264 E	7.4819
942811	AE2-299 C	3.6451
942812	AE2-299 E	14.5803
942961	AE2-316 C	5.6956
942962	AE2-316 E	8.1220
943151	AE2-344 C	7.6841
943152	AE2-344 E	5.1228
943351	AF1-006 C	0.7075
943352	AF1-006 E	0.3980
943711	AF1-039 C O1	0.7599
943712	AF1-039 E O1	0.5066
943751	AF1-043	7.1554
943871	AF1-055 C O1	2.9015
943872	AF1-055 E O1	1.9343
944001	AF1-068 C O1	0.7834
944002	AF1-068 E O1	0.4406
944181	AF1-086 C O1	1.5310
944182	AF1-086 E O1	6.6609
944261	AF1-094 C	0.7197
944262	AF1-094 E	0.4798
944281	AF1-096 C	0.7672
944282	AF1-096 E	0.5115
944301	AF1-098 C	2.9545
944302	AF1-098 E	1.9697
944311	AF1-099 C	5.0288
944312	AF1-099 E	3.3525
944321	AF1-100 C O1	10.5721
944322	AF1-100 E O1	7.0481
944381	AF1-103 O1	1.5226
944391	AF1-104 O1	1.0293
944411	AF1-106 O1	1.5776
944471	AF1-112 C	0.7379
944472	AF1-112 E	0.4919
944671	AF1-132 C O1	0.7333
944672	AF1-132 E O1	0.4889

Bus #	Bus	MW Impact
944691	AF1-134 C O1	0.7576
944692	AF1-134 E O1	0.7576
944701	AF1-135 C	0.9091
944702	AF1-135 E	0.6061
944731	AF1-138 C O1	1.0502
944732	AF1-138 E O1	0.7001
944741	AF1-139 C O1	0.8723
944742	AF1-139 E O1	0.5815
944751	AF1-140 C	2.9287
944752	AF1-140 E	1.9525
944771	AF1-142 C	8.0460
944772	AF1-142 E	5.3640
944781	AF1-143 C	14.5992
944782	AF1-143 E	9.7328
944841	AF1-149 C	1.4043
944842	AF1-149 E	0.9362
944881	AF1-153 C O1	0.8674
944882	AF1-153 E O1	0.5783
944901	AF1-155 C	0.8670
944902	AF1-155 E	0.5780
945021	AF1-167 C	0.5944
945022	AF1-167 E	0.3963
945051	AF1-170 C	2.5442
945052	AF1-170 E	1.6961
945071	AF1-172 C	10.3025
945072	AF1-172 E	6.8683
945121	AF1-177	0.3806
945161	AF1-181	0.0564
945171	AF1-182	0.2819
945181	AF1-183	0.0738
945331	AF1-198	0.2114
945451	AF1-210 C	0.5540
945452	AF1-210 E	0.3694
945481	AF1-213 C	6.9713
945482	AF1-213 E	4.6475
945491	AF1-214 C	0.7444
945492	AF1-214 E	0.4963
945551	AF1-220 C	7.2853
945552	AF1-220 E	4.8595
945671	AF1-232 C O1	30.5604
945672	AF1-232 E O1	16.4556
945751	AF1-240 C O1	0.8110
945752	AF1-240 E O1	0.5407
945771	AF1-242 C	0.8670
945772	AF1-242 E	0.5780
945901	AF1-255 C	1.7168
945902	AF1-255 E	2.3708
946081	AF1-273 C O1	17.6310
946082	AF1-273 E O1	11.7540
946091	AF1-274 C	4.0432
946092	AF1-274 E	2.6955
946131	AF1-278	42.0132

Bus #	Bus	MW Impact
946191	AF1-284 C O1	0.7890
946192	AF1-284 E O1	0.4734
946211	AF1-286 C O1	0.6389
946212	AF1-286 E O1	0.4338
946221	AF1-287 C	0.7027
946222	AF1-287 E	0.4684
946241	AF1-289 C O1	7.2007
946242	AF1-289 E O1	4.8005
946381	AF1-302 C	1.3182
946382	AF1-302 E	1.7576
946401	AF1-304 C	3.8864
946402	AF1-304 E	2.5909
946421	AF1-306 C	4.2972
946422	AF1-306 E	17.1887
946431	AF1-307 C	12.0207
946432	AF1-307 E	8.0138
946571	AF1-321 C O1	3.8779
946572	AF1-321 E O1	2.5853
946771	AF1-217 C O1	0.7027
946772	AF1-217 E O1	0.4684
DUCKCREEK	DUCKCREEK	0.7128
NEWTON	NEWTON	0.7049
FARMERCITY	FARMERCITY	0.0370
PRAIRIE	PRAIRIE	1.7487
O-066	O-066	1.6733
COFFEEN	COFFEEN	0.3430
EDWARDS	EDWARDS	0.2142
CHEOAH	CHEOAH	0.4109
TILTON	TILTON	0.3956
G-007	G-007	0.3588
MADISON	MADISON	0.0202
GIBSON	GIBSON	0.3593
CALDERWOOD	CALDERWOOD	0.4065
BLUEG	BLUEG	1.1735
TRIMBLE	TRIMBLE	0.3756
CATAWBA	CATAWBA	0.3206

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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
42308065	200795	26SHELOCTA	PENELEC	200810	26KEYSTONE	PENELEC	1	PN_P4-500-002A	breaker	917.0	162.15	164.76	DC	23.56

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	32.5076
200636	26IUP CO-G	0.6752
200794	26CONEMAGH	0.5468
200805	26COLVER13 (Deactivation : 09/01/20)	34.8876
200809	26SITHE	2.1598
200833	26SEWRDB34	28.3096
200834	26SW_E13_K22	0.0787
200835	26DSGENWIN	0.3844
200837	26HOMER C1	37.1972
200838	26HOMER C2	31.2734
200839	26HOMER C3	33.1070
200846	26FORWARD	0.2807
200864	K-013 E	8.0446
200883	Q-053 E	15.1296
200886	26ARWF_N39	0.7144
200888	26HIGHLAND	0.6259
200889	26STNY CRK	0.4725
200890	26BF_G21_K23	0.1885
200891	26CSLMN_L13	0.2957
200892	26LOOKOUT	0.2809
200894	26K02	7.3804
200898	26AA1-106	2.7668
200915	26CHSTN_FL	0.3344
200925	26R32	0.7222
200945	26CT_V3-030	0.2375
201144	W3-099 C OP1	1.5476
201477	26Y2-055	4.3870
202158	26CON.GEN1	0.1133
202160	26CON.GEN2	0.0848
202225	26SCI_S29B	0.1224
203034	26NA_O38_P22	0.6251
203910	26Z1-091	2.4645
203999	P-047 E	13.0226
235003	AC1-025 E	0.1912
236828	01GRAYMONT	0.5180
290086	Q-036 E	8.8754
292350	K-023	8.7126
292542	L-013 1	8.4742
293301	N-039 E	20.4723
293393	V3-030E	8.9704
293432	R-040 E	0.4052

Bus #	Bus	MW Impact
293603	O-018 E	17.9374
293902	O-048 E	7.6268
294515	O38_P22	17.9133
294903	P-060 E	13.5395
296332	R-032 E	20.6970
903644	W3-099 E OP1	10.3567
913142	Y1-033 E OP1	5.9219
916202	Z1-069 E	10.4453
917672	Z2-108 E	4.0517
918682	AA1-082 E	7.0566
919201	AA1-144 OP	20.0981
919491	AA2-000	64.8177
920341	AA2-132	2.7367
922932	AB1-082 OP	3.8155
923443	AB1-160 E	2.9844
930511	AB1-092	2.3799
935191	AD1-154	4.1854
936421	AD2-055	4.8998
936991	AD2-133 C	3.9939
936992	AD2-133 E	18.2677
938351	AE1-053	2.2510
938881	AE1-116	1.4089
938951	AE1-123	2.9191
938991	AE1-128 C	24.0523
938992	AE1-128 E	16.0349
939171	AE1-147 C	1.5578
939172	AE1-147 E	1.0386
939291	AE1-160 C	1.8016
939292	AE1-160 E	1.0356
939381	AE1-169 C O1	7.3470
939382	AE1-169 E O1	4.8980
940201	AE2-001 C	1.5556
940202	AE2-001 E	1.0371
940681	AE2-055 C	1.5221
940682	AE2-055 E	1.0148
940861	AE2-074 C	2.8971
940862	AE2-074 E	3.8136
941191	AE2-113 C	11.4763
941192	AE2-113 E	12.3563
941231	AE2-117 C	2.0808
941232	AE2-117 E	1.3872
941241	AE2-118 C	2.0808
941242	AE2-118 E	1.3872
941251	AE2-119 C (Withdrawn : 12/16/2019)	2.1153
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.4102
941261	AE2-120 C	1.5544
941262	AE2-120 E	1.0363
941271	AE2-121 C	0.8303
941272	AE2-121 E	0.5544
941321	AE2-126 C	2.0539
941322	AE2-126 E	1.3692
941331	AE2-129 C	2.4166

Bus #	Bus	MW Impact
941332	AE2-129 E	1.6111
941351	AE2-131 C	2.4166
941352	AE2-131 E	1.6111
941421	AE2-139 C	7.6068
941422	AE2-139 E	5.0712
942121	AE2-224 C	21.8082
942122	AE2-224 E	14.5388
942351	AE2-248 C	1.2289
942352	AE2-248 E	0.8193
942361	AE2-249 C	2.7059
942362	AE2-249 E	1.8039
942491	AE2-262 C	6.9530
942492	AE2-262 E	4.6724
942501	AE2-263 C	6.5358
942502	AE2-263 E	4.3637
942511	AE2-264 C	9.9878
942512	AE2-264 E	6.6586
942811	AE2-299 C	3.8423
942812	AE2-299 E	15.3691
942961	AE2-316 C	6.2990
942962	AE2-316 E	8.9823
943151	AE2-344 C	8.2183
943152	AE2-344 E	5.4789
943351	AF1-006 C	0.7537
943352	AF1-006 E	0.4239
943711	AF1-039 C O1	0.8303
943712	AF1-039 E O1	0.5535
943751	AF1-043	7.7907
943871	AF1-055 C O1	3.1386
943872	AF1-055 E O1	2.0924
944001	AF1-068 C O1	0.8661
944002	AF1-068 E O1	0.4872
944181	AF1-086 C O1	5.9075
944182	AF1-086 E O1	25.7008
944261	AF1-094 C	0.7983
944262	AF1-094 E	0.5322
944281	AF1-096 C	0.9022
944282	AF1-096 E	0.6015
944301	AF1-098 C	3.1348
944302	AF1-098 E	2.0899
944311	AF1-099 C	5.5940
944312	AF1-099 E	3.7293
944321	AF1-100 C O1	11.9824
944322	AF1-100 E O1	7.9883
944381	AF1-103 O1	1.6028
944391	AF1-104 O1	1.0955
944411	AF1-106 O1	1.5856
944471	AF1-112 C	0.8161
944472	AF1-112 E	0.5441
944671	AF1-132 C O1	0.8107
944672	AF1-132 E O1	0.5405
944691	AF1-134 C O1	1.1405

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.1405
944701	AF1-135 C	1.3686
944702	AF1-135 E	0.9124
944731	AF1-138 C O1	1.1028
944732	AF1-138 E O1	0.7352
944741	AF1-139 C O1	0.8746
944742	AF1-139 E O1	0.5831
944751	AF1-140 C	3.2443
944752	AF1-140 E	2.1629
944771	AF1-142 C	8.9503
944772	AF1-142 E	5.9669
944781	AF1-143 C	15.8892
944782	AF1-143 E	10.5928
944841	AF1-149 C	1.5543
944842	AF1-149 E	1.0362
944881	AF1-153 C O1	0.9693
944882	AF1-153 E O1	0.6462
944901	AF1-155 C	0.9691
944902	AF1-155 E	0.6461
945021	AF1-167 C	0.7104
945022	AF1-167 E	0.4736
945051	AF1-170 C	2.7153
945052	AF1-170 E	1.8102
945071	AF1-172 C	11.3364
945072	AF1-172 E	7.5576
945121	AF1-177	0.4007
945161	AF1-181	0.0639
945171	AF1-182	0.3195
945181	AF1-183	0.0864
945331	AF1-198	0.2136
945451	AF1-210 C	0.6626
945452	AF1-210 E	0.4418
945481	AF1-213 C	9.4791
945482	AF1-213 E	6.3194
945491	AF1-214 C	0.8239
945492	AF1-214 E	0.5492
945551	AF1-220 C	8.0851
945552	AF1-220 E	5.3930
945671	AF1-232 C O1	33.2946
945672	AF1-232 E O1	17.9278
945751	AF1-240 C O1	1.3310
945752	AF1-240 E O1	0.8873
945771	AF1-242 C	0.9691
945772	AF1-242 E	0.6461
945901	AF1-255 C	1.8890
945902	AF1-255 E	2.6086
946071	AF1-272 C O1	29.2485
946072	AF1-272 E O1	19.4990
946081	AF1-273 C O1	19.2084
946082	AF1-273 E O1	12.8056
946091	AF1-274 C	4.5988
946092	AF1-274 E	3.0659

Bus #	Bus	MW Impact
946131	AF1-278	19.3364
946191	AF1-284 C O1	0.8671
946192	AF1-284 E O1	0.5203
946211	AF1-286 C O1	0.6422
946212	AF1-286 E O1	0.4360
946221	AF1-287 C	0.7518
946222	AF1-287 E	0.5012
946241	AF1-289 C O1	7.9675
946242	AF1-289 E O1	5.3117
946381	AF1-302 C	1.4578
946382	AF1-302 E	1.9438
946401	AF1-304 C	4.6208
946402	AF1-304 E	3.0805
946421	AF1-306 C	4.7503
946422	AF1-306 E	19.0010
946431	AF1-307 C	14.1382
946432	AF1-307 E	9.4254
946571	AF1-321 C O1	4.1989
946572	AF1-321 E O1	2.7993
946771	AF1-217 C O1	0.7518
946772	AF1-217 E O1	0.5012
DUCKCREEK	DUCKCREEK	0.5412
NEWTON	NEWTON	0.5491
FARMERCITY	FARMERCITY	0.0290
PRAIRIE	PRAIRIE	1.3845
O-066	O-066	3.3130
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1617
CHEOAH	CHEOAH	0.3544
TILTON	TILTON	0.3018
G-007	G-007	0.6157
MADISON	MADISON	0.0081
GIBSON	GIBSON	0.2796
CALDERWOOD	CALDERWOOD	0.3499
BLUEG	BLUEG	0.9218
TRIMBLE	TRIMBLE	0.2949
CATAWBA	CATAWBA	0.2902

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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
42308171	200810	26KEYSTONE	PENELEC	999401	STAR592	PJM	4	PJM500_PN_P4-500-001D	breaker	635.0	134.81	136.71	DC	11.9

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	16.7325
200636	26IUP CO-G	0.4069
200794	26CONEMAGH	0.2755
200805	26COLVER13 (Deactivation : 09/01/20)	19.5371
200809	26SITHE	1.2781
200833	26SEWRDB34	13.2926
200834	26SW_E13_K22	0.0419
200835	26DSGENWIN	0.2043
200837	26HOMER C1	22.0118
200838	26HOMER C2	18.4521
200839	26HOMER C3	19.5339
200846	26FORWARD	0.1497
200864	K-013 E	4.2904
200883	Q-053 E	7.8926
200886	26ARWF_N39	0.3654
200888	26HIGHLAND	0.3256
200889	26STNY CRK	0.2507
200890	26BF_G21_K23	0.1002
200891	26CSLMN_L13	0.1571
200892	26LOOKOUT	0.1493
200894	26K02	4.2783
200898	26AA1-106	1.6183
200906	26KEYSTN#3	0.6753
200915	26CHSTN_FL	0.1744
200925	26R32	0.3757
200945	26CT_V3-030	0.1279
201144	W3-099 C OP1	0.8862
201477	26Y2-055	2.5227
202158	26CON.GEN1	0.0706
202160	26CON.GEN2	0.0494
202225	26SCI_S29B	0.0652
203034	26NA_O38_P22	0.3198
203910	26Z1-091	1.4594
203999	P-047 E	7.6636
235003	AC1-025 E	0.1066
236828	01GRAYMONT	0.2892
290086	Q-036 E	4.7474
292350	K-023	4.6300
292542	L-013 1	4.5034
293301	N-039 E	10.4723
293393	V3-030E	4.8293
293432	R-040 E	0.2153

Bus #	Bus	MW Impact
293603	O-018 E	9.3319
293902	O-048 E	4.0530
294515	O38_P22	9.1633
294903	P-060 E	7.1841
296332	R-032 E	10.7676
903644	W3-099 E OP1	5.9308
913142	Y1-033 E OP1	3.1317
916202	Z1-069 E	6.1155
917672	Z2-108 E	2.1532
918682	AA1-082 E	4.1617
919201	AA1-144 OP	11.8405
919491	AA2-000	36.9701
920341	AA2-132	1.6166
922932	AB1-082 OP	2.2258
923443	AB1-160 E	1.7473
930511	AB1-092	1.3574
935191	AD1-154	2.3565
936421	AD2-055	2.7947
936991	AD2-133 C	2.1363
936992	AD2-133 E	9.7714
938351	AE1-053	1.1962
938881	AE1-116	0.7506
938951	AE1-123	1.6552
938991	AE1-128 C	12.7001
938992	AE1-128 E	8.4667
939171	AE1-147 C	0.8700
939172	AE1-147 E	0.5800
939291	AE1-160 C	1.0268
939292	AE1-160 E	0.5902
939381	AE1-169 C O1	4.1867
939382	AE1-169 E O1	2.7912
940201	AE2-001 C	0.8686
940202	AE2-001 E	0.5791
940681	AE2-055 C	0.8483
940682	AE2-055 E	0.5656
940861	AE2-074 C	1.6901
940862	AE2-074 E	2.2247
941191	AE2-113 C	6.6183
941192	AE2-113 E	7.1257
941231	AE2-117 C	1.0872
941232	AE2-117 E	0.7248
941241	AE2-118 C	1.0872
941242	AE2-118 E	0.7248
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.1764
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7842
941261	AE2-120 C	0.8679
941262	AE2-120 E	0.5786
941271	AE2-121 C	0.4638
941272	AE2-121 E	0.3097
941321	AE2-126 C	1.1560
941322	AE2-126 E	0.7706
941331	AE2-129 C	1.3127

Bus #	Bus	MW Impact
941332	AE2-129 E	0.8752
941351	AE2-131 C	1.3127
941352	AE2-131 E	0.8752
941421	AE2-139 C	4.4582
941422	AE2-139 E	2.9721
942121	AE2-224 C	11.0976
942122	AE2-224 E	7.3984
942351	AE2-248 C	0.6854
942352	AE2-248 E	0.4570
942361	AE2-249 C	1.4288
942362	AE2-249 E	0.9525
942491	AE2-262 C	3.9062
942492	AE2-262 E	2.6249
942501	AE2-263 C	3.6718
942502	AE2-263 E	2.4515
942511	AE2-264 C	5.1734
942512	AE2-264 E	3.4490
942811	AE2-299 C	2.2018
942812	AE2-299 E	8.8074
942961	AE2-316 C	3.5892
942962	AE2-316 E	5.1182
943151	AE2-344 C	4.6968
943152	AE2-344 E	3.1312
943351	AF1-006 C	0.4299
943352	AF1-006 E	0.2418
943711	AF1-039 C O1	0.4391
943712	AF1-039 E O1	0.2927
943751	AF1-043	4.4436
943871	AF1-055 C O1	1.8031
943872	AF1-055 E O1	1.2020
944001	AF1-068 C O1	0.4829
944002	AF1-068 E O1	0.2717
944181	AF1-086 C O1	3.2911
944182	AF1-086 E O1	14.3182
944261	AF1-094 C	0.4556
944262	AF1-094 E	0.3037
944281	AF1-096 C	0.5142
944282	AF1-096 E	0.3428
944301	AF1-098 C	1.7941
944302	AF1-098 E	1.1961
944311	AF1-099 C	3.1427
944312	AF1-099 E	2.0951
944321	AF1-100 C O1	6.7325
944322	AF1-100 E O1	4.4883
944381	AF1-103 O1	0.9216
944391	AF1-104 O1	0.6234
944411	AF1-106 O1	0.9338
944471	AF1-112 C	0.4553
944472	AF1-112 E	0.3035
944671	AF1-132 C O1	0.4520
944672	AF1-132 E O1	0.3013
944691	AF1-134 C O1	1.4096

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.4096
944701	AF1-135 C	1.6915
944702	AF1-135 E	1.1277
944731	AF1-138 C O1	0.5762
944732	AF1-138 E O1	0.3842
944741	AF1-139 C O1	0.5167
944742	AF1-139 E O1	0.3444
944751	AF1-140 C	1.6938
944752	AF1-140 E	1.1292
944771	AF1-142 C	5.0283
944772	AF1-142 E	3.3522
944781	AF1-143 C	8.4438
944782	AF1-143 E	5.6292
944841	AF1-149 C	0.8678
944842	AF1-149 E	0.5785
944881	AF1-153 C O1	0.5496
944882	AF1-153 E O1	0.3664
944901	AF1-155 C	0.5495
944902	AF1-155 E	0.3663
945021	AF1-167 C	0.4031
945022	AF1-167 E	0.2687
945051	AF1-170 C	1.5485
945052	AF1-170 E	1.0323
945071	AF1-172 C	6.4352
945072	AF1-172 E	4.2901
945121	AF1-177	0.2304
945161	AF1-181	0.0359
945171	AF1-182	0.1795
945181	AF1-183	0.0483
945331	AF1-198	0.1254
945451	AF1-210 C	0.3750
945452	AF1-210 E	0.2500
945481	AF1-213 C	5.2754
945482	AF1-213 E	3.5170
945491	AF1-214 C	0.4601
945492	AF1-214 E	0.3067
945551	AF1-220 C	4.5899
945552	AF1-220 E	3.0616
945671	AF1-232 C O1	17.6831
945672	AF1-232 E O1	9.5217
945751	AF1-240 C O1	0.7494
945752	AF1-240 E O1	0.4996
945771	AF1-242 C	0.5495
945772	AF1-242 E	0.3663
945901	AF1-255 C	0.9932
945902	AF1-255 E	1.3715
946071	AF1-272 C O1	17.9595
946072	AF1-272 E O1	11.9730
946081	AF1-273 C O1	10.2018
946082	AF1-273 E O1	6.8012
946091	AF1-274 C	2.5949
946092	AF1-274 E	1.7299

Bus #	Bus	MW Impact
946131	AF1-278	11.2469
946191	AF1-284 C O1	0.4553
946192	AF1-284 E O1	0.2732
946211	AF1-286 C O1	0.3782
946212	AF1-286 E O1	0.2568
946221	AF1-287 C	0.4297
946222	AF1-287 E	0.2864
946241	AF1-289 C O1	4.1647
946242	AF1-289 E O1	2.7765
946381	AF1-302 C	0.8307
946382	AF1-302 E	1.1076
946401	AF1-304 C	2.6330
946402	AF1-304 E	1.7553
946421	AF1-306 C	2.6955
946422	AF1-306 E	10.7819
946431	AF1-307 C	7.1429
946432	AF1-307 E	4.7619
946571	AF1-321 C O1	2.2446
946572	AF1-321 E O1	1.4964
946771	AF1-217 C O1	0.4297
946772	AF1-217 E O1	0.2864
DUCKCREEK	DUCKCREEK	0.5619
NEWTON	NEWTON	0.5458
FARMERCITY	FARMERCITY	0.0284
PRAIRIE	PRAIRIE	1.3354
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1698
CHEOAH	CHEOAH	0.2933
TILTON	TILTON	0.3112
G-007	G-007	0.0426
MADISON	MADISON	0.0262
GIBSON	GIBSON	0.2790
CALDERWOOD	CALDERWOOD	0.2907
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2905
CATAWBA	CATAWBA	0.2188

11.6.7 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
41712602	999401	STAR592	PJM	200011	KEYSTONE	PJM	4	PJM500_PN_P4-500-001A	breaker	634.0	134.29	136.2	DC	11.9

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deativation : 06/07/19)	16.7325
200636	26IUP CO-G	0.4069
200794	26CONEMAGH	0.2755
200805	26COLVER13 (Deativation : 09/01/20)	19.5371
200809	26SITHE	1.2781
200833	26SEWRDB34	13.2926
200834	26SW_E13_K22	0.0419
200835	26DSGENWIN	0.2043
200837	26HOMER C1	22.0118
200838	26HOMER C2	18.4521
200839	26HOMER C3	19.5339
200846	26FORWARD	0.1497
200864	K-013 E	4.2904
200883	Q-053 E	7.8926
200886	26ARWF_N39	0.3654
200888	26HIGHLAND	0.3256
200889	26STNY CRK	0.2507
200890	26BF_G21_K23	0.1002
200891	26CSLMN_L13	0.1571
200892	26LOOKOUT	0.1493
200894	26K02	4.2783
200898	26AA1-106	1.6183
200906	26KEYSTN#3	0.6753
200915	26CHSTN_FL	0.1744
200925	26R32	0.3757
200945	26CT_V3-030	0.1279
201144	W3-099 C OP1	0.8862
201477	26Y2-055	2.5227
202158	26CON.GEN1	0.0706
202160	26CON.GEN2	0.0494
202225	26SCI_S29B	0.0652
203034	26NA_O38_P22	0.3198
203910	26Z1-091	1.4594
203999	P-047 E	7.6636
235003	AC1-025 E	0.1066
236828	01GRAYMONT	0.2892
290086	Q-036 E	4.7474
292350	K-023	4.6300
292542	L-013 1	4.5034
293301	N-039 E	10.4723
293393	V3-030E	4.8293
293432	R-040 E	0.2153

Bus #	Bus	MW Impact
293603	O-018 E	9.3319
293902	O-048 E	4.0530
294515	O38_P22	9.1633
294903	P-060 E	7.1841
296332	R-032 E	10.7676
903644	W3-099 E OP1	5.9308
913142	Y1-033 E OP1	3.1317
916202	Z1-069 E	6.1155
917672	Z2-108 E	2.1532
918682	AA1-082 E	4.1617
919201	AA1-144 OP	11.8405
919491	AA2-000	36.9701
920341	AA2-132	1.6166
922932	AB1-082 OP	2.2258
923443	AB1-160 E	1.7473
930511	AB1-092	1.3574
935191	AD1-154	2.3565
936421	AD2-055	2.7947
936991	AD2-133 C	2.1363
936992	AD2-133 E	9.7714
938351	AE1-053	1.1962
938881	AE1-116	0.7506
938951	AE1-123	1.6552
938991	AE1-128 C	12.7001
938992	AE1-128 E	8.4667
939171	AE1-147 C	0.8700
939172	AE1-147 E	0.5800
939291	AE1-160 C	1.0268
939292	AE1-160 E	0.5902
939381	AE1-169 C O1	4.1867
939382	AE1-169 E O1	2.7912
940201	AE2-001 C	0.8686
940202	AE2-001 E	0.5791
940681	AE2-055 C	0.8483
940682	AE2-055 E	0.5656
940861	AE2-074 C	1.6901
940862	AE2-074 E	2.2247
941191	AE2-113 C	6.6183
941192	AE2-113 E	7.1257
941231	AE2-117 C	1.0872
941232	AE2-117 E	0.7248
941241	AE2-118 C	1.0872
941242	AE2-118 E	0.7248
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.1764
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7842
941261	AE2-120 C	0.8679
941262	AE2-120 E	0.5786
941271	AE2-121 C	0.4638
941272	AE2-121 E	0.3097
941321	AE2-126 C	1.1560
941322	AE2-126 E	0.7706
941331	AE2-129 C	1.3127

Bus #	Bus	MW Impact
941332	AE2-129 E	0.8752
941351	AE2-131 C	1.3127
941352	AE2-131 E	0.8752
941421	AE2-139 C	4.4582
941422	AE2-139 E	2.9721
942121	AE2-224 C	11.0976
942122	AE2-224 E	7.3984
942351	AE2-248 C	0.6854
942352	AE2-248 E	0.4570
942361	AE2-249 C	1.4288
942362	AE2-249 E	0.9525
942491	AE2-262 C	3.9062
942492	AE2-262 E	2.6249
942501	AE2-263 C	3.6718
942502	AE2-263 E	2.4515
942511	AE2-264 C	5.1734
942512	AE2-264 E	3.4490
942811	AE2-299 C	2.2018
942812	AE2-299 E	8.8074
942961	AE2-316 C	3.5892
942962	AE2-316 E	5.1182
943151	AE2-344 C	4.6968
943152	AE2-344 E	3.1312
943351	AF1-006 C	0.4299
943352	AF1-006 E	0.2418
943711	AF1-039 C O1	0.4391
943712	AF1-039 E O1	0.2927
943751	AF1-043	4.4436
943871	AF1-055 C O1	1.8031
943872	AF1-055 E O1	1.2020
944001	AF1-068 C O1	0.4829
944002	AF1-068 E O1	0.2717
944181	AF1-086 C O1	3.2911
944182	AF1-086 E O1	14.3182
944261	AF1-094 C	0.4556
944262	AF1-094 E	0.3037
944281	AF1-096 C	0.5142
944282	AF1-096 E	0.3428
944301	AF1-098 C	1.7941
944302	AF1-098 E	1.1961
944311	AF1-099 C	3.1427
944312	AF1-099 E	2.0951
944321	AF1-100 C O1	6.7325
944322	AF1-100 E O1	4.4883
944381	AF1-103 O1	0.9216
944391	AF1-104 O1	0.6234
944411	AF1-106 O1	0.9338
944471	AF1-112 C	0.4553
944472	AF1-112 E	0.3035
944671	AF1-132 C O1	0.4520
944672	AF1-132 E O1	0.3013
944691	AF1-134 C O1	1.4096

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.4096
944701	AF1-135 C	1.6915
944702	AF1-135 E	1.1277
944731	AF1-138 C O1	0.5762
944732	AF1-138 E O1	0.3842
944741	AF1-139 C O1	0.5167
944742	AF1-139 E O1	0.3444
944751	AF1-140 C	1.6938
944752	AF1-140 E	1.1292
944771	AF1-142 C	5.0283
944772	AF1-142 E	3.3522
944781	AF1-143 C	8.4438
944782	AF1-143 E	5.6292
944841	AF1-149 C	0.8678
944842	AF1-149 E	0.5785
944881	AF1-153 C O1	0.5496
944882	AF1-153 E O1	0.3664
944901	AF1-155 C	0.5495
944902	AF1-155 E	0.3663
945021	AF1-167 C	0.4031
945022	AF1-167 E	0.2687
945051	AF1-170 C	1.5485
945052	AF1-170 E	1.0323
945071	AF1-172 C	6.4352
945072	AF1-172 E	4.2901
945121	AF1-177	0.2304
945161	AF1-181	0.0359
945171	AF1-182	0.1795
945181	AF1-183	0.0483
945331	AF1-198	0.1254
945451	AF1-210 C	0.3750
945452	AF1-210 E	0.2500
945481	AF1-213 C	5.2754
945482	AF1-213 E	3.5170
945491	AF1-214 C	0.4600
945492	AF1-214 E	0.3067
945551	AF1-220 C	4.5899
945552	AF1-220 E	3.0616
945671	AF1-232 C O1	17.6831
945672	AF1-232 E O1	9.5217
945751	AF1-240 C O1	0.7494
945752	AF1-240 E O1	0.4996
945771	AF1-242 C	0.5495
945772	AF1-242 E	0.3663
945901	AF1-255 C	0.9932
945902	AF1-255 E	1.3715
946071	AF1-272 C O1	17.9595
946072	AF1-272 E O1	11.9730
946081	AF1-273 C O1	10.2018
946082	AF1-273 E O1	6.8012
946091	AF1-274 C	2.5949
946092	AF1-274 E	1.7299

Bus #	Bus	MW Impact
946131	AF1-278	11.2469
946191	AF1-284 C O1	0.4553
946192	AF1-284 E O1	0.2732
946211	AF1-286 C O1	0.3782
946212	AF1-286 E O1	0.2568
946221	AF1-287 C	0.4297
946222	AF1-287 E	0.2864
946241	AF1-289 C O1	4.1647
946242	AF1-289 E O1	2.7765
946381	AF1-302 C	0.8307
946382	AF1-302 E	1.1076
946401	AF1-304 C	2.6330
946402	AF1-304 E	1.7553
946421	AF1-306 C	2.6955
946422	AF1-306 E	10.7819
946431	AF1-307 C	7.1429
946432	AF1-307 E	4.7619
946571	AF1-321 C O1	2.2446
946572	AF1-321 E O1	1.4964
946771	AF1-217 C O1	0.4297
946772	AF1-217 E O1	0.2864
DUCKCREEK	DUCKCREEK	0.5619
NEWTON	NEWTON	0.5458
FARMERCITY	FARMERCITY	0.0284
PRAIRIE	PRAIRIE	1.3354
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1698
CHEOAH	CHEOAH	0.2933
TILTON	TILTON	0.3112
G-007	G-007	0.0426
MADISON	MADISON	0.0262
GIBSON	GIBSON	0.2790
CALDERWOOD	CALDERWOOD	0.2907
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2905
CATAWBA	CATAWBA	0.2188

Short Circuit

11.7 Short Circuit

The following Breakers are overdutied:

None

12 Network Impacts – Secondary Point of Interconnection

The Queue Project AF1-307 was evaluated as a 66.5 MW (Capacity 39.9 MW) injection tapping the Johnstown to Homer City 230 kV line in the PENELEC area. Project AF1-307 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-307 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

12.1 Generation Deliverability

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

None

12.2 Multiple Facility Contingency

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

None

12.3 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	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADING %	POST PROJE CT LOADING %	AC DC	MW IMPACT
417129 28	2007 40	26BLRSVLE	115 .0	PENEL EC	2007 63	26BLAIRSVL	138 .0	PENEL EC	1	PN_P4-500-001J	breaker	364.0	108.8	109.41	DC	4.92
417129 12	2007 41	26SEWARD	115 .0	PENEL EC	2007 66	26FLORENCE	115 .0	PENEL EC	1	PN-P2-3-PN-230-9H-A	breaker	282.0	109.14	110.11	DC	6.1
417129 22	2007 66	26FLORENCE	115 .0	PENEL EC	2007 40	26BLRSVLE	115 .0	PENEL EC	1	PN-P2-3-PN-230-9H-A	breaker	282.0	108.93	109.9	DC	6.1
423080 54	2007 67	26HOMERCT	230 .0	PENEL EC	2007 95	26SHELOCTA	230 .0	PENEL EC	1	PN_P4-500-002A	breaker	917.0	176.72	179.56	DC	25.65
423080 55	2007 67	26HOMERCT	230 .0	PENEL EC	2007 95	26SHELOCTA	230 .0	PENEL EC	1	PN_P4-500-002F	breaker	917.0	176.73	179.57	DC	25.65
426271 20	2007 67	26HOMERCT	230 .0	PENEL EC	2007 95	26SHELOCTA	230 .0	PENEL EC	1	Base Case	single	731.0	128.6	130.15	DC	11.12
426271 21	2007 67	26HOMERCT	230 .0	PENEL EC	2007 95	26SHELOCTA	230 .0	PENEL EC	1	PN-P1-3-PN-230-001T	single	917.0	122.62	124.33	DC	15.4
426271 22	2007 67	26HOMERCT	230 .0	PENEL EC	2007 95	26SHELOCTA	230 .0	PENEL EC	1	PN-P1-2-PN-230-025	single	917.0	122.62	124.33	DC	15.4
423080 64	2007 95	26SHELOCTA	230 .0	PENEL EC	2008 10	26KEYSTONE	230 .0	PENEL EC	1	PN_P4-500-002F	breaker	917.0	156.74	159.61	DC	25.97
423080 65	2007 95	26SHELOCTA	230 .0	PENEL EC	2008 10	26KEYSTONE	230 .0	PENEL EC	1	PN_P4-500-002A	breaker	917.0	156.74	159.61	DC	25.97
426271 35	2007 95	26SHELOCTA	230 .0	PENEL EC	2008 10	26KEYSTONE	230 .0	PENEL EC	1	AP-P1-2-WP-345-311T	single	917.0	108.53	109.91	DC	12.57
426271 36	2007 95	26SHELOCTA	230 .0	PENEL EC	2008 10	26KEYSTONE	230 .0	PENEL EC	1	Base Case	single	731.0	104.33	105.86	DC	11.08
426271 39	2007 95	26SHELOCTA	230 .0	PENEL EC	2008 10	26KEYSTONE	230 .0	PENEL EC	1	PJM_P1_P1_20A_CON EMAGH-KEystone	single	917.0	108.93	110.21	DC	11.64
423081 70	2008 10	26KEYSTONE	230 .0	PENEL EC	9994 01	STAR592	1.0	PJM	4	PJM500_PN_P4-500-001A	breaker	635.0	130.02	132.21	DC	13.69
423081 71	2008 10	26KEYSTONE	230 .0	PENEL EC	9994 01	STAR592	1.0	PJM	4	PJM500_PN_P4-500-001D	breaker	635.0	130.02	132.21	DC	13.69
417128 90	2009 12	26CONEMAGH	230 .0	PENEL EC	2000 05	CONEM-GH	500 .0	PJM	3	PN-P2_3-PN-230-0252-C	breaker	1066.0	102.72	105.0	DC	23.96
417128 91	2009 12	26CONEMAGH	230 .0	PENEL EC	2000 05	CONEM-GH	500 .0	PJM	3	PN-P2_3-PN-230-0252-B	breaker	1066.0	102.67	104.96	DC	23.96
417128 92	2009 12	26CONEMAGH	230 .0	PENEL EC	2000 05	CONEM-GH	500 .0	PJM	3	PN-P2_3-PN-230-0252-A	breaker	1066.0	102.65	104.94	DC	23.96
417126 01	9994 01	STAR592	1.0	PJM	2000 11	KEYSTONE	500 .0	PJM	4	PJM500_PN_P4-500-001D	breaker	634.0	129.5	131.7	DC	13.69
417126 02	9994 01	STAR592	1.0	PJM	2000 11	KEYSTONE	500 .0	PJM	4	PJM500_PN_P4-500-001A	breaker	634.0	129.5	131.7	DC	13.69

12.4 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	CONT NAME	Type	Rating MVA	PRE PROJE CT LOAD NG %	POST PROJE CT LOAD NG %	AC DC	MW IMPA CT
41407597	200740	26BLRSVL E	115.0	PENEL EC	200763	26BLAIRS VL	138.0	PENEL EC	1	PJM_P1_APS_B_G692	operati on	364.0	107.9	108.45	DC	4.48
41407598	200740	26BLRSVL E	115.0	PENEL EC	200763	26BLAIRS VL	138.0	PENEL EC	1	Base Case	operati on	291.0	100.08	100.72	DC	4.14
41407636	200741	26SEWARD	115.0	PENEL EC	200766	26FLORENCE	115.0	PENEL EC	1	PN-P1_2-PN-230-0104	operati on	282.0	107.99	108.92	DC	5.8
41407640	200766	26FLORENCE	115.0	PENEL EC	200740	26BLRSVL E	115.0	PENEL EC	1	PN-P1_2-PN-230-0104	operati on	282.0	107.78	108.71	DC	5.8
42627114	200767	26HOMER CT	230.0	PENEL EC	200795	26SHELO CTA	230.0	PENEL EC	1	PN-P1-3-PN-230-001T	operati on	917.0	172.05	174.9	DC	25.67
42627115	200767	26HOMER CT	230.0	PENEL EC	200795	26SHELO CTA	230.0	PENEL EC	1	PN-P1-2-PN-230-025	operati on	917.0	172.05	174.9	DC	25.67
42627116	200767	26HOMER CT	230.0	PENEL EC	200795	26SHELO CTA	230.0	PENEL EC	1	Base Case	operati on	731.0	173.28	175.86	DC	18.53
42627130	200795	26SHELOCT A	230.0	PENEL EC	200810	26KEYSTO NE	230.0	PENEL EC	1	PN-P1-2-PN-230-025	operati on	917.0	151.42	154.3	DC	25.99
42627131	200795	26SHELOCT A	230.0	PENEL EC	200810	26KEYSTO NE	230.0	PENEL EC	1	PN-P1-3-PN-230-001T	operati on	917.0	151.42	154.3	DC	25.99
42627132	200795	26SHELOCT A	230.0	PENEL EC	200810	26KEYSTO NE	230.0	PENEL EC	1	Base Case	operati on	731.0	151.74	154.31	DC	18.46
42627333	200810	26KEYSTO NE	230.0	PENEL EC	999401	STAR592	1.0	PJM	4	Base Case	operati on	494.0	104.46	106.35	DC	9.17
49697938	200810	26KEYSTO NE	230.0	PENEL EC	999401	STAR592	1.0	PJM	4	PN-P1-2-PN-345-107T	operati on	635.0	125.57	127.15	DC	9.88
49697939	200810	26KEYSTO NE	230.0	PENEL EC	999401	STAR592	1.0	PJM	4	ATSI-P1-2-CEI-345-700T	operati on	635.0	125.57	127.15	DC	9.88
41407579	200912	26CONEM AGH	230.0	PENEL EC	200005	CONEM-GH	500.0	PJM	3	PN-P1_2-PN-230-0103	operati on	1066.0	102.5	104.75	DC	23.7
41407323	999401	STAR592	1.0	PJM	200011	KEYSTON E	500.0	PJM	4	Base Case	operati on	493.0	103.74	105.63	DC	9.17
49697956	999401	STAR592	1.0	PJM	200011	KEYSTON E	500.0	PJM	4	ATSI-P1-2-CEI-345-700T	operati on	634.0	125.04	126.62	DC	9.88
49697957	999401	STAR592	1.0	PJM	200011	KEYSTON E	500.0	PJM	4	PN-P1-2-PN-345-107T	operati on	634.0	125.04	126.62	DC	9.88

12.5 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

12.5.1 Contingency Descriptions

Contingency Name	Contingency Definition
PJM500_PN_P4-500-001A	CONTINGENCY 'PJM500_PN_P4-500-001A' /* KEYSTONE 500KV BKR 1 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 CKT 3 /* KEYSTONE 500 26KEYSTONE 230 REMOVE MACHINE H FROM BUS 200033 /* KEYS G2 20 REMOVE MACHINE L FROM BUS 200033 /* KEYS G2 20 DISCONNECT BUS 200033 /* KEYS G2 20 END
PN-P2_3-PN-230-0252-B	CONTINGENCY 'PN-P2_3-PN-230-0252-B' /* SHELOCTA 230 KV STUCK BREAKER (KEYSTONE/HOMER CITY) OPEN BRANCH FROM BUS 200795 TO BUS 200810 CKT 1 /* 26SHELOCTA 230.00 26KEYSTONE 230.00 OPEN BRANCH FROM BUS 200795 TO BUS 200767 CKT 1 /* 26SHELOCTA 230.00 26HOMER CT 230.00 END
PJM500_PN_P4-500-001D	CONTINGENCY 'PJM500_PN_P4-500-001D' /* KEYSTONE 500KV BKR 4 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 CKT 3 /* KEYSTONE 500 26KEYSTONE 230 REMOVE MACHINE H FROM BUS 200032 /* KEYS G1 20 REMOVE MACHINE L FROM BUS 200032 /* KEYS G1 20 DISCONNECT BUS 200032 /* KEYS G1 20 END
PN-P2_3-PN-230-0252-A	CONTINGENCY 'PN-P2_3-PN-230-0252-A' /* SHELOCTA 230 KV STUCK BREAKER (KEYSTONE/XFMR) OPEN BRANCH FROM BUS 200795 TO BUS 200810 CKT 1 /* 26SHELOCTA 230.00 26KEYSTONE 230.00 OPEN BRANCH FROM BUS 200795 TO BUS 200739 CKT 2 /* 26SHELOCTA 230.00 26SHELOCTA 115.00 END
PJM_P1_P1_20A_CONEMAGH-KEYSTONE	CONTINGENCY 'PJM_P1_P1_20A_CONEMAGH-KEYSTONE' DISCONNECT BRANCH FROM BUS 200005 TO BUS 200011 CKT 1 /* CONEMAGH KEYSTONE 500 500 END
AP-P1-2-WP-345-311T	CONTINGENCY 'AP-P1-2-WP-345-311T' /* ARMSTRONG -HOMERCITY 345KV DISCONNECT BRANCH FROM BUS 235129 TO BUS 200769 CKT 1 /* 01ARMSTRONG 345 26HOMER CY 345 END

Contingency Name	Contingency Definition
ATSI-P1-2-CEI-345-700T	CONTINGENCY 'ATSI-P1-2-CEI-345-700T' /* PN/ATSI ERIE WEST - ASHTABULA - PERRY 345KV DISCONNECT BRANCH FROM BUS 239036 TO BUS 238547 CKT 1 /* 02PERRY 345 02AT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345 02S8-ATT 345 DISCONNECT BRANCH FROM BUS 239082 TO BUS 238544 CKT 8 /* 02S8-ATT 345 02ASH_3 138 DISCONNECT BRANCH FROM BUS 238547 TO BUS 200599 CKT 1 /* 02AT 345 26ERIE W 345 END
PJM_P1_APS_B_G692	CONTINGENCY 'PJM_P1_APS_B_G692' / 200011 KEYSTONE 500 235104 01CABOT 500 1 OPEN BRANCH FROM BUS 200011 TO BUS 235104 CKT 1 END
PN-P2-3-PN-230-9H-A	CONTINGENCY 'PN-P2-3-PN-230-9H-A' /* HOMER CITY 230 KV STUCK BREAKER 209 (SHELOCTA/SOUTH BUS) DISCONNECT BRANCH FROM BUS 200767 TO BUS 200769 TO BUS 202641 CKT S/* 26HOMER CT 230 26HOMER CY 345 26HOMERCITYS 23.00 DISCONNECT BRANCH FROM BUS 200767 TO BUS 200795 CKT 1 /* 26HOMER CT 230 26SHELOCTA 230 END
PN-P1_2-PN-230-0103	CONTINGENCY 'PN-P1_2-PN-230-0103' /* SHELOCTA - KEYSTONE 230 KV LINE OPEN BRANCH FROM BUS 200795 TO BUS 200810 CKT 1 /* 26SHELOCTA 230.00 26KEYSTONE 230.00 END
PN_P4-500-002F	CONTINGENCY 'PN_P4-500-002F' /* CONEMAUGH 500KV BKR 6 DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 DISCONNECT BUS 200030 /* CONE G1 22 END
PN_P4-500-001J	CONTINGENCY 'PN_P4-500-001J' /* KEYSTONE 500KV BKR 16 DISCONNECT BRANCH FROM BUS 200011 TO BUS 235104 CKT 1 /* KEYSTONE 500 01CABOT 500 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 TO BUS 200907 CKT 4/* KEYSTONE 500 26KEYSTONE 230 26KEYSTN#4 20.00 REDUCE BUS 200011 SHUNT BY 100 PERCENT /* KEYSTONE 500 END
Base Case	
PN_P4-500-002A	CONTINGENCY 'PN_P4-500-002A' /* CONEMAUGH 500KV BKR 1 DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 DISCONNECT BUS 200031 /* CONE G2 22 END
PN-P1_2-PN-230-0104	CONTINGENCY 'PN-P1_2-PN-230-0104' /* SHELOCTA - HOMER CITY 230 KV LINE OPEN BRANCH FROM BUS 200795 TO BUS 200767 CKT 1 /* 26SHELOCTA 230.00 26HOMER CT 230.00 END

Contingency Name	Contingency Definition
PN-P1-2-PN-230-025	CONTINGENCY 'PN-P1-2-PN-230-025' /* CONEMAUGH - SEWARD 230KV DISCONNECT BRANCH FROM BUS 200912 TO BUS 200793 CKT 1 /* 26CONEMAGH 230 26SEWARD 2 230 END
PN-P1-2-PN-345-107T	CONTINGENCY 'PN-P1-2-PN-345-107T' /* ERIE WEST - ASHTABULA - PERRY 345KV DISCONNECT BRANCH FROM BUS 200599 TO BUS 238547 CKT 1 /* 26ERIE W 345 02AT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345 02S8-ATT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239036 CKT 1 /* 02AT 345 02PERRY 345 DISCONNECT BUS 238547 /* 02AT 345 END
PN-P1-3-PN-230-001T	CONTINGENCY 'PN-P1-3-PN-230-001T' /* CONEMAUGH #1 500/230KV XFMR DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 END
PN-P2_3-PN-230-0252-C	CONTINGENCY 'PN-P2_3-PN-230-0252-C' /* SHELOCTA 230 KV STUCK BREAKER (HOMER CITY/XFMR) OPEN BRANCH FROM BUS 200795 TO BUS 200767 CKT 1 /* 26SHELOCTA 230.00 26HOMER CT 230.00 OPEN BRANCH FROM BUS 200795 TO BUS 200739 CKT 2 /* 26SHELOCTA 230.00 26SHELOCTA 115.00 END

12.5.2 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
41712928	200740	26BLRSVL E	PENELEC	200763	26BLAIRSVL	PENELEC	1	PN_P4-500-001J	breaker	364.0	108.8	109.41	DC	4.92

Bus #	Bus	MW Impact
200636	26IUP CO-G	0.2723
200794	26CONEMAGH	0.1881
200805	26COLVER13 (Deactivation : 09/01/20)	11.8140
200864	K-013 E	1.7770
200883	Q-053 E	3.4276
202158	26CON.GEN1	0.0485
202160	26CON.GEN2	0.0989
290086	Q-036 E	2.2304
292350	K-023	1.8658
292542	L-013 1	1.8148
293301	N-039 E	3.6481
293393	V3-030E	2.3416
293432	R-040 E	0.1021
293603	O-018 E	4.0717
293902	O-048 E	1.6333
294515	O38_P22	3.1921
294903	P-060 E	2.9877
296332	R-032 E	4.6981
917672	Z2-108 E	1.0208
935191	AD1-154	1.0416
936991	AD2-133 C	1.0037
936992	AD2-133 E	4.5907
938351	AE1-053	0.5671
938362	AE1-054 BAT	1.0105
938881	AE1-116	0.3078
938991	AE1-128 C	5.3691
938992	AE1-128 E	3.5794
941331	AE2-129 C	0.5873
941332	AE2-129 E	0.3915
941351	AE2-131 C	0.5873
941352	AE2-131 E	0.3915
942121	AE2-224 C	3.7475
942122	AE2-224 E	2.4983
942361	AE2-249 C	0.6040
942362	AE2-249 E	0.4027
942511	AE2-264 C	2.2636
942512	AE2-264 E	1.5091
944181	AF1-086 C O2	0.8422
944182	AF1-086 E O2	3.6642
944691	AF1-134 C O1	0.3250
944692	AF1-134 E O1	0.3250

Bus #	Bus	MW Impact
944701	AF1-135 C	0.3900
944702	AF1-135 E	0.2600
944751	AF1-140 C	0.3899
944752	AF1-140 E	0.2599
944781	AF1-143 C	1.8034
944782	AF1-143 E	1.2023
945481	AF1-213 C	2.4767
945482	AF1-213 E	1.6511
945671	AF1-232 C O2	3.8681
945672	AF1-232 E O2	2.0828
945751	AF1-240 C O2	0.3312
945752	AF1-240 E O2	0.2208
945901	AF1-255 C	0.2249
945902	AF1-255 E	0.3105
946081	AF1-273 C O2	2.2186
946082	AF1-273 E O2	1.4791
946241	AF1-289 C O2	0.9562
946242	AF1-289 E O2	0.6375
946431	AF1-307 C O2	1.3310
946432	AF1-307 E O2	0.8874
946571	AF1-321 C O2	0.4287
946572	AF1-321 E O2	0.2858
DUCKCREEK	DUCKCREEK	1.1250
NEWTON	NEWTON	1.0358
FARMERCITY	FARMERCITY	0.0530
G-007A	G-007A	2.9489
VFT	VFT	7.9980
PRAIRIE	PRAIRIE	2.4306
COFFEEN	COFFEEN	0.5089
EDWARDS	EDWARDS	0.3433
CHEOAH	CHEOAH	0.4114
TILTON	TILTON	0.6180
MADISON	MADISON	0.0907
GIBSON	GIBSON	0.5302
CALDERWOOD	CALDERWOOD	0.4110
BLUEG	BLUEG	1.6909
TRIMBLE	TRIMBLE	0.5426
CATAWBA	CATAWBA	0.2460

12.5.3 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
41712912	200741	26SEWARD	PENELEC	200766	26FLORENCE	PENELEC	1	PN-P2-3-PN-230-9H-A	breaker	282.0	109.14	110.11	DC	6.1

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	11.3225
200794	26CONEMAGH	0.2498
200834	26SW_E13_K22	0.0262
200846	26FORWARD	0.0940
200864	K-013 E	2.6940
200883	Q-053 E	4.8898
200888	26HIGHLAND	0.2125
200889	26STNY CRK	0.1577
200915	26CHSTN_FL	0.1081
200925	26R32	0.2451
202225	26SCI_S29B	0.0408
290086	Q-036 E	2.4283
292350	K-023	2.4511
292542	L-013 1	2.3841
293301	N-039 E	4.4108
293393	V3-030E	1.8653
293432	R-040 E	0.1341
293603	O-018 E	6.0882
293902	O-048 E	2.1457
294515	O38_P22	3.8594
294903	P-060 E	4.5184
296332	R-032 E	7.0248
913142	Y1-033 E OP1	1.9314
917672	Z2-108 E	1.3410
936991	AD2-133 C	1.0927
936992	AD2-133 E	4.9980
938351	AE1-053	0.7450
938881	AE1-116	0.4699
938991	AE1-128 C	8.0323
938992	AE1-128 E	5.3549
941231	AE2-117 C	0.5474
941232	AE2-117 E	0.3650
941241	AE2-118 C	0.5474
941242	AE2-118 E	0.3650
941331	AE2-129 C	0.5910
941332	AE2-129 E	0.3940
941351	AE2-131 C	0.5910
941352	AE2-131 E	0.3940
942121	AE2-224 C	4.6170
942122	AE2-224 E	3.0780
942361	AE2-249 C	0.9036

Bus #	Bus	MW Impact
942362	AE2-249 E	0.6024
942511	AE2-264 C	2.6181
942512	AE2-264 E	1.7454
943711	AF1-039 C O2	0.2323
943712	AF1-039 E O2	0.1549
944731	AF1-138 C O2	0.2901
944732	AF1-138 E O2	0.1934
944751	AF1-140 C	1.0815
944752	AF1-140 E	0.7210
944781	AF1-143 C	2.3692
944782	AF1-143 E	1.5795
945671	AF1-232 C O2	11.0729
945672	AF1-232 E O2	5.9623
945901	AF1-255 C	0.6304
945902	AF1-255 E	0.8705
946081	AF1-273 C O2	6.3600
946082	AF1-273 E O2	4.2400
946191	AF1-284 C O2	0.3226
946192	AF1-284 E O2	0.1936
946241	AF1-289 C O2	2.6556
946242	AF1-289 E O2	1.7704
946431	AF1-307 C O2	1.6476
946432	AF1-307 E O2	1.0984
946571	AF1-321 C O2	1.2060
946572	AF1-321 E O2	0.8040
DUCKCREEK	DUCKCREEK	0.5953
NEWTON	NEWTON	0.5534
FARMERCITY	FARMERCITY	0.0284
G-007A	G-007A	1.3210
VFT	VFT	3.6120
PRAIRIE	PRAIRIE	1.3096
COFFEEN	COFFEEN	0.2716
EDWARDS	EDWARDS	0.1813
CHEOAH	CHEOAH	0.2342
TILTON	TILTON	0.3276
MADISON	MADISON	0.0444
GIBSON	GIBSON	0.2834
CALDERWOOD	CALDERWOOD	0.2336
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2910
CATAWBA	CATAWBA	0.1484

12.5.4 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
41712922	200766	26FLORENCE	PENELEC	200740	26BLRSVL E	PENELEC	1	PN-P2-3-PN-230-9H-A	breaker	282.0	108.93	109.9	DC	6.1

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	11.3225
200794	26CONEMAGH	0.2498
200834	26SW_E13_K22	0.0262
200846	26FORWARD	0.0940
200864	K-013 E	2.6940
200883	Q-053 E	4.8898
200888	26HIGHLAND	0.2125
200889	26STNY CRK	0.1577
200915	26CHSTN_FL	0.1081
200925	26R32	0.2451
202225	26SCI_S29B	0.0408
290086	Q-036 E	2.4283
292350	K-023	2.4511
292542	L-013 1	2.3841
293301	N-039 E	4.4108
293393	V3-030E	1.8653
293432	R-040 E	0.1341
293603	O-018 E	6.0882
293902	O-048 E	2.1457
294515	O38_P22	3.8594
294903	P-060 E	4.5184
296332	R-032 E	7.0248
913142	Y1-033 E OP1	1.9314
917672	Z2-108 E	1.3410
936991	AD2-133 C	1.0927
936992	AD2-133 E	4.9980
938351	AE1-053	0.7450
938881	AE1-116	0.4699
938991	AE1-128 C	8.0323
938992	AE1-128 E	5.3549
941231	AE2-117 C	0.5474
941232	AE2-117 E	0.3650
941241	AE2-118 C	0.5474
941242	AE2-118 E	0.3650
941331	AE2-129 C	0.5910
941332	AE2-129 E	0.3940
941351	AE2-131 C	0.5910
941352	AE2-131 E	0.3940
942121	AE2-224 C	4.6170
942122	AE2-224 E	3.0780
942361	AE2-249 C	0.9036

Bus #	Bus	MW Impact
942362	AE2-249 E	0.6024
942511	AE2-264 C	2.6181
942512	AE2-264 E	1.7454
943711	AF1-039 C O2	0.2323
943712	AF1-039 E O2	0.1549
944731	AF1-138 C O2	0.2901
944732	AF1-138 E O2	0.1934
944751	AF1-140 C	1.0815
944752	AF1-140 E	0.7210
944781	AF1-143 C	2.3692
944782	AF1-143 E	1.5795
945671	AF1-232 C O2	11.0729
945672	AF1-232 E O2	5.9623
945901	AF1-255 C	0.6304
945902	AF1-255 E	0.8705
946081	AF1-273 C O2	6.3600
946082	AF1-273 E O2	4.2400
946191	AF1-284 C O2	0.3226
946192	AF1-284 E O2	0.1936
946241	AF1-289 C O2	2.6556
946242	AF1-289 E O2	1.7704
946431	AF1-307 C O2	1.6476
946432	AF1-307 E O2	1.0984
946571	AF1-321 C O2	1.2060
946572	AF1-321 E O2	0.8040
DUCKCREEK	DUCKCREEK	0.5953
NEWTON	NEWTON	0.5534
FARMERCITY	FARMERCITY	0.0284
G-007A	G-007A	1.3210
VFT	VFT	3.6120
PRAIRIE	PRAIRIE	1.3096
COFFEEN	COFFEEN	0.2716
EDWARDS	EDWARDS	0.1813
CHEOAH	CHEOAH	0.2342
TILTON	TILTON	0.3276
MADISON	MADISON	0.0444
GIBSON	GIBSON	0.2834
CALDERWOOD	CALDERWOOD	0.2336
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2910
CATAWBA	CATAWBA	0.1484

12.5.5 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
42308055	200767	26HOMER CT	PENELEC	200795	26SHELOCTA	PENELEC	1	PN_P4-500-002F	breaker	917.0	176.73	179.57	DC	25.65

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	28.9164
200794	26CONEMAGH	0.4629
200805	26COLVER13 (Deactivation : 09/01/20)	14.5103
200809	26SITHE	2.2348
200823	26MHP_X3-003	1.9016
200833	26SEWRDB34	27.2507
200834	26SW_E13_K22	0.0724
200835	26DSGENWIN	0.3532
200837	26HOMER C1	38.4884
200838	26HOMER C2	32.0070
200839	26HOMER C3	33.8836
200846	26FORWARD	0.2587
200864	K-013 E	7.4126
200883	Q-053 E	13.4971
200886	26ARWF_N39	0.6904
200888	26HIGHLAND	0.5687
200889	26STNY CRK	0.4333
200890	26BF_G21_K23	0.1732
200891	26CSLMN_L13	0.2717
200892	26LOOKOUT	0.2581
200894	26K02	7.0234
200898	26AA1-106	2.6973
200905	26Q36	0.3168
200915	26CHSTN_FL	0.2983
200925	26R32	0.6562
201144	W3-099 C OP1	1.4662
201477	26Y2-055	4.1676
202225	26SCI_S29B	0.1127
203034	26NA_O38_P22	0.6041
203909	26Z1-038	1.8767
203910	26Z1-091	2.4569
203999	P-047 E	12.9768
235003	AC1-025 E	0.1729
236828	01GRAYMONT	0.4680
290086	Q-036 E	9.0772
292350	K-023	8.0052
292542	L-013 1	7.7862
293301	N-039 E	19.7843
293393	V3-030E	5.3060
293432	R-040 E	0.4380
293603	O-018 E	16.2963

Bus #	Bus	MW Impact
293902	O-048 E	7.0076
294515	O38_P22	17.3113
294573	P-028 E	11.4097
294903	P-060 E	12.4160
296332	R-032 E	18.8034
903644	W3-099 E OP1	9.8124
913142	Y1-033 E OP1	5.4199
915951	Y3-092 FTIR	107.9900
916202	Z1-069 E	10.3402
917672	Z2-108 E	4.3798
918682	AA1-082 E	6.9637
919201	AA1-144 OP	19.7891
919491	AA2-000	59.5323
920341	AA2-132	2.7294
922932	AB1-082 OP	3.7512
923443	AB1-160 E	2.9544
930511	AB1-092	2.1859
935191	AD1-154	2.5503
936421	AD2-055	4.5003
936991	AD2-133 C	4.0847
936992	AD2-133 E	18.6831
938351	AE1-053	2.4332
938881	AE1-116	1.2972
938951	AE1-123	2.2336
938991	AE1-128 C	21.9514
938992	AE1-128 E	14.6342
939171	AE1-147 C	1.4073
939172	AE1-147 E	0.9382
939291	AE1-160 C	1.5320
939292	AE1-160 E	0.8806
939381	AE1-169 C O1	6.2038
939382	AE1-169 E O1	4.1359
940201	AE2-001 C	1.4055
940202	AE2-001 E	0.9370
940681	AE2-055 C	1.3775
940682	AE2-055 E	0.9183
940861	AE2-074 C	2.8483
940862	AE2-074 E	3.7494
941191	AE2-113 C	10.9112
941192	AE2-113 E	11.7479
941231	AE2-117 C	1.9816
941232	AE2-117 E	1.3210
941241	AE2-118 C	1.9816
941242	AE2-118 E	1.3210
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.7524
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.1682
941261	AE2-120 C	1.4044
941262	AE2-120 E	0.9363
941271	AE2-121 C	0.7499
941272	AE2-121 E	0.5007
941321	AE2-126 C	1.7879
941322	AE2-126 E	1.1919

Bus #	Bus	MW Impact
941331	AE2-129 C	2.0624
941332	AE2-129 E	1.3750
941351	AE2-131 C	2.0624
941352	AE2-131 E	1.3750
941421	AE2-139 C	7.4089
941422	AE2-139 E	4.9393
942121	AE2-224 C	21.1962
942122	AE2-224 E	14.1308
942351	AE2-248 C	1.1113
942352	AE2-248 E	0.7409
942361	AE2-249 C	2.4695
942362	AE2-249 E	1.6464
942491	AE2-262 C	6.2505
942492	AE2-262 E	4.2003
942501	AE2-263 C	5.8754
942502	AE2-263 E	3.9228
942511	AE2-264 C	11.2229
942512	AE2-264 E	7.4819
942811	AE2-299 C	3.6451
942812	AE2-299 E	14.5803
942961	AE2-316 C	5.6956
942962	AE2-316 E	8.1220
943151	AE2-344 C	7.6841
943152	AE2-344 E	5.1228
943351	AF1-006 C	0.7075
943352	AF1-006 E	0.3980
943711	AF1-039 C O2	0.6567
943712	AF1-039 E O2	0.4378
943751	AF1-043	7.1554
943871	AF1-055 C O2	2.9939
943872	AF1-055 E O2	1.9959
944001	AF1-068 C O2	0.7828
944002	AF1-068 E O2	0.4404
944181	AF1-086 C O2	1.5303
944182	AF1-086 E O2	6.6576
944261	AF1-094 C	0.7197
944262	AF1-094 E	0.4798
944281	AF1-096 C	0.7672
944282	AF1-096 E	0.5115
944301	AF1-098 C	2.9545
944302	AF1-098 E	1.9697
944311	AF1-099 C	5.0288
944312	AF1-099 E	3.3525
944321	AF1-100 C O2	10.5343
944322	AF1-100 E O2	7.0228
944381	AF1-103 O2	1.5226
944391	AF1-104 O2	1.0293
944411	AF1-106 O2	1.5776
944471	AF1-112 C	0.7379
944472	AF1-112 E	0.4919
944671	AF1-132 C O2	0.7339
944672	AF1-132 E O2	0.4893

Bus #	Bus	MW Impact
944691	AF1-134 C O1	0.7576
944692	AF1-134 E O1	0.7576
944701	AF1-135 C	0.9091
944702	AF1-135 E	0.6061
944731	AF1-138 C O2	1.0502
944732	AF1-138 E O2	0.7001
944741	AF1-139 C O1	0.8723
944742	AF1-139 E O1	0.5815
944751	AF1-140 C	2.9287
944752	AF1-140 E	1.9525
944771	AF1-142 C	8.0460
944772	AF1-142 E	5.3640
944781	AF1-143 C	14.5992
944782	AF1-143 E	9.7328
944841	AF1-149 C	1.4043
944842	AF1-149 E	0.9362
944881	AF1-153 C O2	0.8674
944882	AF1-153 E O2	0.5783
944901	AF1-155 C	0.8670
944902	AF1-155 E	0.5780
945021	AF1-167 C	0.5944
945022	AF1-167 E	0.3963
945051	AF1-170 C	2.5442
945052	AF1-170 E	1.6961
945071	AF1-172 C	10.3025
945072	AF1-172 E	6.8683
945121	AF1-177	0.3806
945161	AF1-181	0.0564
945171	AF1-182	0.2819
945181	AF1-183	0.0738
945331	AF1-198	0.2114
945451	AF1-210 C	0.5540
945452	AF1-210 E	0.3694
945481	AF1-213 C	6.9713
945482	AF1-213 E	4.6475
945491	AF1-214 C	0.7444
945492	AF1-214 E	0.4963
945521	AF1-217 C O2	0.7027
945522	AF1-217 E O2	0.4684
945551	AF1-220 C	7.2853
945552	AF1-220 E	4.8595
945671	AF1-232 C O2	30.4751
945672	AF1-232 E O2	16.4097
945751	AF1-240 C O2	0.8110
945752	AF1-240 E O2	0.5407
945771	AF1-242 C	0.8670
945772	AF1-242 E	0.5780
945901	AF1-255 C	1.7168
945902	AF1-255 E	2.3708
946081	AF1-273 C O2	17.5158
946082	AF1-273 E O2	11.6772
946091	AF1-274 C	4.0432

Bus #	Bus	MW Impact
946092	AF1-274 E	2.6955
946131	AF1-278	42.0132
946191	AF1-284 C O2	0.9121
946192	AF1-284 E O2	0.5473
946211	AF1-286 C O2	0.6389
946212	AF1-286 E O2	0.4338
946221	AF1-287 C	0.7027
946222	AF1-287 E	0.4684
946241	AF1-289 C O2	7.1962
946242	AF1-289 E O2	4.7974
946381	AF1-302 C	1.3182
946382	AF1-302 E	1.7576
946401	AF1-304 C	3.8864
946402	AF1-304 E	2.5909
946421	AF1-306 C	4.2972
946422	AF1-306 E	17.1887
946431	AF1-307 C O2	15.3882
946432	AF1-307 E O2	10.2588
946571	AF1-321 C O2	4.5743
946572	AF1-321 E O2	3.0495
DUCKCREEK	DUCKCREEK	0.7128
NEWTON	NEWTON	0.7049
FARMERCITY	FARMERCITY	0.0370
PRAIRIE	PRAIRIE	1.7487
O-066	O-066	1.6733
COFFEEN	COFFEEN	0.3430
EDWARDS	EDWARDS	0.2142
CHEOAH	CHEOAH	0.4109
TILTON	TILTON	0.3956
G-007	G-007	0.3588
MADISON	MADISON	0.0202
GIBSON	GIBSON	0.3593
CALDERWOOD	CALDERWOOD	0.4065
BLUEG	BLUEG	1.1735
TRIMBLE	TRIMBLE	0.3756
CATAWBA	CATAWBA	0.3206

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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
42308065	200795	26SHELOCTA	PENELEC	200810	26KEYSTONE	PENELEC	1	PN_P4-500-002A	breaker	917.0	156.74	159.61	DC	25.97

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	32.5076
200636	26IUP CO-G	0.6752
200794	26CONEMAGH	0.5468
200805	26COLVER13 (Deactivation : 09/01/20)	34.8876
200809	26SITHE	2.1598
200833	26SEWRDB34	28.3096
200834	26SW_E13_K22	0.0787
200835	26DSGENWIN	0.3844
200837	26HOMER C1	37.1972
200838	26HOMER C2	31.2734
200839	26HOMER C3	33.1070
200846	26FORWARD	0.2807
200864	K-013 E	8.0446
200883	Q-053 E	15.1296
200886	26ARWF_N39	0.7144
200888	26HIGHLAND	0.6259
200889	26STNY CRK	0.4725
200890	26BF_G21_K23	0.1885
200891	26CSLMN_L13	0.2957
200892	26LOOKOUT	0.2809
200894	26K02	7.3804
200898	26AA1-106	2.7668
200915	26CHSTN_FL	0.3344
200925	26R32	0.7222
200945	26CT_V3-030	0.2375
201144	W3-099 C OP1	1.5476
201477	26Y2-055	4.3870
202158	26CON.GEN1	0.1133
202160	26CON.GEN2	0.0848
202225	26SCI_S29B	0.1224
203034	26NA_O38_P22	0.6251
203910	26Z1-091	2.4645
203999	P-047 E	13.0226
235003	AC1-025 E	0.1912
236828	01GRAYMONT	0.5180
290086	Q-036 E	8.8754
292350	K-023	8.7126
292542	L-013 1	8.4742
293301	N-039 E	20.4723
293393	V3-030E	8.9704
293432	R-040 E	0.4052

Bus #	Bus	MW Impact
293603	O-018 E	17.9374
293902	O-048 E	7.6268
294515	O38_P22	17.9133
294903	P-060 E	13.5395
296332	R-032 E	20.6970
903644	W3-099 E OP1	10.3567
913142	Y1-033 E OP1	5.9219
916202	Z1-069 E	10.4453
917672	Z2-108 E	4.0517
918682	AA1-082 E	7.0566
919201	AA1-144 OP	20.0981
919491	AA2-000	64.8177
920341	AA2-132	2.7367
922932	AB1-082 OP	3.8155
923443	AB1-160 E	2.9844
930511	AB1-092	2.3799
935191	AD1-154	4.1854
936421	AD2-055	4.8998
936991	AD2-133 C	3.9939
936992	AD2-133 E	18.2677
938351	AE1-053	2.2510
938881	AE1-116	1.4089
938951	AE1-123	2.9191
938991	AE1-128 C	24.0523
938992	AE1-128 E	16.0349
939171	AE1-147 C	1.5577
939172	AE1-147 E	1.0385
939291	AE1-160 C	1.8016
939292	AE1-160 E	1.0356
939381	AE1-169 C O1	7.3470
939382	AE1-169 E O1	4.8980
940201	AE2-001 C	1.5556
940202	AE2-001 E	1.0371
940681	AE2-055 C	1.5221
940682	AE2-055 E	1.0148
940861	AE2-074 C	2.8971
940862	AE2-074 E	3.8136
941191	AE2-113 C	11.4763
941192	AE2-113 E	12.3563
941231	AE2-117 C	2.0808
941232	AE2-117 E	1.3872
941241	AE2-118 C	2.0808
941242	AE2-118 E	1.3872
941251	AE2-119 C (Withdrawn : 12/16/2019)	2.1153
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.4102
941261	AE2-120 C	1.5544
941262	AE2-120 E	1.0363
941271	AE2-121 C	0.8303
941272	AE2-121 E	0.5544
941321	AE2-126 C	2.0539
941322	AE2-126 E	1.3692
941331	AE2-129 C	2.4166

Bus #	Bus	MW Impact
941332	AE2-129 E	1.6111
941351	AE2-131 C	2.4166
941352	AE2-131 E	1.6111
941421	AE2-139 C	7.6068
941422	AE2-139 E	5.0712
942121	AE2-224 C	21.8082
942122	AE2-224 E	14.5388
942351	AE2-248 C	1.2289
942352	AE2-248 E	0.8193
942361	AE2-249 C	2.7059
942362	AE2-249 E	1.8039
942491	AE2-262 C	6.9530
942492	AE2-262 E	4.6724
942501	AE2-263 C	6.5358
942502	AE2-263 E	4.3637
942511	AE2-264 C	9.9878
942512	AE2-264 E	6.6586
942811	AE2-299 C	3.8423
942812	AE2-299 E	15.3691
942961	AE2-316 C	6.2990
942962	AE2-316 E	8.9823
943151	AE2-344 C	8.2183
943152	AE2-344 E	5.4789
943351	AF1-006 C	0.7537
943352	AF1-006 E	0.4239
943711	AF1-039 C O2	0.7195
943712	AF1-039 E O2	0.4797
943751	AF1-043	7.7907
943871	AF1-055 C O2	3.1500
943872	AF1-055 E O2	2.1000
944001	AF1-068 C O2	0.8654
944002	AF1-068 E O2	0.4868
944181	AF1-086 C O2	5.9280
944182	AF1-086 E O2	25.7902
944261	AF1-094 C	0.7983
944262	AF1-094 E	0.5322
944281	AF1-096 C	0.9022
944282	AF1-096 E	0.6015
944301	AF1-098 C	3.1348
944302	AF1-098 E	2.0899
944311	AF1-099 C	5.5940
944312	AF1-099 E	3.7293
944321	AF1-100 C O2	11.8952
944322	AF1-100 E O2	7.9302
944381	AF1-103 O2	1.6028
944391	AF1-104 O2	1.0955
944411	AF1-106 O2	1.5856
944471	AF1-112 C	0.8161
944472	AF1-112 E	0.5441
944671	AF1-132 C O2	0.8113
944672	AF1-132 E O2	0.5409
944691	AF1-134 C O1	1.1405

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.1405
944701	AF1-135 C	1.3686
944702	AF1-135 E	0.9124
944731	AF1-138 C O2	1.1028
944732	AF1-138 E O2	0.7352
944741	AF1-139 C O1	0.8746
944742	AF1-139 E O1	0.5831
944751	AF1-140 C	3.2443
944752	AF1-140 E	2.1629
944771	AF1-142 C	8.9503
944772	AF1-142 E	5.9669
944781	AF1-143 C	15.8892
944782	AF1-143 E	10.5928
944841	AF1-149 C	1.5543
944842	AF1-149 E	1.0362
944881	AF1-153 C O2	0.9693
944882	AF1-153 E O2	0.6462
944901	AF1-155 C	0.9691
944902	AF1-155 E	0.6461
945021	AF1-167 C	0.7104
945022	AF1-167 E	0.4736
945051	AF1-170 C	2.7153
945052	AF1-170 E	1.8102
945071	AF1-172 C	11.3364
945072	AF1-172 E	7.5576
945121	AF1-177	0.4007
945161	AF1-181	0.0639
945171	AF1-182	0.3195
945181	AF1-183	0.0864
945331	AF1-198	0.2136
945451	AF1-210 C	0.6626
945452	AF1-210 E	0.4418
945481	AF1-213 C	9.4791
945482	AF1-213 E	6.3194
945491	AF1-214 C	0.8239
945492	AF1-214 E	0.5492
945521	AF1-217 C O2	0.7518
945522	AF1-217 E O2	0.5012
945551	AF1-220 C	8.0851
945552	AF1-220 E	5.3930
945671	AF1-232 C O2	33.1864
945672	AF1-232 E O2	17.8696
945751	AF1-240 C O2	1.3310
945752	AF1-240 E O2	0.8873
945771	AF1-242 C	0.9691
945772	AF1-242 E	0.6461
945901	AF1-255 C	1.8890
945902	AF1-255 E	2.6086
946081	AF1-273 C O2	19.0632
946082	AF1-273 E O2	12.7088
946091	AF1-274 C	4.5988
946092	AF1-274 E	3.0659

Bus #	Bus	MW Impact
946131	AF1-278	19.3364
946191	AF1-284 C O2	0.9993
946192	AF1-284 E O2	0.5996
946211	AF1-286 C O2	0.6422
946212	AF1-286 E O2	0.4360
946221	AF1-287 C	0.7518
946222	AF1-287 E	0.5012
946241	AF1-289 C O2	7.9654
946242	AF1-289 E O2	5.3102
946381	AF1-302 C	1.4578
946382	AF1-302 E	1.9438
946401	AF1-304 C	4.6208
946402	AF1-304 E	3.0805
946421	AF1-306 C	4.7503
946422	AF1-306 E	19.0010
946431	AF1-307 C O2	15.5810
946432	AF1-307 E O2	10.3873
946571	AF1-321 C O2	4.6567
946572	AF1-321 E O2	3.1045
DUCKCREEK	DUCKCREEK	0.5412
NEWTON	NEWTON	0.5491
FARMERCITY	FARMERCITY	0.0290
PRAIRIE	PRAIRIE	1.3845
O-066	O-066	3.3130
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1617
CHEOAH	CHEOAH	0.3544
TILTON	TILTON	0.3018
G-007	G-007	0.6157
MADISON	MADISON	0.0081
GIBSON	GIBSON	0.2796
CALDERWOOD	CALDERWOOD	0.3499
BLUEG	BLUEG	0.9218
TRIMBLE	TRIMBLE	0.2949
CATAWBA	CATAWBA	0.2902

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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
42308171	200810	26KEYSTONE	PENELEC	999401	STAR592	PJM	4	PJM500_PN_P4-500-001D	breaker	635.0	130.02	132.21	DC	13.69

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	16.7325
200636	26IUP CO-G	0.4069
200794	26CONEMAGH	0.2755
200805	26COLVER13 (Deactivation : 09/01/20)	19.5371
200809	26SITHE	1.2781
200833	26SEWRDB34	13.2926
200834	26SW_E13_K22	0.0419
200835	26DSGENWIN	0.2043
200837	26HOMER C1	22.0118
200838	26HOMER C2	18.4521
200839	26HOMER C3	19.5339
200846	26FORWARD	0.1497
200864	K-013 E	4.2904
200883	Q-053 E	7.8926
200886	26ARWF_N39	0.3654
200888	26HIGHLAND	0.3256
200889	26STNY CRK	0.2507
200890	26BF_G21_K23	0.1002
200891	26CSLMN_L13	0.1571
200892	26LOOKOUT	0.1493
200894	26K02	4.2783
200898	26AA1-106	1.6183
200906	26KEYSTN#3	0.6753
200915	26CHSTN_FL	0.1744
200925	26R32	0.3757
200945	26CT_V3-030	0.1279
201144	W3-099 C OP1	0.8862
201477	26Y2-055	2.5227
202158	26CON.GEN1	0.0706
202160	26CON.GEN2	0.0494
202225	26SCI_S29B	0.0652
203034	26NA_O38_P22	0.3198
203910	26Z1-091	1.4594
203999	P-047 E	7.6636
235003	AC1-025 E	0.1066
236828	01GRAYMONT	0.2892
290086	Q-036 E	4.7474
292350	K-023	4.6300
292542	L-013 1	4.5034
293301	N-039 E	10.4723
293393	V3-030E	4.8293
293432	R-040 E	0.2153

Bus #	Bus	MW Impact
293603	O-018 E	9.3319
293902	O-048 E	4.0530
294515	O38_P22	9.1633
294903	P-060 E	7.1841
296332	R-032 E	10.7676
903644	W3-099 E OP1	5.9308
913142	Y1-033 E OP1	3.1317
916202	Z1-069 E	6.1155
917672	Z2-108 E	2.1532
918682	AA1-082 E	4.1617
919201	AA1-144 OP	11.8405
919491	AA2-000	36.9701
920341	AA2-132	1.6166
922932	AB1-082 OP	2.2258
923443	AB1-160 E	1.7473
930511	AB1-092	1.3574
935191	AD1-154	2.3565
936421	AD2-055	2.7947
936991	AD2-133 C	2.1363
936992	AD2-133 E	9.7714
938351	AE1-053	1.1962
938881	AE1-116	0.7506
938951	AE1-123	1.6552
938991	AE1-128 C	12.7001
938992	AE1-128 E	8.4667
939171	AE1-147 C	0.8700
939172	AE1-147 E	0.5800
939291	AE1-160 C	1.0268
939292	AE1-160 E	0.5902
939381	AE1-169 C O1	4.1867
939382	AE1-169 E O1	2.7912
940201	AE2-001 C	0.8686
940202	AE2-001 E	0.5791
940681	AE2-055 C	0.8483
940682	AE2-055 E	0.5656
940861	AE2-074 C	1.6901
940862	AE2-074 E	2.2247
941191	AE2-113 C	6.6183
941192	AE2-113 E	7.1257
941231	AE2-117 C	1.0872
941232	AE2-117 E	0.7248
941241	AE2-118 C	1.0872
941242	AE2-118 E	0.7248
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.1764
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7842
941261	AE2-120 C	0.8679
941262	AE2-120 E	0.5786
941271	AE2-121 C	0.4638
941272	AE2-121 E	0.3097
941321	AE2-126 C	1.1560
941322	AE2-126 E	0.7706
941331	AE2-129 C	1.3127

Bus #	Bus	MW Impact
941332	AE2-129 E	0.8752
941351	AE2-131 C	1.3127
941352	AE2-131 E	0.8752
941421	AE2-139 C	4.4582
941422	AE2-139 E	2.9721
942121	AE2-224 C	11.0976
942122	AE2-224 E	7.3984
942351	AE2-248 C	0.6854
942352	AE2-248 E	0.4570
942361	AE2-249 C	1.4288
942362	AE2-249 E	0.9525
942491	AE2-262 C	3.9062
942492	AE2-262 E	2.6249
942501	AE2-263 C	3.6718
942502	AE2-263 E	2.4515
942511	AE2-264 C	5.1734
942512	AE2-264 E	3.4490
942811	AE2-299 C	2.2018
942812	AE2-299 E	8.8074
942961	AE2-316 C	3.5892
942962	AE2-316 E	5.1182
943151	AE2-344 C	4.6968
943152	AE2-344 E	3.1312
943351	AF1-006 C	0.4299
943352	AF1-006 E	0.2418
943711	AF1-039 C O2	0.3793
943712	AF1-039 E O2	0.2528
943751	AF1-043	4.4436
943871	AF1-055 C O2	1.8147
943872	AF1-055 E O2	1.2098
944001	AF1-068 C O2	0.4826
944002	AF1-068 E O2	0.2715
944181	AF1-086 C O2	3.3026
944182	AF1-086 E O2	14.3682
944261	AF1-094 C	0.4556
944262	AF1-094 E	0.3037
944281	AF1-096 C	0.5142
944282	AF1-096 E	0.3428
944301	AF1-098 C	1.7941
944302	AF1-098 E	1.1961
944311	AF1-099 C	3.1427
944312	AF1-099 E	2.0951
944321	AF1-100 C O2	6.6899
944322	AF1-100 E O2	4.4599
944381	AF1-103 O2	0.9216
944391	AF1-104 O2	0.6234
944411	AF1-106 O2	0.9338
944471	AF1-112 C	0.4553
944472	AF1-112 E	0.3035
944671	AF1-132 C O2	0.4524
944672	AF1-132 E O2	0.3016
944691	AF1-134 C O1	1.4096

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.4096
944701	AF1-135 C	1.6915
944702	AF1-135 E	1.1277
944731	AF1-138 C O2	0.5762
944732	AF1-138 E O2	0.3842
944741	AF1-139 C O1	0.5167
944742	AF1-139 E O1	0.3444
944751	AF1-140 C	1.6938
944752	AF1-140 E	1.1292
944771	AF1-142 C	5.0283
944772	AF1-142 E	3.3522
944781	AF1-143 C	8.4438
944782	AF1-143 E	5.6292
944841	AF1-149 C	0.8678
944842	AF1-149 E	0.5785
944881	AF1-153 C O2	0.5496
944882	AF1-153 E O2	0.3664
944901	AF1-155 C	0.5495
944902	AF1-155 E	0.3663
945021	AF1-167 C	0.4031
945022	AF1-167 E	0.2687
945051	AF1-170 C	1.5485
945052	AF1-170 E	1.0323
945071	AF1-172 C	6.4352
945072	AF1-172 E	4.2901
945121	AF1-177	0.2304
945161	AF1-181	0.0359
945171	AF1-182	0.1795
945181	AF1-183	0.0483
945331	AF1-198	0.1254
945451	AF1-210 C	0.3750
945452	AF1-210 E	0.2500
945481	AF1-213 C	5.2754
945482	AF1-213 E	3.5170
945491	AF1-214 C	0.4601
945492	AF1-214 E	0.3067
945521	AF1-217 C O2	0.4297
945522	AF1-217 E O2	0.2864
945551	AF1-220 C	4.5899
945552	AF1-220 E	3.0616
945671	AF1-232 C O2	17.6332
945672	AF1-232 E O2	9.4948
945751	AF1-240 C O2	0.7494
945752	AF1-240 E O2	0.4996
945771	AF1-242 C	0.5495
945772	AF1-242 E	0.3663
945901	AF1-255 C	0.9932
945902	AF1-255 E	1.3715
946081	AF1-273 C O2	10.1352
946082	AF1-273 E O2	6.7568
946091	AF1-274 C	2.5949
946092	AF1-274 E	1.7299

Bus #	Bus	MW Impact
946131	AF1-278	11.2469
946191	AF1-284 C O2	0.5267
946192	AF1-284 E O2	0.3160
946211	AF1-286 C O2	0.3782
946212	AF1-286 E O2	0.2568
946221	AF1-287 C	0.4297
946222	AF1-287 E	0.2864
946241	AF1-289 C O2	4.1618
946242	AF1-289 E O2	2.7746
946381	AF1-302 C	0.8307
946382	AF1-302 E	1.1076
946401	AF1-304 C	2.6330
946402	AF1-304 E	1.7553
946421	AF1-306 C	2.6955
946422	AF1-306 E	10.7819
946431	AF1-307 C O2	8.2138
946432	AF1-307 E O2	5.4759
946571	AF1-321 C O2	2.6302
946572	AF1-321 E O2	1.7534
DUCKCREEK	DUCKCREEK	0.5619
NEWTON	NEWTON	0.5458
FARMERCITY	FARMERCITY	0.0284
PRAIRIE	PRAIRIE	1.3354
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1698
CHEOAH	CHEOAH	0.2933
TILTON	TILTON	0.3112
G-007	G-007	0.0426
MADISON	MADISON	0.0262
GIBSON	GIBSON	0.2790
CALDERWOOD	CALDERWOOD	0.2907
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2905
CATAWBA	CATAWBA	0.2188

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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
41712890	200912	26CONEMAGH	PENELEC	200005	CONEM-GH	PJM	3	PN-P2_3-PN-230-0252-C	breaker	1066.0	102.72	105.0	DC	23.96

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	30.7476
200794	26CONEMAGH	0.5306
200805	26COLVER13 (Deactivation : 09/01/20)	27.4549
200809	26SITHE	1.6348
200833	26SEWRDB34	30.3583
200834	26SW_E13_K22	0.0709
200835	26DSGENWIN	0.3478
200837	26HOMER C1	28.1545
200838	26HOMER C2	23.7777
200839	26HOMER C3	25.1718
200846	26FORWARD	0.2526
200864	K-013 E	7.2400
200883	Q-053 E	14.0366
200886	26ARWF_N39	0.6871
200888	26HIGHLAND	0.5841
200889	26STNY CRK	0.4284
200890	26BF_G21_K23	0.1705
200891	26CSLMN_L13	0.2675
200892	26LOOKOUT	0.2541
200894	26K02	5.7572
200898	26AA1-106	2.1269
200915	26CHSTN_FL	0.3102
200925	26R32	0.6740
200945	26CT_V3-030	0.2053
201144	W3-099 C OP1	1.2351
201477	26Y2-055	3.4759
202225	26SCI_S29B	0.1103
203034	26NA_O38_P22	0.6012
203910	26Z1-091	1.8524
203999	P-047 E	9.9155
235003	AC1-025 E	0.1594
236828	01GRAYMONT	0.4308
290086	Q-036 E	7.9043
292350	K-023	7.8819
292542	L-013 1	7.6662
293301	N-039 E	19.6902
293393	V3-030E	7.7542
293432	R-040 E	0.3665
293603	O-018 E	16.7383
293902	O-048 E	6.8996

Bus #	Bus	MW Impact
294515	O38_P22	17.2290
294903	P-060 E	12.2766
296332	R-032 E	19.3134
903644	W3-099 E OP1	8.2654
913142	Y1-033 E OP1	5.3945
916202	Z1-069 E	8.0307
917672	Z2-108 E	3.6654
918682	AA1-082 E	5.3411
919201	AA1-144 OP	15.2405
919491	AA2-000	51.9525
920341	AA2-132	2.0682
922932	AB1-082 OP	2.9520
923443	AB1-160 E	2.2945
930511	AB1-092	1.9075
935191	AD1-154	3.3089
936421	AD2-055	3.9273
936991	AD2-133 C	3.5569
936992	AD2-133 E	16.2691
938351	AE1-053	2.0363
938881	AE1-116	1.2699
938951	AE1-123	2.3218
938991	AE1-128 C	21.9607
938992	AE1-128 E	14.6405
939171	AE1-147 C	1.2951
939172	AE1-147 E	0.8634
939291	AE1-160 C	1.4340
939292	AE1-160 E	0.8243
939381	AE1-169 C O1	5.8453
939382	AE1-169 E O1	3.8969
940201	AE2-001 C	1.2936
940202	AE2-001 E	0.8624
940681	AE2-055 C	1.2703
940682	AE2-055 E	0.8469
940861	AE2-074 C	2.2414
940862	AE2-074 E	2.9505
941191	AE2-113 C	9.0452
941192	AE2-113 E	9.7387
941231	AE2-117 C	1.9378
941232	AE2-117 E	1.2919
941241	AE2-118 C	1.9378
941242	AE2-118 E	1.2919
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.7562
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.1708
941261	AE2-120 C	1.2927
941262	AE2-120 E	0.8618
941271	AE2-121 C	0.6900
941272	AE2-121 E	0.4607
941321	AE2-126 C	1.6775
941322	AE2-126 E	1.1183
941331	AE2-129 C	2.0951
941332	AE2-129 E	1.3967
941351	AE2-131 C	2.0951

Bus #	Bus	MW Impact
941352	AE2-131 E	1.3967
941421	AE2-139 C	5.8226
941422	AE2-139 E	3.8817
942121	AE2-224 C	21.1416
942122	AE2-224 E	14.0944
942351	AE2-248 C	1.0240
942352	AE2-248 E	0.6827
942361	AE2-249 C	2.4706
942362	AE2-249 E	1.6471
942491	AE2-262 C	5.7175
942492	AE2-262 E	3.8422
942501	AE2-263 C	5.3745
942502	AE2-263 E	3.5883
942511	AE2-264 C	9.4248
942512	AE2-264 E	6.2832
942811	AE2-299 C	3.0638
942812	AE2-299 E	12.2552
942961	AE2-316 C	5.0495
942962	AE2-316 E	7.2007
943151	AE2-344 C	6.5761
943152	AE2-344 E	4.3840
943351	AF1-006 C	0.6052
943352	AF1-006 E	0.3404
943711	AF1-039 C O2	0.6585
943712	AF1-039 E O2	0.4390
943751	AF1-043	6.2444
943871	AF1-055 C O2	2.4871
943872	AF1-055 E O2	1.6580
944001	AF1-068 C O2	0.7215
944002	AF1-068 E O2	0.4059
944181	AF1-086 C O2	2.1438
944182	AF1-086 E O2	9.3267
944261	AF1-094 C	0.6377
944262	AF1-094 E	0.4252
944281	AF1-096 C	0.7181
944282	AF1-096 E	0.4788
944301	AF1-098 C	2.5036
944302	AF1-098 E	1.6691
944311	AF1-099 C	4.6000
944312	AF1-099 E	3.0667
944321	AF1-100 C O2	9.7457
944322	AF1-100 E O2	6.4971
944381	AF1-103 O2	1.2700
944411	AF1-106 O2	1.2052
944471	AF1-112 C	0.6798
944472	AF1-112 E	0.4532
944671	AF1-132 C O2	0.6765
944672	AF1-132 E O2	0.4510
944691	AF1-134 C O1	0.9267
944692	AF1-134 E O1	0.9267
944701	AF1-135 C	1.1121
944702	AF1-135 E	0.7414

Bus #	Bus	MW Impact
944731	AF1-138 C O2	1.0270
944732	AF1-138 E O2	0.6847
944741	AF1-139 C O1	0.6610
944742	AF1-139 E O1	0.4407
944751	AF1-140 C	3.0100
944752	AF1-140 E	2.0067
944771	AF1-142 C	7.3600
944772	AF1-142 E	4.9066
944781	AF1-143 C	14.3742
944782	AF1-143 E	9.5828
944841	AF1-149 C	1.2926
944842	AF1-149 E	0.8618
944881	AF1-153 C O2	0.7832
944882	AF1-153 E O2	0.5221
944901	AF1-155 C	0.7830
944902	AF1-155 E	0.5220
945021	AF1-167 C	0.5693
945022	AF1-167 E	0.3796
945051	AF1-170 C	2.1816
945052	AF1-170 E	1.4544
945071	AF1-172 C	9.1571
945072	AF1-172 E	6.1047
945121	AF1-177	0.3175
945161	AF1-181	0.0524
945171	AF1-182	0.2622
945181	AF1-183	0.0713
945331	AF1-198	0.1635
945451	AF1-210 C	0.5334
945452	AF1-210 E	0.3556
945481	AF1-213 C	7.7751
945482	AF1-213 E	5.1834
945491	AF1-214 C	0.6852
945492	AF1-214 E	0.4568
945521	AF1-217 C O2	0.6013
945522	AF1-217 E O2	0.4009
945551	AF1-220 C	6.5248
945552	AF1-220 E	4.3523
945671	AF1-232 C O2	30.0290
945672	AF1-232 E O2	16.1694
945751	AF1-240 C O2	1.0522
945752	AF1-240 E O2	0.7015
945771	AF1-242 C	0.7830
945772	AF1-242 E	0.5220
945901	AF1-255 C	1.7354
945902	AF1-255 E	2.3965
946081	AF1-273 C O2	17.2344
946082	AF1-273 E O2	11.4896
946091	AF1-274 C	3.7434
946092	AF1-274 E	2.4956
946131	AF1-278	15.0426
946191	AF1-284 C O2	0.9146
946192	AF1-284 E O2	0.5487

Bus #	Bus	MW Impact
946211	AF1-286 C O2	0.4881
946212	AF1-286 E O2	0.3314
946221	AF1-287 C	0.6013
946222	AF1-287 E	0.4009
946241	AF1-289 C O2	7.3817
946242	AF1-289 E O2	4.9211
946381	AF1-302 C	1.1687
946382	AF1-302 E	1.5582
946401	AF1-304 C	3.6755
946402	AF1-304 E	2.4504
946421	AF1-306 C	3.8383
946422	AF1-306 E	15.3534
946431	AF1-307 C O2	14.3772
946432	AF1-307 E O2	9.5848
946571	AF1-321 C O2	3.8318
946572	AF1-321 E O2	2.5546
LGEE	LGEE	0.0667
WEC	WEC	0.0599
CBM-W2	CBM-W2	0.4259
CBM-W1	CBM-W1	3.6404
O-066	O-066	7.8019
CHEOAH	CHEOAH	0.0581
G-007	G-007	1.2979
MEC	MEC	0.2177
CALDERWOOD	CALDERWOOD	0.0547
CATAWBA	CATAWBA	0.1019

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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
41712602	999401	STAR592	PJM	200011	KEYSTONE	PJM	4	PJM500_PN_P4-500-001A	breaker	634.0	129.5	131.7	DC	13.69

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deativation : 06/07/19)	16.7325
200636	26IUP CO-G	0.4069
200794	26CONEMAGH	0.2755
200805	26COLVER13 (Deativation : 09/01/20)	19.5371
200809	26SITHE	1.2781
200833	26SEWRDB34	13.2926
200834	26SW_E13_K22	0.0419
200835	26DSGENWIN	0.2043
200837	26HOMER C1	22.0118
200838	26HOMER C2	18.4521
200839	26HOMER C3	19.5339
200846	26FORWARD	0.1497
200864	K-013 E	4.2904
200883	Q-053 E	7.8926
200886	26ARWF_N39	0.3654
200888	26HIGHLAND	0.3256
200889	26STNY CRK	0.2507
200890	26BF_G21_K23	0.1002
200891	26CSLMN_L13	0.1571
200892	26LOOKOUT	0.1493
200894	26K02	4.2783
200898	26AA1-106	1.6183
200906	26KEYSTN#3	0.6753
200915	26CHSTN_FL	0.1744
200925	26R32	0.3757
200945	26CT_V3-030	0.1279
201144	W3-099 C OP1	0.8862
201477	26Y2-055	2.5227
202158	26CON.GEN1	0.0706
202160	26CON.GEN2	0.0494
202225	26SCI_S29B	0.0652
203034	26NA_O38_P22	0.3198
203910	26Z1-091	1.4594
203999	P-047 E	7.6636
235003	AC1-025 E	0.1066
236828	01GRAYMONT	0.2892
290086	Q-036 E	4.7474
292350	K-023	4.6300
292542	L-013 1	4.5034
293301	N-039 E	10.4723
293393	V3-030E	4.8293
293432	R-040 E	0.2153

Bus #	Bus	MW Impact
293603	O-018 E	9.3319
293902	O-048 E	4.0530
294515	O38_P22	9.1633
294903	P-060 E	7.1841
296332	R-032 E	10.7676
903644	W3-099 E OP1	5.9308
913142	Y1-033 E OP1	3.1317
916202	Z1-069 E	6.1155
917672	Z2-108 E	2.1532
918682	AA1-082 E	4.1617
919201	AA1-144 OP	11.8405
919491	AA2-000	36.9701
920341	AA2-132	1.6166
922932	AB1-082 OP	2.2258
923443	AB1-160 E	1.7473
930511	AB1-092	1.3574
935191	AD1-154	2.3565
936421	AD2-055	2.7947
936991	AD2-133 C	2.1363
936992	AD2-133 E	9.7714
938351	AE1-053	1.1962
938881	AE1-116	0.7506
938951	AE1-123	1.6552
938991	AE1-128 C	12.7001
938992	AE1-128 E	8.4667
939171	AE1-147 C	0.8700
939172	AE1-147 E	0.5800
939291	AE1-160 C	1.0268
939292	AE1-160 E	0.5902
939381	AE1-169 C O1	4.1867
939382	AE1-169 E O1	2.7912
940201	AE2-001 C	0.8686
940202	AE2-001 E	0.5791
940681	AE2-055 C	0.8483
940682	AE2-055 E	0.5656
940861	AE2-074 C	1.6901
940862	AE2-074 E	2.2247
941191	AE2-113 C	6.6183
941192	AE2-113 E	7.1257
941231	AE2-117 C	1.0872
941232	AE2-117 E	0.7248
941241	AE2-118 C	1.0872
941242	AE2-118 E	0.7248
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.1764
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7842
941261	AE2-120 C	0.8679
941262	AE2-120 E	0.5786
941271	AE2-121 C	0.4638
941272	AE2-121 E	0.3097
941321	AE2-126 C	1.1560
941322	AE2-126 E	0.7706
941331	AE2-129 C	1.3127

Bus #	Bus	MW Impact
941332	AE2-129 E	0.8752
941351	AE2-131 C	1.3127
941352	AE2-131 E	0.8752
941421	AE2-139 C	4.4582
941422	AE2-139 E	2.9721
942121	AE2-224 C	11.0976
942122	AE2-224 E	7.3984
942351	AE2-248 C	0.6854
942352	AE2-248 E	0.4570
942361	AE2-249 C	1.4288
942362	AE2-249 E	0.9525
942491	AE2-262 C	3.9062
942492	AE2-262 E	2.6249
942501	AE2-263 C	3.6718
942502	AE2-263 E	2.4515
942511	AE2-264 C	5.1734
942512	AE2-264 E	3.4490
942811	AE2-299 C	2.2018
942812	AE2-299 E	8.8074
942961	AE2-316 C	3.5892
942962	AE2-316 E	5.1182
943151	AE2-344 C	4.6968
943152	AE2-344 E	3.1312
943351	AF1-006 C	0.4299
943352	AF1-006 E	0.2418
943711	AF1-039 C O2	0.3793
943712	AF1-039 E O2	0.2528
943751	AF1-043	4.4436
943871	AF1-055 C O2	1.8147
943872	AF1-055 E O2	1.2098
944001	AF1-068 C O2	0.4826
944002	AF1-068 E O2	0.2715
944181	AF1-086 C O2	3.3026
944182	AF1-086 E O2	14.3682
944261	AF1-094 C	0.4556
944262	AF1-094 E	0.3037
944281	AF1-096 C	0.5142
944282	AF1-096 E	0.3428
944301	AF1-098 C	1.7941
944302	AF1-098 E	1.1961
944311	AF1-099 C	3.1427
944312	AF1-099 E	2.0951
944321	AF1-100 C O2	6.6899
944322	AF1-100 E O2	4.4599
944381	AF1-103 O2	0.9216
944391	AF1-104 O2	0.6234
944411	AF1-106 O2	0.9338
944471	AF1-112 C	0.4553
944472	AF1-112 E	0.3035
944671	AF1-132 C O2	0.4524
944672	AF1-132 E O2	0.3016
944691	AF1-134 C O1	1.4096

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.4096
944701	AF1-135 C	1.6915
944702	AF1-135 E	1.1277
944731	AF1-138 C O2	0.5762
944732	AF1-138 E O2	0.3842
944741	AF1-139 C O1	0.5167
944742	AF1-139 E O1	0.3444
944751	AF1-140 C	1.6938
944752	AF1-140 E	1.1292
944771	AF1-142 C	5.0283
944772	AF1-142 E	3.3522
944781	AF1-143 C	8.4438
944782	AF1-143 E	5.6292
944841	AF1-149 C	0.8678
944842	AF1-149 E	0.5785
944881	AF1-153 C O2	0.5496
944882	AF1-153 E O2	0.3664
944901	AF1-155 C	0.5495
944902	AF1-155 E	0.3663
945021	AF1-167 C	0.4031
945022	AF1-167 E	0.2687
945051	AF1-170 C	1.5485
945052	AF1-170 E	1.0323
945071	AF1-172 C	6.4352
945072	AF1-172 E	4.2901
945121	AF1-177	0.2304
945161	AF1-181	0.0359
945171	AF1-182	0.1795
945181	AF1-183	0.0483
945331	AF1-198	0.1254
945451	AF1-210 C	0.3750
945452	AF1-210 E	0.2500
945481	AF1-213 C	5.2754
945482	AF1-213 E	3.5170
945491	AF1-214 C	0.4600
945492	AF1-214 E	0.3067
945521	AF1-217 C O2	0.4297
945522	AF1-217 E O2	0.2864
945551	AF1-220 C	4.5899
945552	AF1-220 E	3.0616
945671	AF1-232 C O2	17.6332
945672	AF1-232 E O2	9.4948
945751	AF1-240 C O2	0.7494
945752	AF1-240 E O2	0.4996
945771	AF1-242 C	0.5495
945772	AF1-242 E	0.3663
945901	AF1-255 C	0.9932
945902	AF1-255 E	1.3715
946081	AF1-273 C O2	10.1352
946082	AF1-273 E O2	6.7568
946091	AF1-274 C	2.5949
946092	AF1-274 E	1.7299

Bus #	Bus	MW Impact
946131	AF1-278	11.2469
946191	AF1-284 C O2	0.5267
946192	AF1-284 E O2	0.3160
946211	AF1-286 C O2	0.3782
946212	AF1-286 E O2	0.2568
946221	AF1-287 C	0.4297
946222	AF1-287 E	0.2864
946241	AF1-289 C O2	4.1618
946242	AF1-289 E O2	2.7746
946381	AF1-302 C	0.8307
946382	AF1-302 E	1.1076
946401	AF1-304 C	2.6330
946402	AF1-304 E	1.7553
946421	AF1-306 C	2.6955
946422	AF1-306 E	10.7819
946431	AF1-307 C O2	8.2138
946432	AF1-307 E O2	5.4759
946571	AF1-321 C O2	2.6302
946572	AF1-321 E O2	1.7534
DUCKCREEK	DUCKCREEK	0.5619
NEWTON	NEWTON	0.5458
FARMERCITY	FARMERCITY	0.0284
PRAIRIE	PRAIRIE	1.3354
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1698
CHEOAH	CHEOAH	0.2933
TILTON	TILTON	0.3112
G-007	G-007	0.0426
MADISON	MADISON	0.0262
GIBSON	GIBSON	0.2790
CALDERWOOD	CALDERWOOD	0.2907
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2905
CATAWBA	CATAWBA	0.2188

Short Circuit

12.6 Short Circuit

The following Breakers are overdutied:

None

Affected Systems

13 Affected Systems

13.1 LG&E

LG&E Impacts to be determined during later study phases (as applicable).

13.2 MISO

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

13.3 TVA

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

13.4 Duke Energy Progress

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

13.5 NYISO

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

Attachment 1

System Configuration