



**Generation Interconnection
Feasibility Study Report
for
Queue Project AF1-220
RIDGWAY-WHETSTONE 115 KV
91 MW Capacity / 151.7 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.

An Interconnection Customer with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

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 Elk County, Pennsylvania. The installed facilities will have a total capability of 151.7 MW with 91 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is March 1, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF1-220
Project Name	RIDGWAY-WHETSTONE 115 KV
State	Pennsylvania
County	Elk
Transmission Owner	MAIT/PENELEC zone
MFO	151.7
MWE	151.7
MWC	91
Fuel	Solar
Basecase Study Year	2023

3.1 Point of Interconnection

The interconnection of the project to the Penelec system will be accomplished by constructing a new 115 kV three (3) breaker ring bus substation and looping the Ridgway - Whetstone 115 kV line into the new station. The new substation will be located approximately 8.5 miles from Whetstone 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 Ridgway and Whetstone substations.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF1-220 generation project to connect to the FirstEnergy ("FE") transmission system. IC will be responsible for constructing the facilities on its side of the POI, including the attachment facilities which connect the generator to the FE transmission system's direct connection facilities.

3.2 Cost Summary

The AF1-220 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$ 307,300
Direct Connection Network Upgrade	\$6,963,800
Non Direct Connection Network Upgrades	\$3,464,100
Total Costs	\$10,735,200

In addition, the AF1-220 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$762,983,500

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

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 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 required Attachment Facilities and Direct and Non-Direct Connection work for the interconnection of the AF1-220 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 Transmission Owner Scope of Work

The interconnection of the project to the Penelec system will be accomplished by constructing a new 115 kV three (3) breaker ring bus substation and looping the Ridgway - Whetstone 115 kV line into the new station. The new substation will be located approximately 8.5 miles from Whetstone 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 Ridgway and Whetstone substations.

5 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
Install 115 kV terminal position for the AF1-220 generator lead line.	\$242,700
Review drawings and provide nameplates for customer's switchyard.	\$64,600
Total Attachment Facility Costs	\$307,300

6 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 115 kV three breaker ring bus interconnection substation.	\$6,963,800
Total Direct Connection Facility Costs	\$6,963,800

7 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 Ridgway - Whetstone 115 kV line into the new interconnection substation.	\$1,104,900

Description	Total Cost
Upgrade relaying and install anti-islanding at Ridgway substation.	\$589,800
Upgrade relaying and install anti-islanding at Whetstone substation.	\$589,800
Upgrade relaying and install anti-islanding at Dubois substation.	\$589,800
Install anti-islanding at Shawville substation.	\$589,800
Total Non-Direct Connection Facility Costs	\$3,464,100

8 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 **20 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 Attachment Facilities and Direct Connection work. Full initial deposit is required for the Non-Direct Connection work. 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.

9 Transmission Owner Analysis

9.1 Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AF1-220 project did not contribute to any overloads on the FE transmission <100 kV system.

10 Interconnection Customer Requirements

10.1 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.

10.2 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 AF1-220 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 AF1-220 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.

10.3 Power Factor Requirements

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

11 Revenue Metering and SCADA Requirements

11.1 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.

11.1.1 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

11.2 FirstEnergy Requirements

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

12 Network Impacts

The Queue Project AF1-220 was evaluated as a 151.7 MW (Capacity 91.0 MW) injection tapping the Whetstone to Ridgway 115 kV substation in the MAIT/PENELEC area. Project AF1-220 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-220 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

13 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 LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
42539241	919200	AA1-144 TAP	230.0	PENELEC	200940	26SCOTCHHLLW	230.0	PENELEC	1	AP-P1-3-WP-230-326T	single	621.0	98.14	100.17	DC	12.6

14 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
41631210	200582	26RIDGWAY	115.0	PENELEC	200647	26FOREST	115.0	PENELEC	1	AP-P2-3-WP-230-446T	breaker	277.0	87.19	115.59	DC	78.62
41631211	200582	26RIDGWAY	115.0	PENELEC	200647	26FOREST	115.0	PENELEC	1	AP-P2-2-WP-230-001T	breaker	277.0	87.12	115.52	DC	78.62
41855601	200582	26RIDGWAY	115.0	PENELEC	200647	26FOREST	115.0	PENELEC	1	AP-P2-2-WP-230-001T	bus	277.0	87.12	115.52	DC	78.62
41631066	200711	26WHETSTON	115.0	PENELEC	200720	26HARVY.RU	115.0	PENELEC	1	AP-P2-3-WP-230-708DT	breaker	172.0	74.18	104.37	DC	52.0
41630967	200720	26HARVY.RU	115.0	PENELEC	200712	26DUBOIS	115.0	PENELEC	1	PN-P2-3-PN-230-7AT	breaker	179.0	56.74	102.94	DC	82.71
41855526	200720	26HARVY.RU	115.0	PENELEC	200712	26DUBOIS	115.0	PENELEC	1	PN-P2-2-PN-230-012T	bus	179.0	56.74	102.94	DC	82.71
41631089	945550	AF1-220 TAP	115.0	PENELEC	200582	26RIDGWAY	115.0	PENELEC	1	AP-P2-3-WP-230-446T	breaker	239.0	75.88	120.29	DC	106.07
41631090	945550	AF1-220 TAP	115.0	PENELEC	200582	26RIDGWAY	115.0	PENELEC	1	AP-P2-2-WP-230-001T	breaker	239.0	75.8	120.21	DC	106.07
41855545	945550	AF1-220 TAP	115.0	PENELEC	200582	26RIDGWAY	115.0	PENELEC	1	AP-P2-2-WP-230-001T	bus	239.0	75.8	120.21	DC	106.07

15 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 LOADIN G %	POST PROJE CT LOADIN G %	AC/D C	MW IMPA CT
413123 83	20051 2	26LEWISTWN	115.0	PENEL EC	20051 9	26REED TAP	115.0	PENEL EC	1	PL_P12_1006 18	single	225.0	104.56	107.02	DC	5.54
413123 84	20051 2	26LEWISTWN	115.0	PENEL EC	20051 9	26REED TAP	115.0	PENEL EC	1	PN-P1-2-PN-230-103T	single	225.0	103.2	105.66	DC	5.54
416312 23	20051 2	26LEWISTWN	115.0	PENEL EC	20051 9	26REED TAP	115.0	PENEL EC	1	PL_P42_1005 48	breaker	225.0	108.87	110.73	DC	9.26
416309 10	20051 3	26LEWISTWN	230.0	PENEL EC	20800 5	JUNI BU2	230.0	PPL	1	AP-P2-3-WP-230-446T	breaker	624.0	143.31	146.27	DC	18.47
418554 30	20051 3	26LEWISTWN	230.0	PENEL EC	20800 5	JUNI BU2	230.0	PPL	1	PN-P2-2-PN-115-032	bus	624.0	133.8	135.77	DC	28.46
413123 10	20051 9	26REED TAP	115.0	PENEL EC	20052 2	26SHADE GP	115.0	PENEL EC	1	PL_P12_1006 18	single	225.0	104.63	107.1	DC	5.54
413123 11	20051 9	26REED TAP	115.0	PENEL EC	20052 2	26SHADE GP	115.0	PENEL EC	1	PN-P1-2-PN-230-103T	single	225.0	103.28	105.74	DC	5.54
416311 21	20051 9	26REED TAP	115.0	PENEL EC	20052 2	26SHADE GP	115.0	PENEL EC	1	PL_P42_1005 48	breaker	225.0	112.89	114.74	DC	9.26
413119 76	20052 2	26SHADE GP	115.0	PENEL EC	93838 0	AE1-071 TAP	115.0	PENEL EC	1	PL_P12_1006 18	single	160.0	132.14	135.61	DC	5.54
413119 77	20052 2	26SHADE GP	115.0	PENEL EC	93838 0	AE1-071 TAP	115.0	PENEL EC	1	PN-P1-2-PN-230-103T	single	160.0	130.24	133.7	DC	5.54
416312 42	20052 7	26TYRONE N	115.0	PENEL EC	20052 8	26WESTFA LL	115.0	PENEL EC	1	AP-P2-3-WP-230-460T	breaker	237.0	107.46	110.05	DC	13.62
422353 11	20059 3	26GLADE	230.0	PENEL EC	20081 1	26WARRE N	230.0	PENEL EC	1	PN-P2-3-PN-345-003A	breaker	621.0	161.42	165.56	DC	25.9
425394 18	20059 3	26GLADE	230.0	PENEL EC	20081 1	26WARRE N	230.0	PENEL EC	1	Base Case	single	520.0	130.56	133.46	DC	15.2
425394 20	20059 3	26GLADE	230.0	PENEL EC	20081 1	26WARRE N	230.0	PENEL EC	1	PN-P1-2-PN-345-003	single	621.0	128.41	130.87	DC	15.43
495961 19	20059 9	26ERIE W	345.0	PENEL EC	23854 7	02AT	345.0	ATSI	1	Base Case	single	1560.0	110.67	111.87	DC	18.78
425393 14	20067 5	26E.TWANDA	230.0	PENEL EC	20092 4	26CANYON	230.0	PENEL EC	1	Base Case	single	515.0	116.01	117.65	DC	8.47
413120 69	20071 4	26SHAWVL 1	115.0	PENEL EC	20087 2	26BIOEN TP	115.0	PENEL EC	1	AP-P1-2-WP-230-323T	single	185.0	105.31	110.07	DC	8.8
413120 70	20071 4	26SHAWVL 1	115.0	PENEL EC	20087 2	26BIOEN TP	115.0	PENEL EC	1	AP-P1-3-WP-230-326T	single	185.0	105.03	109.79	DC	8.81
416311 56	20071 4	26SHAWVL 1	115.0	PENEL EC	20072 7	26SHAW. 2	115.0	PENEL EC	ZB	PN-P2-3-PN-230-21DT	breaker	191.0	105.01	115.88	DC	20.78
416311 57	20071 4	26SHAWVL 1	115.0	PENEL EC	20072 7	26SHAW. 2	115.0	PENEL EC	ZB	PN-P2-3-PN-115-28B_A	breaker	191.0	102.89	113.98	DC	21.19
416311 58	20071 4	26SHAWVL 1	115.0	PENEL EC	20072 7	26SHAW. 2	115.0	PENEL EC	ZB	PN-P2-3-PN-115-59B	breaker	191.0	102.89	113.98	DC	21.19
418554 26	20071 4	26SHAWVL 1	115.0	PENEL EC	99939 4	STAR599	1.0	PENEL EC	1A	PN-P2-2-PN-230-014T	bus	126.0	155.57	159.07	DC	9.78
418555 80	20071 4	26SHAWVL 1	115.0	PENEL EC	20072 7	26SHAW. 2	115.0	PENEL EC	ZB	PN-P2-2-PN-230-013T	bus	191.0	104.95	115.83	DC	20.78
413121 20	20071 6	26PHILIPSB	115.0	PENEL EC	20090 4	26EAGL VAL	115.0	PENEL EC	1	AP-P1-2-WP-230-323T	single	174.0	113.29	117.98	DC	8.17
413121 21	20071 6	26PHILIPSB	115.0	PENEL EC	20090 4	26EAGL VAL	115.0	PENEL EC	1	AP-P1-3-WP-230-326T	single	174.0	113.0	117.7	DC	8.17
416310 12	20071 6	26PHILIPSB	115.0	PENEL EC	20090 4	26EAGL VAL	115.0	PENEL EC	1	AP-P2-3-WP-230-460T	breaker	174.0	123.95	127.49	DC	13.63
413119 21	20072 6	26SHAWVL 2	230.0	PENEL EC	23524 8	01SHINGL	230.0	AP	1	AP-P1-3-WP-230-005	single	554.0	120.69	123.54	DC	16.34
413119 22	20072 6	26SHAWVL 2	230.0	PENEL EC	23524 8	01SHINGL	230.0	AP	1	AP-P1-2-WP-230-005B	single	554.0	120.69	123.54	DC	16.34
413119 23	20072 6	26SHAWVL 2	230.0	PENEL EC	23524 8	01SHINGL	230.0	AP	1	AP-P1-2-WP-230-005A	single	554.0	108.16	110.97	DC	16.34

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 LOADIN G %	POST PROJE CT LOADIN G %	AC/D C	MW IMPA CT
413121 40	20072 7	26SHAW. 2	115.0	PENEL EC	20071 6	26PHILIPSB	115.0	PENEL EC	1	AP-P1-2-WP-230-323T	single	185.0	118.57	122.99	DC	8.17
413121 41	20072 7	26SHAW. 2	115.0	PENEL EC	20071 6	26PHILIPSB	115.0	PENEL EC	1	AP-P1-3-WP-230-326T	single	185.0	118.36	122.78	DC	8.17
416310 22	20072 7	26SHAW. 2	115.0	PENEL EC	20071 6	26PHILIPSB	115.0	PENEL EC	1	AP-P2-3-WP-230-460T	breaker	185.0	124.15	127.47	DC	13.63
422352 26	20076 7	26HOMER CT	230.0	PENEL EC	20079 5	26SHELOC TA	230.0	PENEL EC	1	PN_P4-500-002A	breaker	917.0	155.64	156.99	DC	26.96
422352 27	20076 7	26HOMER CT	230.0	PENEL EC	20079 5	26SHELOC TA	230.0	PENEL EC	1	PN_P4-500-002F	breaker	917.0	155.65	157.0	DC	26.96
425393 40	20076 7	26HOMER CT	230.0	PENEL EC	20079 5	26SHELOC TA	230.0	PENEL EC	1	Base Case	single	731.0	115.85	116.62	DC	12.2
425393 41	20076 7	26HOMER CT	230.0	PENEL EC	20079 5	26SHELOC TA	230.0	PENEL EC	1	PN-P1-3-PN-230-001T	single	917.0	109.04	109.85	DC	16.2
425393 42	20076 7	26HOMER CT	230.0	PENEL EC	20079 5	26SHELOC TA	230.0	PENEL EC	1	PN-P1-2-PN-230-025	single	917.0	109.04	109.85	DC	16.2
422354 50	20076 9	26HOMER CY	345.0	PENEL EC	99939 2	STAR601	1.0	PENEL EC	N	PN-P2-3-PN-230-9E	breaker	807.0	129.51	130.75	DC	21.76
422352 36	20079 5	26SHELOCTA	230.0	PENEL EC	20081 0	26KEYSTO NE	230.0	PENEL EC	1	PN_P4-500-002F	breaker	917.0	136.42	137.91	DC	29.92
422352 37	20079 5	26SHELOCTA	230.0	PENEL EC	20081 0	26KEYSTO NE	230.0	PENEL EC	1	PN_P4-500-002A	breaker	917.0	136.42	137.91	DC	29.92
418555 60	20080 1	26GARMAN	115.0	PENEL EC	20050 7	26GLORY	115.0	PENEL EC	1	PN-P2-2-PN-230-007T	bus	233.0	117.82	120.38	DC	13.23
422353 42	20081 0	26KEYSTONE	230.0	PENEL EC	99940 1	STAR592	1.0	PJM	4	PJM500_PN_P4-500-001A	breaker	635.0	113.94	115.17	DC	16.98
422353 43	20081 0	26KEYSTONE	230.0	PENEL EC	99940 1	STAR592	1.0	PJM	4	PJM500_PN_P4-500-001D	breaker	635.0	113.93	115.15	DC	16.98
422355 89	20081 1	26WARREN	230.0	PENEL EC	20091 8	26ERIE S TIE	230.0	PENEL EC	1	PN-P2-3-PN-115-71CT	breaker	621.0	118.48	122.14	DC	22.97
422355 90	20081 1	26WARREN	230.0	PENEL EC	20091 8	26ERIE S TIE	230.0	PENEL EC	1	PN-P2-3-PN-115-71ET	breaker	621.0	118.48	122.14	DC	22.97
468671 52	20081 1	26WARREN	230.0	PENEL EC	20091 8	26ERIE S TIE	230.0	PENEL EC	1	PN-P2-3-PN-345-003A	breaker	621.0	121.97	125.28	DC	20.53
416309 81	20090 4	26EAGL VAL	115.0	PENEL EC	20052 7	26TYRONE N	115.0	PENEL EC	1	PN-P2-3-PN-115-28B_A	breaker	191.0	135.42	138.27	DC	12.06
416309 82	20090 4	26EAGL VAL	115.0	PENEL EC	20052 7	26TYRONE N	115.0	PENEL EC	1	PN-P2-3-PN-115-59B	breaker	191.0	135.42	138.27	DC	12.06
418554 17	20090 4	26EAGL VAL	115.0	PENEL EC	20052 7	26TYRONE N	115.0	PENEL EC	1	AP-P2-2-WP-230-005T	bus	191.0	155.13	158.34	DC	13.62
425394 10	20092 4	26CANYON	230.0	PENEL EC	20070 6	26N.MESH PN	230.0	PENEL EC	1	Base Case	single	546.0	108.43	109.98	DC	8.47
416311 06	20092 7	26FOURMILE	115.0	PENEL EC	20082 0	26ERIE SE	115.0	PENEL EC	1	PN-P2-3-PN-230-6G	breaker	245.0	156.54	158.14	DC	8.69
425392 17	20094 0	26SCOTCHHL LW	230.0	PENEL EC	20067 5	26E.TWAN DA	230.0	PENEL EC	1	AP-P1-3-WP-230-326T	single	570.0	104.61	106.82	DC	12.6
422354 75	20800 5	JUNI BU2	230.0	PPL	20800 4	JUNI BU1	230.0	PPL	1	PL_P42_0004 51	breaker	641.0	104.92	106.02	DC	16.06
413117 77	23524 8	01SHINGL	230.0	AP	20051 3	26LEWIST WN	230.0	PENEL EC	1	Base Case	single	491.0	140.11	144.02	DC	19.86
416307 83	23524 8	01SHINGL	230.0	AP	20051 3	26LEWIST WN	230.0	PENEL EC	1	AP-P2-3-WP-230-446T	breaker	570.0	206.44	208.12	DC	21.34
416307 84	23524 8	01SHINGL	230.0	AP	20051 3	26LEWIST WN	230.0	PENEL EC	1	AP-P2-3-WP-230-443T *	breaker	570.0	206.3	207.98	DC	21.34
416307 85	23524 8	01SHINGL	230.0	AP	20051 3	26LEWIST WN	230.0	PENEL EC	1	AP-P2-2-WP-230-001T	breaker	570.0	206.3	207.98	DC	21.34
418553 30	23524 8	01SHINGL	230.0	AP	20051 3	26LEWIST WN	230.0	PENEL EC	1	AP-P2-2-WP-230-001T	bus	570.0	206.3	207.98	DC	21.34
495957 59	23524 8	01SHINGL	230.0	AP	20051 3	26LEWIST WN	230.0	PENEL EC	1	PN-P1-2-PN-230-004	single	570.0	136.89	140.75	DC	22.05
427673 64	23903 6	02PERRY	345.0	ATSI	23933 4	02L.CENTE R	345.0	ATSI	1	ATSI-P7-1-CEI-345-012	tower	1667.0	135.46	136.03	DC	20.81
427674 34	23903 6	02PERRY	345.0	ATSI	23868 4	02EASTLK	345.0	ATSI	1	ATSI-P7-1-CEI-345-016	tower	1667.0	127.53	128.08	DC	20.1

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 LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
41630956	941190	AE2-113 TAP	115.0	PENEL EC	200668	26FARM VLY	115.0	PENEL EC	1	PN-P2-3-PN-230-8M_SUM_WI N	breaker	160.0	104.53	124.71	DC	32.29
42235455	999392	STAR601	1.0	PENEL EC	200767	26HOMER CT	230.0	PENEL EC	N	PN-P2-3-PN-230-9E	breaker	807.0	129.51	130.75	DC	21.76
41631037	999401	STAR592	1.0	PJM	200011	KEYSTONE	500.0	PJM	4	PJM500_PN_P4-500-001D	breaker	634.0	113.38	114.61	DC	16.98
41631038	999401	STAR592	1.0	PJM	200011	KEYSTONE	500.0	PJM	4	PJM500_PN_P4-500-001A	breaker	634.0	113.38	114.61	DC	16.98

16 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 PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
41312381	200512	26LEWISTW N	115.0	PENEL EC	200519	26REED TAP	115.0	PENEL EC	1	PL_P12_100618	operation	225.0	107.44	109.29	DC	9.24
41311895	200513	26LEWISTW N	230.0	PENEL EC	208005	JUNI BU2	230.0	PPL	1	Base Case	operation	493.0	141.86	144.13	DC	25.84
41311896	200513	26LEWISTW N	230.0	PENEL EC	208005	JUNI BU2	230.0	PPL	1	PN-P1-2-PN-115-094-A	operation	624.0	133.76	135.73	DC	28.47
41312308	200519	26REED TAP	115.0	PENEL EC	200522	26SHADE GP	115.0	PENEL EC	1	PL_P12_100618	operation	225.0	111.45	113.3	DC	9.24
41311974	200522	26SHADE GP	115.0	PENEL EC	938380	AE1-071 TAP	115.0	PENEL EC	1	PL_P12_100618	operation	160.0	141.73	144.33	DC	9.24
41312385	200527	26TYRONE N	115.0	PENEL EC	200528	26WESTFALL	115.0	PENEL EC	1	AP-P1-2-WP-230-323T	operation	237.0	107.32	109.91	DC	13.6
42539414	200593	26GLADE	230.0	PENEL EC	200811	26WARREN	230.0	PENEL EC	1	Base Case	operation	520.0	159.82	164.67	DC	25.35
42539415	200593	26GLADE	230.0	PENEL EC	200811	26WARREN	230.0	PENEL EC	1	PN-P1-2-PN-345-003	operation	621.0	159.46	163.57	DC	25.72
41312757	200599	26ERIE W	345.0	PENEL EC	238547	02AT	345.0	ATSI	1	Base Case	operation	1560.0	129.8	130.7	DC	31.31
41312758	200599	26ERIE W	345.0	PENEL EC	238547	02AT	345.0	ATSI	1	ATSI-P1-1-CEI-345-711	operation	1900.0	118.24	118.98	DC	31.31
42539309	200675	26E.TWAND A	230.0	PENEL EC	200924	26CANYON	230.0	PENEL EC	1	Base Case	operation	515.0	131.64	132.89	DC	14.12
41312611	200711	26WHETSTO N	115.0	PENEL EC	200720	26HARVY.RU	115.0	PENEL EC	1	AP-P1-2-WP-230-321T	operation	172.0	74.3	104.51	DC	52.04
41312067	200714	26SHAWVL 1	115.0	PENEL EC	200872	26BIOEN TP	115.0	PENEL EC	1	AP-P1-2-WP-230-323T	operation	185.0	148.13	151.71	DC	14.68
41312078	200714	26SHAWVL 1	115.0	PENEL EC	200872	26BIOEN TP	115.0	PENEL EC	1	Base Case	operation	163.0	100.19	103.29	DC	11.22

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 LOADI NG %	POST PROJE CT LOADI NG %	AC D C	MW IMPA CT
413123 40	2007 14	26SHAWVL 1	115. 0	PENEL EC	2007 27	26SHAW. 2	115. 0	PENEL EC	ZB	PN-P1-2-PN-115-048	operati on	191.0	102.52	113.62	DC	21.19
413121 18	2007 16	26PHILIPSB	115. 0	PENEL EC	2009 04	26EAGL VAL	115. 0	PENEL EC	1	AP-P1-2-WP-230-323T	operati on	174.0	123.79	127.32	DC	13.61
413122 45	2007 17	26MADERA	115. 0	PENEL EC	9441 80	AF1-086 TAP	115. 0	PENEL EC	1	AP-P1-2-WP-230-323T	operati on	237.0	116.8	119.59	DC	14.68
413119 16	2007 26	26SHAWVL 2	230. 0	PENEL EC	2352 48	01SHINGL	230. 0	AP	1	AP-P1-3-WP-230-005	operati on	554.0	144.97	149.7	DC	27.23
413119 17	2007 26	26SHAWVL 2	230. 0	PENEL EC	2352 48	01SHINGL	230. 0	AP	1	AP-P1-2-WP-230-005B	operati on	554.0	144.97	149.7	DC	27.23
413121 38	2007 27	26SHAW. 2	115. 0	PENEL EC	2007 16	26PHILIPSB	115. 0	PENEL EC	1	AP-P1-2-WP-230-323T	operati on	185.0	124.02	127.34	DC	13.61
413120 22	2007 55	26WESTOVE R	115. 0	PENEL EC	2008 01	26GARMAN	115. 0	PENEL EC	1	AP-P1-2-WP-230-323T	operati on	246.0	142.52	145.21	DC	14.68
413120 24	2007 55	26WESTOVE R	115. 0	PENEL EC	2008 01	26GARMAN	115. 0	PENEL EC	1	Base Case	operati on	193.0	120.95	123.57	DC	11.22
425393 34	2007 67	26HOMER CT	230. 0	PENEL EC	2007 95	26SHELOCTA	230. 0	PENEL EC	1	PN-P1-3-PN-230-001T	operati on	917.0	150.94	152.29	DC	27.0
425393 35	2007 67	26HOMER CT	230. 0	PENEL EC	2007 95	26SHELOCTA	230. 0	PENEL EC	1	PN-P1-3-PN-230-025	operati on	917.0	150.94	152.29	DC	27.0
425393 36	2007 67	26HOMER CT	230. 0	PENEL EC	2007 95	26SHELOCTA	230. 0	PENEL EC	1	Base Case	operati on	731.0	153.77	155.04	DC	20.33
425398 73	2007 69	26HOMER CY	345. 0	PENEL EC	9993 92	STAR601	1.0	PENEL EC	N	PN-P1-3-PN-230-004A	operati on	807.0	112.08	113.33	DC	21.9
425399 03	2007 69	26HOMER CY	345. 0	PENEL EC	9993 91	STAR602	1.0	PENEL EC	S	PN-P1-3-PN-230-003A	operati on	824.0	109.17	110.39	DC	21.78
425393 50	2007 95	26SHELOCTA	230. 0	PENEL EC	2008 10	26KEYSTONE	230. 0	PENEL EC	1	PN-P1-3-PN-230-025	operati on	917.0	131.08	132.57	DC	29.97
425393 51	2007 95	26SHELOCTA	230. 0	PENEL EC	2008 10	26KEYSTONE	230. 0	PENEL EC	1	PN-P1-3-PN-230-001T	operati on	917.0	131.08	132.57	DC	29.97
425393 52	2007 95	26SHELOCTA	230. 0	PENEL EC	2008 10	26KEYSTONE	230. 0	PENEL EC	1	Base Case	operati on	731.0	132.89	134.32	DC	22.94
413122 65	2008 01	26GARMAN	115. 0	PENEL EC	2005 07	26GLORY	115. 0	PENEL EC	1	AP-P1-2-WP-230-323T	operati on	233.0	117.27	119.82	DC	13.19
425395 50	2008 10	26KEYSTONE	230. 0	PENEL EC	9994 01	STAR592	1.0	PJM	4	PN-P1-3-PN-500-001AT	operati on	635.0	107.56	108.78	DC	17.03
425397 74	2008 11	26WARREN	230. 0	PENEL EC	2009 18	26ERIE S TIE	230. 0	PENEL EC	1	Base Case	operati on	520.0	117.94	121.81	DC	20.07
425397 78	2008 11	26WARREN	230. 0	PENEL EC	2009 18	26ERIE S TIE	230. 0	PENEL EC	1	PN-P1-2-PN-345-003	operati on	621.0	120.18	123.46	DC	20.36
413125 67	2008 72	26BIOEN TP	115. 0	PENEL EC	9454 80	AF1-213 TAP	115. 0	PENEL EC	1	AP-P1-2-WP-230-323T	operati on	242.0	109.77	112.51	DC	14.68
413119 29	2009 04	26EAGL VAL	115. 0	PENEL EC	2005 27	26TYRONE N	115. 0	PENEL EC	1	PN-P1-2-PN-115-048	operati on	191.0	135.27	138.12	DC	12.06
413119 32	2009 04	26EAGL VAL	115. 0	PENEL EC	2005 27	26TYRONE N	115. 0	PENEL EC	1	Base Case	operati on	147.0	121.32	124.4	DC	10.01
425394 05	2009 24	26CANYON	230. 0	PENEL EC	2007 06	26N.MESHP N	230. 0	PENEL EC	1	Base Case	operati on	546.0	123.18	124.36	DC	14.12
425392 18	2009 40	26SCOTCHHL LW	230. 0	PENEL EC	2006 75	26E.TWAND A	230. 0	PENEL EC	1	Base Case	operati on	491.0	107.07	108.29	DC	13.51
425396 81	2080 05	JUNI BU2	230. 0	PPL	2080 04	JUNI BU1	230. 0	PPL	1	PL_P12_000 196	operati on	641.0	100.47	101.56	DC	15.87
425396 82	2080 05	JUNI BU2	230. 0	PPL	2080 04	JUNI BU1	230. 0	PPL	1	PL_P12_100 598	operati on	641.0	100.47	101.56	DC	15.87
425396 83	2080 05	JUNI BU2	230. 0	PPL	2080 04	JUNI BU1	230. 0	PPL	1	PL_P21_000 305	operati on	641.0	100.47	101.56	DC	15.87
413117 71	2352 48	01SHINGL	230. 0	AP	2005 13	26LEWISTW N	230. 0	PENEL EC	1	Base Case	operati on	491.0	183.01	189.53	DC	33.1
413117 74	2352 48	01SHINGL	230. 0	AP	2005 13	26LEWISTW N	230. 0	PENEL EC	1	AP-P1-2-WP-230-324T_FSA_B	operati on	570.0	180.16	186.67	DC	38.17
495957 54	2352 48	01SHINGL	230. 0	AP	2005 13	26LEWISTW N	230. 0	PENEL EC	1	200909 26LOBO+ 230 919490 AA2-000 TAP 230 1	operati on	570.0	180.16	186.67	DC	38.17

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 PROJECTIONS T LOADING %	POST PROJECTIONS T LOADING %	AC/D C	MW IMPACT
49596585	238547	02AT	345.0	ATSI	239036	02PERRY	345.0	ATSI	1	ATSI-P1-3-SYS-345-722	operation	1891.0	102.3	103.03	DC	30.42
42539240	919200	AA1-144 TAP	230.0	PENEL EC	200940	26SCOTCHHILL	230.0	PENEL EC	1	Base Case	operation	520.0	103.64	104.79	DC	13.51
41312203	941190	AE2-113 TAP	115.0	PENEL EC	200668	26FARM VLY	115.0	PENEL EC	1	PN-P1-2-PN-230-006	operation	160.0	89.1	109.3	DC	32.31
41311978	944180	AF1-086 TAP	115.0	PENEL EC	200755	26WESTOVER	115.0	PENEL EC	1	AP-P1-2-WP-230-323T	operation	237.0	148.7	151.49	DC	14.68
41311980	944180	AF1-086 TAP	115.0	PENEL EC	200755	26WESTOVER	115.0	PENEL EC	1	Base Case	operation	175.0	134.36	137.25	DC	11.22
41312588	944300	AF1-098 TAP	115.0	PENEL EC	200927	26FOURMILE	115.0	PENEL EC	1	PN-P1-2-PN-230-003	operation	245.0	107.86	109.73	DC	10.15
41312252	945480	AF1-213 TAP	115.0	PENEL EC	200717	26MADERA	115.0	PENEL EC	1	AP-P1-2-WP-230-323T	operation	242.0	116.33	119.06	DC	14.68
42539905	999391	STAR602	1.0	PENEL EC	200767	26HOMER CT	230.0	PENEL EC	S	PN-P1-3-PN-230-003A	operation	824.0	109.16	110.38	DC	21.78
42539876	999392	STAR601	1.0	PENEL EC	200767	26HOMER CT	230.0	PENEL EC	N	PN-P1-3-PN-230-004A	operation	807.0	112.08	113.33	DC	21.9
41312232	999401	STAR592	1.0	PJM	200011	KEYSTONE	500.0	PJM	4	PN-P1-3-PN-500-001AT	operation	634.0	107.0	108.23	DC	17.03

17 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
41311976,41311977	9	26SHADE GP 115.0 kV - AE1-071 TAP 115.0 kV Ckt 1	PENELEC PN-AF1-F-0005a: Reconductor Shade Gap - AE1-071 (~7.2 miles). Project Type : FAC Cost : \$12,852,000 Time Estimate : 6.0 Months PN-AF1-F-0005b : Replace substation conductor at Roxbury and Shade Gap Replace Wave Trap at Shade Gap Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months PN-AF1-F-0005c : Replace CT at Roxbury Project Type : FAC Cost : \$0 Time Estimate : 12.0 Months	\$12,971,000
41630981,41630982,41855417	26	26EAGL VAL 115.0 kV - 26TYRONE N 115.0 kV Ckt 1	PENELEC PN-AF1-F-0007a: Reconductor Tyrone North - Westfall 115 kV (~14.5 miles) Project Type : FAC Cost : \$25,882,500 Time Estimate : 30.0 Months s1776.1: Supplemental upgrade s1776.1: Tyrone North - Construct a four breaker 115 kV ring bus. The supplemental project has a projected in-service date of 12/31/2020. Project Type: CON Cost : \$0	\$25,882,500
41631242	10	26TYRONE N 115.0 kV - 26WESTFALL 115.0 kV Ckt 1	s1776.2: Supplemental upgrade s1776.2: Replace the Tyrone North #2 115/46 kV 45/60/75 MVA transformer. The supplemental project has a projected in-service date of 12/31/2020. Project Type: CON Cost : \$0 s1776.3: Supplemental upgrade s1776.3: Install a 46 kV 1200 A bypass switch between the Tipton and Warrior Ridge 46 kV lines. The supplemental project has a projected in-service date of 12/31/2020. Project Type: CON Cost : \$0	

ID	Index	Facility	Upgrade Description	Cost
41312120,41312121,41631012	17	26PHILIPSB 115.0 kV - 26EAGL VAL 115.0 kV Ckt 1	PENELEC PN-AF1-F-0031c : Replace circuit breaker at Philipsburg Replace substation conductor at Philipsburg Reconductor Shawville - Philipsburg 115 kV (~14 miles) Project Type : FAC Cost : \$26,061,000 Time Estimate : 12.0 Months PN-AF1-F-0031d : Replace substation conductor at Philipsburg Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months	
41631022,41312140,41312141	19	26SHAW. 2 115.0 kV - 26PHILIPSB 115.0 kV Ckt 1	s1919: Supplemental upgrade s1919: Construct a 115 kV ring bus at the Philipsburg substation. - Build a four breaker 115 kV ring bus at the Philipsburg substation. (s1919.1) - Replace limiting CTs, substation conductor / drop, line trap and circuit breakers on Shawville 115 kV line exit at the Philipsburg substation. (s1919.2) - Replace limiting CTs, substation conductor / drop, and circuit breakers on Eagle Valley 115 kV line exit at the Philipsburg substation. (s1919.3) - Replace line trap on Philipsburg 115 kV line exit at the Shawville substation and adjust line relaying as necessary. (s1919.4) The supplemental project has a projected in-service date of 12/01/2023. Project Type: CON Cost : \$0	\$26,180,000
42539241	1	AA1-144 TAP 230.0 kV - 26SCOTCHHLLW 230.0 kV Ckt 1	PENELEC PN-AF1-F-0063a: Replace substation conductor at Grover Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months	\$119,000
42539314	13	26E.TWANDA 230.0 kV - 26CANYON 230.0 kV Ckt 1	PENELEC PN-AF1-F-0014a : Replace substation conductor at East Towanda Replace disconnect switch at Canyon Switching Reconductor East Towanda - Canyon 230 kV (~12.3 miles) Project Type : FAC Cost : \$22,193,500 Time Estimate : 9.0 Months	\$22,193,500

ID	Index	Facility	Upgrade Description	Cost
41311921,41311923,41311922	18	26SHAWVL 2 230.0 kV - 01SHINGL 230.0 kV Ckt 1	<u>APS</u> WP-AF1-F-0002a : Replace Wave Trap at Shawville Project Type : FAC Cost : \$126,000 Time Estimate : 9.0 Months WP-AF1-F-0002b : Replace Wave Trap at Shingletown and CT at Shingletown Project Type : FAC Cost : \$756,000 Time Estimate : 12.0 Months WP-AF1-F-0002c : Replace substation conductor at Shingletown Project Type : FAC Cost : \$126,000 Time Estimate : 6.0 Months WP-AF1-F-0002d : Replace substation conductor at Shingletown Project Type : FAC Cost : \$126,000 Time Estimate : 6.0 Months WP-AF1-F-0002e : Replace substation conductor at Shawville Project Type : FAC Cost : \$126,000 Time Estimate : 6.0 Months WP-AF1-F-0002f : Reconductor Shawville - Shingletown (~41 miles) Project Type : FAC Cost : \$77,490,000 Time Estimate : 6.0 Months WP-AF1-F-0002g : Replace disconnect switches at Shawville and Shingletown Replace meter and relay at Shawville Project Type : FAC Cost : \$441,000 Time Estimate : 12.0 Months <u>PENELEC</u> PN-AF1-F-0029e: Replace disconnect switches at Shawville Replace relay and meter at Shawville Project Type : FAC Cost : \$416,500 Time Estimate : 12.0 Months <u>APS / PENELEC</u> s2051: Supplemental upgrade s2051: Replace terminal equipment on the Shawville – Shingletown 230 kV Line. - Shawville 230 kV Substation – Replace line trap and substation conductor on the Shawville – Shingletown 230 kV Line. (s2051.1) - Shingletown 230 kV Substation – Replace line relaying, line trap, and substation conductor on the Shawville – Shingletown 230 kV Line. (s2051.2) The supplemental project has a projected in-service	\$79,607,500

ID	Index	Facility	Upgrade Description	Cost
42235450	21	26HOMER CY 345.0 kV - STAR601 1.0 kV Ckt N	<u>PENELEC</u> PN-AF1-F-0042 :Homer City Substation: Replace transformer Project Type : FAC Cost : \$7,140,000 Time Estimate : 24.0 Months	\$7,140,000
41855601,4163 1210,41631211	2	26RIDGWAY 115.0 kV - 26FOREST 115.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0009a : Replace Wave Trap at Forest and Ridgway Project Type : FAC Cost : \$238,000 Time Estimate : 9.0 Months PN-AF1-F-0009b : Replace substation conductor at Ridgway Replace circuit breakers at Forest and Ridgway Project Type : FAC Cost : \$1,190,000 Time Estimate : 12.0 Months	\$1,428,000
41312384,4163 1223,41312383	6	26LEWISTWN 115.0 kV - 26REED TAP 115.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0002a : Reconductor Lewistown - Shade Gap 115 kV (~10 miles) Project Type : FAC Cost : \$17,850,000 Time Estimate : 30.0 Months PN-AF1-F-0002b : Reconductor Lewistown - Shade Gap 115 kV (~0.2 mile) Project Type : FAC Cost : \$766,360 Time Estimate : 24.0 Months	\$18,616,360

ID	Index	Facility	Upgrade Description	Cost
42235589,4686 7152,42235590	25	26WARREN 230.0 kV - 26ERIE S TIE 230.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0047a: Replace substation conductor at Erie South and Warren. Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months PN-AF1-F-0047b: Reconductor line. At Erie South substation, upgrade/replace current transformers. Project Type : FAC Cost : \$714,000 Time Estimate : 12.0 Months PN-AF1-F-0047c: At Erie South substation, replace circuit breaker and adjust relays. At Warren substation, replace relays. Project Type : FAC Cost : \$ 1,011,500 Time Estimate : 12.0 Months	\$1,844,500
41631090,4163 1089,41855545	5	AF1-220 TAP 115.0 kV - 26RIDGWAY 115.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0074b : Replace substation conductor and CTs at Ridgway Reconductor AF1-220 - Ridgway 115 kV (~0.3 miles) Project Type : FAC Cost : \$952,000 Time Estimate : 12.0 Months PN-AF1-F-0074c : Reconductor AF1-220 - Ridgway 115 kV (~7 miles) Project Type : FAC Cost : \$11,959,500 Time Estimate : 6.0 Months s1886: Supplemental upgrade s1886: Upgrade terminal equipment at the Ridgway - Whetstone 115 kV substation.. - Replace line relaying and circuit breaker on the Whetstone 115 kV Line exit at the Ridgway substation. (s1886.1) - Replace line relaying on the Ridgway 115 kV line exit at the Whetstone Substation. (s1886.2) The supplemental project has a projected in-service date of 12/31/2022. Project Type: CON Cost : \$0	\$12,911,500

ID	Index	Facility	Upgrade Description	Cost
42539217	29	26SCOTCHHLLW 230.0 kV - 26E.TWANDA 230.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0057a : Replace wave trap at East Towanda Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months PN-AF1-F-0057b : Replace substation conductor at East Towanda Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months	\$238,000
42539410	27	26CANYON 230.0 kV - 26N.MESHPN 230.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0055a : Replace substation conductor at Canyon and North Meshoppen. Replace disconnect switch at Canyon. Reconductor Canyon - North Meshoppen 230 kV (~10 miles) Project Type : FAC Cost : \$17,731,000 Time Estimate : 9.0 Months	\$17,731,000
42539341,42539342,42539340,42235226,42235227	20	26HOMER CT 230.0 kV - 26SHELOCTA 230.0 kV Ckt 1	<u>PENELEC</u> 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 - Shelocta 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	\$19,545,750
42235475	30	JUNI BU2 230.0 kV - JUNI BU1 230.0 kV Ckt 1	<u>PPL</u> R-PL-0007 : Replace two (2) CB's MOD switches at Juniata Project Type : FAC Cost : \$600,000 Time Estimate : 24.0 Months	\$600,000

ID	Index	Facility	Upgrade Description	Cost
42235237,4223 5236	22	26SHELOCTA 230.0 kV - 26KEYSTONE 230.0 kV Ckt 1	<u>PENELEC</u> 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	\$4,510,100
41312069,4131 2070	14	26SHAWVL 1 115.0 kV - 26BIOEN TP 115.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0023 : Replace Wave Trap at Shawville Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months	\$119,000

ID	Index	Facility	Upgrade Description	Cost
41311777,4959 5759,41855330, 41630785,4163 0784,41630783	31	01SHINGL 230.0 kV - 26LEWISTWN 230.0 kV Ckt 1	<u>APS</u> WP-AF1-F-0005a : Replace substation conductor at Shingletown Project Type : FAC Cost : \$126,000 Time Estimate : 6.0 Months WP-AF1-F-0005b : Replace substation conductor Replace switches at Shingletown Project Type : FAC Cost : \$378,000 Time Estimate : 9.0 Months WP-AF1-F-0005c : Replace substation conductor and relays at Lewistown and Shingletown Project Type : FAC Cost : \$441,000 Time Estimate : 12.0 Months WP-AF1-F-0005d : Replace circuit breaker at Shingletown Project Type : FAC Cost : \$630,000 Time Estimate : 12.0 Months <u>PENELEC</u> PN-AF1-F-0061a : Replace substation conductor at Shingletown Project Type : FAC Cost : \$238,000 Time Estimate : 6.0 Months PN-AF1-F-0061b : Replace substation conductor at Shingletown. Replace disconnect switches at Shingletown Reconductor Shingletown - Lewistown 115 kV (~26 miles) Project Type : FAC Cost : \$46,826,500 Time Estimate : 9.0 Months PN-AF1-F-0061c : Replace disconnect switches at Shingletown. Replace substation conductor at Shingletown. Replace relays at Lewistown and Shingletown Project Type : FAC Cost : \$714,000 Time Estimate : 12.0 Months PN-AF1-F-0061d : Replace 1600 Amp Generic circuit breaker at Shingletown Project Type : FAC Cost : \$595,000 Time Estimate : 12.0 Months	\$49,948,500

ID	Index	Facility	Upgrade Description	Cost
42539418,4223 5311,42539420	11	26GLADE 230.0 kV - 26WARREN 230.0 kV Ckt 1	PENELEC PN-AF1-F-0011a : Replace substation conductor at Glade and Warren. Reconductor Glade - Warren 230 kV (~11.5 miles). Project Type : FAC Cost : \$20,706,000 Time Estimate : 6.0 Months PN-AF1-F-0011b : Replace Wave Trap at Glade Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months PN-AF1-F-0011c : Replace relays at Glade Project Type : FAC Cost : \$357,000 Time Estimate : 12.0 Months Note: AF1-220 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 AF1-220 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, AF1-220 will have a cost responsibility for those additional mitigations. b3017 : PJM Baseline Upgrade b3017: Rebuild Glade to Warren 230 kV line with hi-temp conductor 11.53 miles. New conductor will be 1033 ACSS. Existing conductor is 1033 ACSR. (b3017.1) Glade substation terminal upgrades. Replace bus conductor, wave traps, and relaying. (b3017.2) Warren substation terminal upgrades. Replace bus conductor, wave traps, and relaying. (b3017.3) The baseline project has an projected in-service date of 06/01/2021.	\$21,182,000
41630956	34	AE2-113 TAP 115.0 kV - 26FARM VLY 115.0 kV Ckt 1	PENELEC PN-AF1-F-0067a : Replace substation conductor at Farmers Valley. Reconductor AE2-113 - Farmers Valley (~12 miles) Project Type : FAC Cost : \$21,955,500 Time Estimate : 6.0 Months	\$21,955,500

ID	Index	Facility	Upgrade Description	Cost
49596119	12	26ERIE W 345.0 kV - 02AT 345.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0090a: Erie- Ashtabula 345 kV Line: Reconductor line (13.7 miles). Project Type : FAC Cost : \$48,909,000 Time Estimate : 36.0 Months <u>ATSI</u> AT-AF1-F-0001: Reconductor line. At Ashtabula substation, replace the line trap, disconnect switch, relaying, and bus conductor. Project Type : FAC Cost : \$88,920,000 Time Estimate : 40.0 Months	\$137,829,000
41631106	28	26FOURMILE 115.0 kV - 26ERIE SE 115.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0056: Replace substation conductor at Erie South and Four Mile Reconductor Erie South - Four Mile 115 kV (~5 miles) Project Type : FAC Cost : \$8,258,600 Time Estimate : 6.0 Months	\$8,258,600
42767364	32	02PERRY 345.0 kV - 02L.CENTER 345.0 kV Ckt 1	<u>ATSI</u> CEI-002A : Reconductor the Leroy Center-Perry S6 345 kV Line (~10 miles from Leroy Center to Perry). The existing conductor is (2) 954 ACSR conductor and the new conductor is (2) 954 kcmil ACSS conductor. Upgrade terminals as required. Project Type : FAC Cost : \$29,400,000 Time Estimate : 30.0 Months	\$29,400,000
41631121,4131 2311,41312310	8	26REED TAP 115.0 kV - 26SHADE GP 115.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0004a: Reconductor Reeds Tap - Shade Gap (~22.4 miles). Project Type : FAC Cost : \$39,984,000 Time Estimate : 6.0 Months PN-AF1-F-0004b : Replace CTs at Shade Gap Reconductor Reeds Tap - Shade Gap (~0.2 miles). Project Type : FAC Cost : \$1,042,440 Time Estimate : 12.0 Months PN-AF1-F-0004c : Replace substation conductor at Shade Gap Project Type : FAC Cost : \$89,250 Time Estimate : 6.0 Months	\$41,115,690

ID	Index	Facility	Upgrade Description	Cost
42767434	33	02PERRY 345.0 kV - 02EASTLK 345.0 kV Ckt 1	<u>ATSI</u> CEI-003A : Reconductor the Eastlake-Perry S8 345 kV Line (~22 miles from Eastlake to Perry). The existing conductor is (2) 954 ACSR conductor and the new conductor is (2) 954 kcmil ACSS conductor. Upgrade terminals as required. Project Type : FAC Cost : \$64,680,000 Time Estimate : 48.0 Months	\$64,680,000
41631158,4185 5580,41631157, 41631156	15	26SHAWVL 1 115.0 kV - 26SHAW. 2 115.0 kV Ckt ZB	<u>PENELEC</u> PN-AF1-F-0022 : Replace substation conductor at Shawville Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months	\$119,000
41630967,4185 5526	4	26HARVY.RU 115.0 kV - 26DUBOIS 115.0 kV Ckt 1	<u>PENELEC</u> s1769.1: Supplemental upgrade s1769.1: Dubois – Harvey Run – Whetstone 115 kV Line, Rehab approximately 14.25 miles of wood pole construction. The supplemental project has a projected in-service date of 12/31/2021. Project Type: CON Cost : \$0 s1769.2: Supplemental upgrade s1769.2: Dubois 115 kV substation - Replace Line relaying, line trap, substation conductor, line tuner, CCVT, circuit breaker and breaker disconnects (on Dubois – Harvey Run – Whetstone 115 kV Line). The supplemental project has a projected in-service date of 12/31/2021. Project Type: FAC Cost : \$0	\$0
41631066	3	26WHETSTON 115.0 kV - 26HARVY.RU 115.0 kV Ckt 1	s1769.3: Supplemental upgrade s1769.3: Harvey Run 115 kV substation - Replace Substation conductor, disconnect switches and CVTs (on Dubois – Harvey Run – Whetstone 115 kV Line). The supplemental project has a projected in-service date of 12/31/2021. Project Type: CON Cost : \$0 s1769.4: Supplemental upgrade s1769.4: Whetstone 115 kV substation - Replace Line relaying, line trap, substation conductor, line tuner, CCVT, circuit breaker and breaker disconnects (on Dubois – Harvey Run – Whetstone 115 kV Line). The supplemental project has a projected in-service date of 12/31/2021. Project Type: CON Cost : \$0	

ID	Index	Facility	Upgrade Description	Cost
41855560	23	26GARMAN 115.0 kV - 26GLORY 115.0 kV Ckt 1	<u>PENELEC</u> s1771.1: Supplemental upgrade s1771.1: Garman 115 kV Substation - Replace Line relaying, line drops, CCVT, line trap, line tuner, coax, arresters and bus tie breaker (on Garman – Glory 115 kV line). The supplemental project had a projected in-service date of 11/30/2019. Project Type: FAC Cost : \$0 s1771.2: Supplemental upgrade s1771.2: Glory 115 kV Substation - Replace Line relaying, DFR, CCVT, line trap, line tuner, coax, arresters and breaker (on Garman – Glory 115 kV line). The supplemental project had a projected in-service date of 11/30/2019. Project Type: FAC Cost : \$0	\$0
41855426	16	26SHAWVL 1 115.0 kV - STAR599 1.0 kV Ckt 1A	<u>PENELEC</u> PN-AF1-F-0024 : Replace relay at Shawville Project Type : FAC Cost : \$297,500 Time Estimate : 12.0 Months	\$297,500
42235343,4223 5342	24	26KEYSTONE 230.0 kV - STAR592 1.0 kV Ckt 4	<u>PENELEC</u> PN-AF1-F-0046a : Replace transformer Replace substation conductor at Keystone (3A) Project Type : FAC Cost : \$26,180,000 Time Estimate : 24.0 Months	\$26,180,000
41631037,4163 1038	36	STAR592 1.0 kV - KEYSTONE 500.0 kV Ckt 4		
42235455	35	STAR601 1.0 kV - 26HOMER CT 230.0 kV Ckt N	<u>PENELEC</u> PN-AF1-F-0079 : Replace Homer City 345/230 kV North transformer Project Type : FAC Cost : \$7,140,000 Time Estimate : 24.0 Months	\$7,140,000

ID	Index	Facility	Upgrade Description	Cost
41855430,4163 0910	7	26LEWISTWN 230.0 kV - JUNI BU2 230.0 kV Ckt 1	<u>PENELEC</u> PN-AF1-F-0003b: Reconductor Lewistown - Juniata (~24.5 miles). Project Type : FAC Cost : \$102,042,500 Time Estimate : 6.0 Months PN-AF1-F-0003c: Replace relays at Lewistown Project Type : FAC Cost : \$297,500 Time Estimate : 12.0 Months <u>PPL</u> R-PL-0006: Re-conductor PPL's ~0.9mi Lewistown-Juniata 230kV Line Project Type : FAC Cost : \$900,000 Time Estimate : 24.0 Months	\$103,240,000
			TOTAL COST	\$762,983,500

18 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.

18.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
42539241	919200	AA1-144 TAP	PENELEC	200940	26SCOTCHHLLW	PENELEC	1	AP-P1-3-WP-230-326T	single	621.0	98.14	100.17	DC	12.6

Bus #	Bus	MW Impact
200642	26SENECA#1	2.4712
200643	26SENECA#2	2.3339
200644	26SENECA#3	0.2333
200649	26PENNTech	0.8035
200665	26SHAWVL 3	5.0678
200666	26SHAWVL 4	4.9477
200715	26SHAWVL 1	3.1969
200722	26SHAWVL 2	3.2629
200898	26AA1-106	9.3590
200905	26Q36	0.1414
200913	26SHAW-D	0.1383
201201	26WRREN CT	0.5020
201477	26Y2-055	1.8316
203261	26BLOSSBCT	0.4513
203351	26GROZ1-110	1.3064
203352	26CANZ2-011	1.3064
919201	AA1-144 OP	134.4375
919491	AA2-000	184.1166
930511	AB1-092	6.7602
934801	AD1-108	0.0985
934811	AD1-109	0.0722
936421	AD2-055	13.9181
936991	AD2-133 C	1.8229
939171	AE1-147 C	2.7844
940201	AE2-001 C	2.7786
940681	AE2-055 C	2.6890
941191	AE2-113 C	5.3967
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.9814
941261	AE2-120 C	2.7766
941271	AE2-121 C	1.4827
941321	AE2-126 C	1.7920
941331	AE2-129 C	1.5599
941351	AE2-131 C	1.5599
941421	AE2-139 C	45.4318
942351	AE2-248 C	2.1867
942491	AE2-262 C	11.8070
942501	AE2-263 C	11.0986
942961	AE2-316 C	4.5462
943751	AF1-043	41.7543
944001	AF1-068 C O1	2.8983

Bus #	Bus	MW Impact
944181	AF1-086 C O1	1.5485
944311	AF1-099 C	17.9230
944321	AF1-100 C O1	31.0935
944381	AF1-103 O1	1.2618
944471	AF1-112 C	2.7400
944671	AF1-132 C O1	2.7103
944691	AF1-134 C O1	1.1392
944701	AF1-135 C	1.3670
944771	AF1-142 C	28.6768
944841	AF1-149 C	2.7764
944881	AF1-153 C O1	1.8734
944901	AF1-155 C	1.8593
945071	AF1-172 C	49.5645
945121	AF1-177	0.3154
945161	AF1-181	0.1667
945171	AF1-182	0.8292
945181	AF1-183	0.1877
945331	AF1-198	0.4254
945481	AF1-213 C	12.6301
945491	AF1-214 C	2.7767
945551	AF1-220 C	12.5980
945771	AF1-242 C	1.8593
946091	AF1-274 C	7.4547
946381	AF1-302 C	1.9852
946421	AF1-306 C	9.6164
LGEE	LGEE	0.2995
CPL	CPL	0.2176
WEC	WEC	0.1710
CBM-W2	CBM-W2	4.0868
NY	NY	1.6419
CBM-W1	CBM-W1	7.0807
TVA	TVA	0.6566
CBM-S2	CBM-S2	2.1444
CBM-S1	CBM-S1	4.0896
MEC	MEC	0.8358

18.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41855601	200582	26RIDGWAY	PENELEC	200647	26FOREST	PENELEC	1	AP-P2-2-WP-230-001T	bus	277.0	87.12	115.52	DC	78.62

Bus #	Bus	MW Impact
200649	26PENNTech	3.4320
200715	26SHAWVL 1	1.9100
200722	26SHAWVL 2	1.9585
200913	26SHAW-D	0.1146
235003	AC1-025 E	0.0788
236828	01GRAYMONT	0.2161
290086	Q-036 E	2.7996
916202	Z1-069 E	2.4213
919491	AA2-000	24.5536
922932	AB1-082 OP	1.2345
923443	AB1-160 E	0.6918
930511	AB1-092	0.9015
936421	AD2-055	1.8561
936991	AD2-133 C	1.2598
936992	AD2-133 E	5.7622
939171	AE1-147 C	0.6511
939172	AE1-147 E	0.4340
940201	AE2-001 C	0.6494
940202	AE2-001 E	0.4330
940681	AE2-055 C	0.6249
940682	AE2-055 E	0.4166
940861	AE2-074 C	0.9373
940862	AE2-074 E	1.2338
941191	AE2-113 C	19.6032
941192	AE2-113 E	21.1063
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.6408
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.0938
941261	AE2-120 C	0.6486
941262	AE2-120 E	0.4324
941271	AE2-121 C	0.3477
941272	AE2-121 E	0.2321
941321	AE2-126 C	4.3520
941322	AE2-126 E	2.9014
941331	AE2-129 C	1.2784
941332	AE2-129 E	0.8522
941351	AE2-131 C	1.2784
941352	AE2-131 E	0.8522
942351	AE2-248 C	0.5081
942352	AE2-248 E	0.3387
942491	AE2-262 C	3.0536

Bus #	Bus	MW Impact
942492	AE2-262 E	2.0520
942501	AE2-263 C	2.8704
942502	AE2-263 E	1.9165
943751	AF1-043	2.9512
944001	AF1-068 C O1	0.3573
944002	AF1-068 E O1	0.2010
944311	AF1-099 C	2.4568
944312	AF1-099 E	1.6378
944321	AF1-100 C O1	6.0574
944322	AF1-100 E O1	4.0383
944382	AF1-103 BAT	1.5776
944471	AF1-112 C	0.3380
944472	AF1-112 E	0.2254
944671	AF1-132 C O1	0.3340
944672	AF1-132 E O1	0.2227
944691	AF1-134 C O1	0.3914
944692	AF1-134 E O1	0.3914
944701	AF1-135 C	0.4697
944702	AF1-135 E	0.3132
944771	AF1-142 C	3.9308
944772	AF1-142 E	2.6205
944841	AF1-149 C	0.6485
944842	AF1-149 E	0.4323
945071	AF1-172 C	4.6593
945072	AF1-172 E	3.1062
945161	AF1-181	0.0323
945171	AF1-182	0.1615
945181	AF1-183	0.1122
945481	AF1-213 C	10.1135
945482	AF1-213 E	6.7423
945491	AF1-214 C	0.3438
945492	AF1-214 E	0.2292
945551	AF1-220 C	47.1644
945552	AF1-220 E	31.4602
946091	AF1-274 C	20.7963
946092	AF1-274 E	13.8642
946423	AF1-306 BAT	65.9576
DUCKCREEK	DUCKCREEK	0.4042
NEWTON	NEWTON	0.3664
FARMERCITY	FARMERCITY	0.0188
G-007A	G-007A	1.2563
VFT	VFT	3.4314
PRAIRIE	PRAIRIE	0.8550
COFFEEN	COFFEEN	0.1807
EDWARDS	EDWARDS	0.1239
CHEOAH	CHEOAH	0.1356
TILTON	TILTON	0.2211
MADISON	MADISON	0.0202
GIBSON	GIBSON	0.1873
CALDERWOOD	CALDERWOOD	0.1357
BLUEG	BLUEG	0.5902
TRIMBLE	TRIMBLE	0.1892

Bus #	Bus	MW Impact
CATAWBA	CATAWBA	0.0770

18.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41631066	200711	26WHETSTON	PENELEC	200720	26HARVY.RU	PENELEC	1	AP-P2-3-WP-230-708DT	breaker	172.0	74.18	104.37	DC	52.0

Bus #	Bus	MW Impact
200642	26SENECA#1	3.6425
200643	26SENECA#2	3.4401
200644	26SENECA#3	0.3439
200649	26PENNTech	1.6132
201477	26Y2-055	2.2540
235007	AC1-025 BAT	0.0830
236828	01GRAYMONT	-0.1932
916202	Z1-069 E	2.4820
922932	AB1-082 OP	1.3381
923443	AB1-160 E	0.7092
940861	AE2-074 C	1.0160
940862	AE2-074 E	1.3375
941191	AE2-113 C	11.1885
941192	AE2-113 E	12.0464
944313	AF1-099 BAT	2.6729
944323	AF1-100 BAT	6.8450
944381	AF1-103 O1	0.8230
944773	AF1-142 BAT	4.2639
944841	AF1-149 C	-0.5797
944842	AF1-149 E	-0.3864
945121	AF1-177	0.2057
945483	AF1-213 BAT	6.3327
945551	AF1-220 C	31.1921
945552	AF1-220 E	20.8061
946131	AF1-278	7.3001
946423	AF1-306 BAT	19.0066
LGEE	LGEE	0.1010
CPL	CPL	0.0404
WEC	WEC	0.0608
CBM-W2	CBM-W2	1.3350
CBM-W1	CBM-W1	2.6771
TVA	TVA	0.2002
O-066	O-066	2.1571
CBM-S2	CBM-S2	0.4913
CBM-S1	CBM-S1	1.2780
G-007	G-007	0.3349
MEC	MEC	0.2876

18.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41855526	200720	26HARVY.RU	PENELEC	200712	26DUBOIS	PENELEC	1	PN-P2-2-PN-230-012T	bus	179.0	56.74	102.94	DC	82.71

Bus #	Bus	MW Impact
200649	26PENNTech	2.9493
916202	Z1-069 E	3.0917
922932	AB1-082 OP	1.6666
923443	AB1-160 E	0.8833
940861	AE2-074 C	1.2655
940862	AE2-074 E	1.6658
941191	AE2-113 C	18.4589
941192	AE2-113 E	19.8742
944323	AF1-100 BAT	4.6505
945483	AF1-213 BAT	4.3936
945551	AF1-220 C	49.6132
945552	AF1-220 E	33.0936
946091	AF1-274 C	32.9756
946092	AF1-274 E	21.9837
946131	AF1-278	5.3136
LGEE	LGEE	0.0434
CPL	CPL	0.0126
WEC	WEC	0.0261
CBM-W2	CBM-W2	0.5651
CBM-W1	CBM-W1	1.1634
TVA	TVA	0.0826
O-066	O-066	1.0080
CBM-S2	CBM-S2	0.1792
CBM-S1	CBM-S1	0.5282
G-007	G-007	0.1591
MEC	MEC	0.1239

18.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41855545	945550	AF1-220 TAP	PENELEC	200582	26RIDGWAY	PENELEC	1	AP-P2-2-WP-230-001T	bus	239.0	75.8	120.21	DC	106.07

Bus #	Bus	MW Impact
200665	26SHAWVL 3	2.7651
200666	26SHAWVL 4	2.7179
200715	26SHAWVL 1	2.4750
200722	26SHAWVL 2	2.5383
200905	26Q36	0.1493
200913	26SHAW-D	0.1506
235003	AC1-025 E	0.0984
236828	01GRAYMONT	0.2698
290086	Q-036 E	4.2796
919491	AA2-000	28.5639
930511	AB1-092	1.0488
936421	AD2-055	2.1593
936991	AD2-133 C	1.9258
936992	AD2-133 E	8.8085
939171	AE1-147 C	0.8128
939172	AE1-147 E	0.5419
940201	AE2-001 C	0.8108
940202	AE2-001 E	0.5405
940681	AE2-055 C	0.7805
940682	AE2-055 E	0.5203
941251	AE2-119 C (Withdrawn : 12/16/2019)	2.1564
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.4376
941261	AE2-120 C	0.8098
941262	AE2-120 E	0.5399
941271	AE2-121 C	0.4340
941272	AE2-121 E	0.2898
941321	AE2-126 C	5.8481
941322	AE2-126 E	3.8987
941331	AE2-129 C	1.6717
941332	AE2-129 E	1.1145
941351	AE2-131 C	1.6717
941352	AE2-131 E	1.1145
942351	AE2-248 C	0.6345
942352	AE2-248 E	0.4230
942491	AE2-262 C	3.8054
942492	AE2-262 E	2.5573
942501	AE2-263 C	3.5771
942502	AE2-263 E	2.3883
943751	AF1-043	3.4332
944001	AF1-068 C O1	0.4463

Bus #	Bus	MW Impact
944002	AF1-068 E O1	0.2510
944181	AF1-086 C O1	0.6200
944182	AF1-086 E O1	2.6972
944311	AF1-099 C	3.0616
944312	AF1-099 E	2.0411
944321	AF1-100 C O1	17.0805
944322	AF1-100 E O1	11.3870
944382	AF1-103 BAT	1.3802
944471	AF1-112 C	0.4222
944472	AF1-112 E	0.2814
944671	AF1-132 C O1	0.4172
944672	AF1-132 E O1	0.2782
944691	AF1-134 C O1	1.1545
944692	AF1-134 E O1	1.1545
944701	AF1-135 C	1.3854
944702	AF1-135 E	0.9236
944771	AF1-142 C	4.8986
944772	AF1-142 E	3.2657
944841	AF1-149 C	0.8097
944842	AF1-149 E	0.5398
945071	AF1-172 C	5.6013
945072	AF1-172 E	3.7342
945161	AF1-181	0.0910
945171	AF1-182	0.4555
945181	AF1-183	0.1453
945481	AF1-213 C	13.3514
945482	AF1-213 E	8.9009
945491	AF1-214 C	0.4292
945492	AF1-214 E	0.2861
945551	AF1-220 C	63.6290
945552	AF1-220 E	42.4427
946091	AF1-274 C	27.9857
946092	AF1-274 E	18.6572
946423	AF1-306 BAT	38.2075
DUCKCREEK	DUCKCREEK	0.3362
NEWTON	NEWTON	0.3030
FARMERCITY	FARMERCITY	0.0155
G-007A	G-007A	1.1196
VFT	VFT	3.0315
NY	NY	0.0481
PRAIRIE	PRAIRIE	0.7052
COFFEEN	COFFEEN	0.1496
EDWARDS	EDWARDS	0.1029
CHEOAH	CHEOAH	0.1086
TILTON	TILTON	0.1833
MADISON	MADISON	0.0181
GIBSON	GIBSON	0.1551
CALDERWOOD	CALDERWOOD	0.1088
BLUEG	BLUEG	0.4878
TRIMBLE	TRIMBLE	0.1564
CATAWBA	CATAWBA	0.0595

18.6 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41631223	200512	26LEWISTWN	PENELEC	200519	26REED TAP	PENELEC	1	PL_P42_100548	breaker	225.0	108.87	110.73	DC	9.26

Bus #	Bus	MW Impact
200812	26ALY HYDR	0.3760
200852	26WARR RDG	0.1074
235003	AC1-025 E	0.1809
236828	01GRAYMONT	0.4655
290086	Q-036 E	2.0611
293301	N-039 E	3.5812
294515	O38_P22	3.1335
919491	AA2-000	26.2577
930511	AB1-092	0.9641
936421	AD2-055	1.9849
936991	AD2-133 C	0.9275
936992	AD2-133 E	4.2422
939171	AE1-147 C	1.3885
939172	AE1-147 E	0.9257
940201	AE2-001 C	1.3931
940202	AE2-001 E	0.9287
940681	AE2-055 C	1.4624
940682	AE2-055 E	0.9750
941231	AE2-117 C	1.5395
941232	AE2-117 E	1.0263
941241	AE2-118 C	1.5395
941242	AE2-118 E	1.0263
941251	AE2-119 C (Withdrawn : 12/16/2019)	0.7308
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.4872
941261	AE2-120 C	1.3956
941262	AE2-120 E	0.9304
941271	AE2-121 C	0.7340
941272	AE2-121 E	0.4901
941321	AE2-126 C	0.6666
941322	AE2-126 E	0.4444
941331	AE2-129 C	0.6690
941332	AE2-129 E	0.4460
941351	AE2-131 C	0.6690
941352	AE2-131 E	0.4460
942351	AE2-248 C	1.1468
942352	AE2-248 E	0.7645
942491	AE2-262 C	4.1025
942492	AE2-262 E	2.7569
942501	AE2-263 C	3.8564
942502	AE2-263 E	2.5747
942511	AE2-264 C	5.0630
942512	AE2-264 E	3.3754

Bus #	Bus	MW Impact
943751	AF1-043	3.1560
944001	AF1-068 C O1	1.5383
944002	AF1-068 E O1	0.8653
944311	AF1-099 C	3.3006
944312	AF1-099 E	2.2004
944321	AF1-100 C O1	5.6135
944322	AF1-100 E O1	3.7423
944471	AF1-112 C	1.4258
944472	AF1-112 E	0.9506
944671	AF1-132 C O1	1.4471
944672	AF1-132 E O1	0.9647
944691	AF1-134 C O1	0.2510
944692	AF1-134 E O1	0.2510
944701	AF1-135 C	0.3012
944702	AF1-135 E	0.2008
944731	AF1-138 C O1	1.5395
944732	AF1-138 E O1	1.0263
944771	AF1-142 C	5.2810
944772	AF1-142 E	3.5207
944841	AF1-149 C	1.3958
944842	AF1-149 E	0.9306
944881	AF1-153 C O1	0.3383
944882	AF1-153 E O1	0.2255
944901	AF1-155 C	0.3363
944902	AF1-155 E	0.2242
945071	AF1-172 C	4.9350
945072	AF1-172 E	3.2900
945161	AF1-181	0.0299
945171	AF1-182	0.1497
945181	AF1-183	0.0349
945481	AF1-213 C	2.6018
945482	AF1-213 E	1.7345
945491	AF1-214 C	1.3954
945492	AF1-214 E	0.9302
945551	AF1-220 C	2.5011
945552	AF1-220 E	1.6683
945771	AF1-242 C	0.3363
945772	AF1-242 E	0.2242
946091	AF1-274 C	1.4725
946092	AF1-274 E	0.9817
946312	AF1-295 BAT	7.5751
946421	AF1-306 C	1.7269
946422	AF1-306 E	6.9075
LGEE	LGEE	0.0650
WEC	WEC	0.0435
CBM-W2	CBM-W2	0.5897
CBM-W1	CBM-W1	2.0892
TVA	TVA	0.0364
O-066	O-066	1.5456
CHEOAH	CHEOAH	0.0070
CBM-S1	CBM-S1	0.3578
G-007	G-007	0.2735

Bus #	Bus	MW Impact
MEC	MEC	0.1796
CALDERWOOD	CALDERWOOD	0.0050
CATAWBA	CATAWBA	0.0399

18.7 Index 7

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41630910	200513	26LEWISTWN	PENELEC	208005	JUNI BU2	PPL	1	AP-P2-3-WP-230-446T	breaker	624.0	143.31	146.27	DC	18.47

Bus #	Bus	MW Impact
200665	26SHAWVL 3	7.7967
200666	26SHAWVL 4	7.6716
200715	26SHAWVL 1	4.9146
200722	26SHAWVL 2	5.0397
200812	26ALY HYDR	1.1301
200852	26WARR RDG	0.3229
200883	Q-053 E	6.8957
200886	26ARWF_N39	0.4288
200894	26K02	9.1554
200898	26AA1-106	1.9579
200905	26Q36	0.2813
200913	26SHAW-D	0.2124
200915	26CHSTN_FL	0.1524
203034	26NA_O38_P22	0.3752
203905	26W1-045 C	0.6853
235003	AC1-025 E	0.6133
236828	01GRAYMONT	1.5971
290086	Q-036 E	8.0600
293301	N-039 E	12.2874
293393	V3-030E	2.7472
294515	O38_P22	10.7514
901242	W1-045 E OP1	1.1181
919491	AA2-000	117.3103
930511	AB1-092	4.3073
936421	AD2-055	8.8679
936471	AD2-062 C O1	5.0032
936472	AD2-062 E O1	2.5063
936991	AD2-133 C	3.6270
936992	AD2-133 E	16.5895
938381	AE1-071 C	13.1348
938382	AE1-071 E	8.0374
939171	AE1-147 C	4.7732
939172	AE1-147 E	3.1822
940201	AE2-001 C	4.7834
940202	AE2-001 E	3.1890
940681	AE2-055 C	4.9397
940682	AE2-055 E	3.2931
941231	AE2-117 C	4.6266
941232	AE2-117 E	3.0844
941241	AE2-118 C	4.6266

Bus #	Bus	MW Impact
941242	AE2-118 E	3.0844
941251	AE2-119 C (Withdrawn : 12/16/2019)	3.0438
941252	AE2-119 E (Withdrawn : 12/16/2019)	2.0292
941261	AE2-120 C	4.7891
941262	AE2-120 E	3.1927
941271	AE2-121 C	2.5283
941272	AE2-121 E	1.6882
941321	AE2-126 C	2.1067
941322	AE2-126 E	1.4045
941331	AE2-129 C	2.7008
941332	AE2-129 E	1.8006
941351	AE2-131 C	2.7008
941352	AE2-131 E	1.8006
941421	AE2-139 C	5.5361
941422	AE2-139 E	3.6907
942031	AE2-215 C	14.8871
942032	AE2-215 E	9.9247
942121	AE2-224 C	7.2840
942122	AE2-224 E	4.8560
942351	AE2-248 C	3.8996
942352	AE2-248 E	2.5997
942491	AE2-262 C	17.7280
942492	AE2-262 E	11.9132
942501	AE2-263 C	16.6643
942502	AE2-263 E	11.1261
942511	AE2-264 C	15.1296
942512	AE2-264 E	10.0864
943751	AF1-043	26.6038
944001	AF1-068 C O1	5.2205
944002	AF1-068 E O1	2.9365
944181	AF1-086 C O1	2.8312
944182	AF1-086 E O1	12.3174
944311	AF1-099 C	26.9111
944312	AF1-099 E	17.9407
944321	AF1-100 C O1	48.2115
944322	AF1-100 E O1	32.1410
944471	AF1-112 C	4.8575
944472	AF1-112 E	3.2383
944671	AF1-132 C O1	4.9052
944672	AF1-132 E O1	3.2702
944691	AF1-134 C O1	1.8754
944692	AF1-134 E O1	1.8754
944701	AF1-135 C	2.2505
944702	AF1-135 E	1.5003
944731	AF1-138 C O1	4.6266
944732	AF1-138 E O1	3.0844
944751	AF1-140 C	1.1435
944752	AF1-140 E	0.7623
944771	AF1-142 C	43.0578
944772	AF1-142 E	28.7052
944841	AF1-149 C	4.7897
944842	AF1-149 E	3.1931

Bus #	Bus	MW Impact
945071	AF1-172 C	42.2760
945072	AF1-172 E	28.1840
945161	AF1-181	0.2565
945171	AF1-182	1.2856
945181	AF1-183	0.2886
945481	AF1-213 C	19.9893
945482	AF1-213 E	13.3262
945491	AF1-214 C	4.7887
945492	AF1-214 E	3.1925
945551	AF1-220 C	11.0811
945552	AF1-220 E	7.3914
945901	AF1-255 C	0.2695
945902	AF1-255 E	0.3722
946091	AF1-274 C	8.1585
946092	AF1-274 E	5.4390
946241	AF1-289 C O1	1.2428
946242	AF1-289 E O1	0.8286
946311	AF1-295	4.9624
LGEE	LGEE	0.5465
CPL	CPL	0.3744
WEC	WEC	0.3115
CBM-W2	CBM-W2	7.4120
CBM-W1	CBM-W1	12.8478
TVA	TVA	1.1872
O-066	O-066	18.8832
CBM-S2	CBM-S2	3.7743
CBM-S1	CBM-S1	7.3954
G-007	G-007	2.9432
MEC	MEC	1.5207

18.8 Index 8

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41631121	200519	26REED TAP	PENELEC	200522	26SHADE GP	PENELEC	1	PL_P42_100548	breaker	225.0	112.89	114.74	DC	9.26

Bus #	Bus	MW Impact
200812	26ALY HYDR	0.3760
200852	26WARR RDG	0.1074
235003	AC1-025 E	0.1809
236828	01GRAYMONT	0.4655
290086	Q-036 E	2.0611
293301	N-039 E	3.5812
294515	O38_P22	3.1335
919491	AA2-000	26.2577
930511	AB1-092	0.9641
936421	AD2-055	1.9849
936991	AD2-133 C	0.9275
936992	AD2-133 E	4.2422
939171	AE1-147 C	1.3885
939172	AE1-147 E	0.9257
940201	AE2-001 C	1.3931
940202	AE2-001 E	0.9287
940681	AE2-055 C	1.4624
940682	AE2-055 E	0.9750
941231	AE2-117 C	1.5395
941232	AE2-117 E	1.0263
941241	AE2-118 C	1.5395
941242	AE2-118 E	1.0263
941251	AE2-119 C (Withdrawn : 12/16/2019)	0.7308
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.4872
941261	AE2-120 C	1.3956
941262	AE2-120 E	0.9304
941271	AE2-121 C	0.7340
941272	AE2-121 E	0.4901
941321	AE2-126 C	0.6666
941322	AE2-126 E	0.4444
941331	AE2-129 C	0.6690
941332	AE2-129 E	0.4460
941351	AE2-131 C	0.6690
941352	AE2-131 E	0.4460
942031	AE2-215 C	13.2746
942032	AE2-215 E	8.8498
942351	AE2-248 C	1.1468
942352	AE2-248 E	0.7645
942491	AE2-262 C	4.1025
942492	AE2-262 E	2.7569
942501	AE2-263 C	3.8564
942502	AE2-263 E	2.5747

Bus #	Bus	MW Impact
942511	AE2-264 C	5.0630
942512	AE2-264 E	3.3754
943751	AF1-043	3.1560
944001	AF1-068 C O1	1.5383
944002	AF1-068 E O1	0.8653
944311	AF1-099 C	3.3006
944312	AF1-099 E	2.2004
944321	AF1-100 C O1	5.6135
944322	AF1-100 E O1	3.7423
944471	AF1-112 C	1.4258
944472	AF1-112 E	0.9506
944671	AF1-132 C O1	1.4471
944672	AF1-132 E O1	0.9647
944691	AF1-134 C O1	0.2510
944692	AF1-134 E O1	0.2510
944701	AF1-135 C	0.3012
944702	AF1-135 E	0.2008
944731	AF1-138 C O1	1.5395
944732	AF1-138 E O1	1.0263
944771	AF1-142 C	5.2810
944772	AF1-142 E	3.5207
944841	AF1-149 C	1.3958
944842	AF1-149 E	0.9306
944881	AF1-153 C O1	0.3383
944882	AF1-153 E O1	0.2255
944901	AF1-155 C	0.3363
944902	AF1-155 E	0.2242
945071	AF1-172 C	4.9350
945072	AF1-172 E	3.2900
945161	AF1-181	0.0299
945171	AF1-182	0.1497
945181	AF1-183	0.0349
945481	AF1-213 C	2.6018
945482	AF1-213 E	1.7345
945491	AF1-214 C	1.3954
945492	AF1-214 E	0.9302
945551	AF1-220 C	2.5011
945552	AF1-220 E	1.6683
945771	AF1-242 C	0.3363
945772	AF1-242 E	0.2242
946091	AF1-274 C	1.4725
946092	AF1-274 E	0.9817
946311	AF1-295	4.4249
946421	AF1-306 C	1.7269
946422	AF1-306 E	6.9075
LGEE	LGEE	0.0650
WEC	WEC	0.0435
CBM-W2	CBM-W2	0.5897
CBM-W1	CBM-W1	2.0892
TVA	TVA	0.0364
O-066	O-066	1.5456
CHEOAH	CHEOAH	0.0070

Bus #	Bus	MW Impact
CBM-S1	CBM-S1	0.3578
G-007	G-007	0.2735
MEC	MEC	0.1796
CALDERWOOD	CALDERWOOD	0.0050
CATAWBA	CATAWBA	0.0399

18.9 Index 9

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41311976	200522	26SHADE GP	PENELEC	938380	AE1-071 TAP	PENELEC	1	PL_P12_100618	single	160.0	132.14	135.61	DC	5.54

Bus #	Bus	MW Impact
200649	26PENNTech	0.3546
200665	26SHAWVL 3	2.0128
200666	26SHAWVL 4	1.9806
200715	26SHAWVL 1	1.3184
200722	26SHAWVL 2	1.3520
200812	26ALY HYDR	0.3758
200852	26WARR RDG	0.1074
200886	26ARWF_N39	0.1468
200905	26Q36	0.0845
200913	26SHAW-D	0.0599
203034	26NA_O38_P22	0.1284
919491	AA2-000	30.8497
930511	AB1-092	1.1327
936421	AD2-055	2.3320
936991	AD2-133 C	1.0894
939171	AE1-147 C	1.3877
940201	AE2-001 C	1.3922
940681	AE2-055 C	1.4616
941231	AE2-117 C	1.5386
941241	AE2-118 C	1.5386
941251	AE2-119 C (Withdrawn : 12/16/2019)	0.8587
941261	AE2-120 C	1.3948
941271	AE2-121 C	0.7336
941321	AE2-126 C	0.7831
941331	AE2-129 C	0.7860
941351	AE2-131 C	0.7860
942031	AE2-215 C	13.2754
942351	AE2-248 C	1.1461
942491	AE2-262 C	4.8230
942501	AE2-263 C	4.5336
942511	AE2-264 C	5.0592
943751	AF1-043	6.9961
944001	AF1-068 C O1	1.5374
944311	AF1-099 C	7.3213
944321	AF1-100 C O1	12.4470
944471	AF1-112 C	1.4251
944671	AF1-132 C O1	1.4462
944691	AF1-134 C O1	0.5562
944701	AF1-135 C	0.6674
944731	AF1-138 C O1	1.5386
944771	AF1-142 C	11.7141

Bus #	Bus	MW Impact
944841	AF1-149 C	1.3950
944881	AF1-153 C O1	0.7498
944901	AF1-155 C	0.7454
945071	AF1-172 C	10.9410
945161	AF1-181	0.0662
945171	AF1-182	0.3319
945181	AF1-183	0.0774
945481	AF1-213 C	5.7672
945491	AF1-214 C	1.3945
945551	AF1-220 C	5.5437
945771	AF1-242 C	0.7454
946091	AF1-274 C	3.2640
946311	AF1-295	4.4251
946421	AF1-306 C	3.8280
LGEE	LGEE	0.0633
WEC	WEC	0.0425
CBM-W2	CBM-W2	0.5651
CBM-W1	CBM-W1	2.0391
TVA	TVA	0.0336
CHEOAH	CHEOAH	0.0080
CBM-S1	CBM-S1	0.3408
MEC	MEC	0.1748
CALDERWOOD	CALDERWOOD	0.0060
CATAWBA	CATAWBA	0.0403

18.10 Index 10

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41631242	200527	26TYRONE N	PENELEC	200528	26WESTFALL	PENELEC	1	AP-P2-3-WP-230-460T	breaker	237.0	107.46	110.05	DC	13.62

Bus #	Bus	MW Impact
200665	26SHAWVL 3	2.5575
200666	26SHAWVL 4	2.5131
200715	26SHAWVL 1	2.2632
200722	26SHAWVL 2	2.3267
200905	26Q36	0.7174
200913	26SHAW-D	0.1366
235003	AC1-025 E	0.1151
236828	01GRAYMONT	0.3072
290086	Q-036 E	20.5576
919491	AA2-000	28.4419
930511	AB1-092	1.0443
936421	AD2-055	2.1500
936991	AD2-133 C	9.2509
936992	AD2-133 E	42.3127
939171	AE1-147 C	0.9216
939172	AE1-147 E	0.6144
940201	AE2-001 C	0.9216
940202	AE2-001 E	0.6144
940681	AE2-055 C	0.9202
940682	AE2-055 E	0.6135
941191	AE2-113 C	2.9329
941192	AE2-113 E	3.1578
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.9616
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.3078
941261	AE2-120 C	0.9215
941262	AE2-120 E	0.6143
941271	AE2-121 C	0.4901
941272	AE2-121 E	0.3272
941321	AE2-126 C	1.4369
941322	AE2-126 E	0.9579
941331	AE2-129 C	4.2824
941332	AE2-129 E	2.8550
941351	AE2-131 C	4.2824
941352	AE2-131 E	2.8550
942351	AE2-248 C	0.7366
942352	AE2-248 E	0.4911
942491	AE2-262 C	3.8573
942492	AE2-262 E	2.5921
942501	AE2-263 C	3.6259
942502	AE2-263 E	2.4208

Bus #	Bus	MW Impact
943751	AF1-043	3.4186
944001	AF1-068 C O1	0.5205
944002	AF1-068 E O1	0.2928
944181	AF1-086 C O1	0.4676
944182	AF1-086 E O1	2.0342
944311	AF1-099 C	3.1034
944312	AF1-099 E	2.0689
944321	AF1-100 C O1	15.7935
944322	AF1-100 E O1	10.5290
944471	AF1-112 C	0.4881
944472	AF1-112 E	0.3254
944671	AF1-132 C O1	0.4879
944672	AF1-132 E O1	0.3253
944691	AF1-134 C O1	0.4455
944692	AF1-134 E O1	0.4455
944701	AF1-135 C	0.5345
944702	AF1-135 E	0.3564
944771	AF1-142 C	4.9654
944772	AF1-142 E	3.3102
944841	AF1-149 C	0.9215
944842	AF1-149 E	0.6143
944881	AF1-153 C O1	0.3827
944882	AF1-153 E O1	0.2552
944901	AF1-155 C	0.3798
944902	AF1-155 E	0.2532
945071	AF1-172 C	5.4168
945072	AF1-172 E	3.6112
945161	AF1-181	0.0841
945171	AF1-182	0.4212
945181	AF1-183	0.1329
945481	AF1-213 C	11.8368
945482	AF1-213 E	7.8912
945491	AF1-214 C	0.4884
945492	AF1-214 E	0.3256
945551	AF1-220 C	3.6818
945552	AF1-220 E	2.4559
945771	AF1-242 C	0.3798
945772	AF1-242 E	0.2532
946091	AF1-274 C	5.6646
946092	AF1-274 E	3.7764
946421	AF1-306 C	2.0125
946422	AF1-306 E	8.0498
DUCKCREEK	DUCKCREEK	0.0115
NEWTON	NEWTON	0.0161
FARMERCITY	FARMERCITY	0.0009
CBM-W1	CBM-W1	0.0375
PRAIRIE	PRAIRIE	0.0465
O-066	O-066	0.3494
COFFEEN	COFFEEN	0.0074
EDWARDS	EDWARDS	0.0032
CHEOAH	CHEOAH	0.0205
TILTON	TILTON	0.0069

Bus #	Bus	MW Impact
G-007	G-007	0.0697
GIBSON	GIBSON	0.0076
CALDERWOOD	CALDERWOOD	0.0199
BLUEG	BLUEG	0.0278
TRIMBLE	TRIMBLE	0.0089
CATAWBA	CATAWBA	0.0203

18.11 Index 11

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
42235311	200593	26GLADE	PENELEC	200811	26WARREN	PENELEC	1	PN-P2-3-PN-345-003A	breaker	621.0	161.42	165.56	DC	25.9

Bus #	Bus	MW Impact
200642	26SENECA#1	11.2398
200643	26SENECA#2	10.6153
200644	26SENECA#3	1.0612
200649	26PENNTech	1.0703
200665	26SHAWVL 3	2.9713
200666	26SHAWVL 4	2.9187
200894	26K02	3.9122
200898	26AA1-106	1.2431
235003	AC1-025 E	0.1202
236828	01GRAYMONT	0.3311
290086	Q-036 E	2.7363
915952	Y3-092 NFWTR	143.9500
916202	Z1-069 E	5.4537
919491	AA2-000	41.4133
922932	AB1-082 OP	2.9396
923443	AB1-160 E	1.5582
923821	AB2-019 FTWR	4.0306
930511	AB1-092	1.5206
936421	AD2-055	3.1306
936991	AD2-133 C	1.2313
936992	AD2-133 E	5.6320
939171	AE1-147 C	0.9983
939172	AE1-147 E	0.6655
940201	AE2-001 C	0.9954
940202	AE2-001 E	0.6636
940681	AE2-055 C	0.9525
940682	AE2-055 E	0.6350
940861	AE2-074 C	2.2320
940862	AE2-074 E	2.9382
941191	AE2-113 C	11.0858
941192	AE2-113 E	11.9359
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.1559
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7706
941261	AE2-120 C	0.9939
941262	AE2-120 E	0.6626
941271	AE2-121 C	0.5334
941272	AE2-121 E	0.3561
941321	AE2-126 C	1.7676
941322	AE2-126 E	1.1784
941331	AE2-129 C	0.9711

Bus #	Bus	MW Impact
941332	AE2-129 E	0.6474
941351	AE2-131 C	0.9711
941352	AE2-131 E	0.6474
942351	AE2-248 C	0.7763
942352	AE2-248 E	0.5176
942491	AE2-262 C	4.7536
942492	AE2-262 E	3.1944
942501	AE2-263 C	4.4684
942502	AE2-263 E	2.9834
942813	AE2-299 BAT	29.7008
942961	AE2-316 C	3.6176
942962	AE2-316 E	5.1587
943751	AF1-043	4.9776
944001	AF1-068 C O1	0.5456
944002	AF1-068 E O1	0.3069
944311	AF1-099 C	3.8245
944312	AF1-099 E	2.5497
944321	AF1-100 C O1	18.3420
944322	AF1-100 E O1	12.2280
944382	AF1-103 BAT	10.7388
944392	AF1-104 BAT	3.0956
944471	AF1-112 C	0.5168
944472	AF1-112 E	0.3445
944671	AF1-132 C O1	0.5098
944672	AF1-132 E O1	0.3399
944691	AF1-134 C O1	0.3673
944692	AF1-134 E O1	0.3673
944701	AF1-135 C	0.4408
944702	AF1-135 E	0.2939
944771	AF1-142 C	6.1192
944772	AF1-142 E	4.0794
944841	AF1-149 C	0.9938
944842	AF1-149 E	0.6625
944881	AF1-153 C O1	1.6386
944882	AF1-153 E O1	1.0924
944901	AF1-155 C	1.6288
944902	AF1-155 E	1.0858
945071	AF1-172 C	7.6042
945072	AF1-172 E	5.0695
945161	AF1-181	0.0978
945171	AF1-182	0.4891
945181	AF1-183	0.0531
945331	AF1-198	0.0858
945481	AF1-213 C	3.9764
945482	AF1-213 E	2.6509
945491	AF1-214 C	0.5268
945492	AF1-214 E	0.3512
945551	AF1-220 C	15.5337
945552	AF1-220 E	10.3615
945771	AF1-242 C	1.6288
945772	AF1-242 E	1.0858
946091	AF1-274 C	7.8581

Bus #	Bus	MW Impact
946092	AF1-274 E	5.2387
946131	AF1-278	42.0788
946381	AF1-302 C	0.8373
946382	AF1-302 E	1.1163
946421	AF1-306 C	9.4557
946422	AF1-306 E	37.8230
DUCKCREEK	DUCKCREEK	1.5845
NEWTON	NEWTON	1.4216
FARMERCITY	FARMERCITY	0.0731
G-007A	G-007A	3.6418
VFT	VFT	9.9330
PRAIRIE	PRAIRIE	3.3088
COFFEEN	COFFEEN	0.7034
EDWARDS	EDWARDS	0.4854
CHEOAH	CHEOAH	0.5090
TILTON	TILTON	0.8625
MADISON	MADISON	0.0444
GIBSON	GIBSON	0.7240
CALDERWOOD	CALDERWOOD	0.5089
BLUEG	BLUEG	2.2672
TRIMBLE	TRIMBLE	0.7285
CATAWBA	CATAWBA	0.2835

18.12 Index 12

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
49596119	200599	26ERIE W	PENELEC	238547	02AT	ATSI	1	Base Case	single	1560.0	110.67	111.87	DC	18.78

Bus #	Bus	MW Impact
200608	26PINEY #1	1.0365
200642	26SENECA#1	9.8431
200643	26SENECA#2	9.2963
200644	26SENECA#3	0.9293
200649	26PENNTech	1.2689
200662	26SCRUB GR	4.0539
200805	26COLVER13 (Deactivation : 09/01/20)	12.9404
200828	26HNSMLK 1	2.7282
200829	26HNSMLK 2	2.7282
200830	26HNSMLK 3	2.7282
200831	26HNSMLK 4	2.7282
200832	26HNSMLK 5	2.7282
200849	26LAKVU GN	0.3599
200898	26AA1-106	2.5433
201144	W3-099 C OP1	6.4428
201201	26WRREN CT	2.8418
201477	26Y2-055	10.3498
203910	26Z1-091	2.3793
915951	Y3-092 FTIR	588.3200
919201	AA1-144 OP	19.2529
919491	AA2-000	63.2750
920341	AA2-132	2.5685
922932	AB1-082 OP	4.2204
930511	AB1-092	2.3233
935191	AD1-154	3.2292
936421	AD2-055	4.7832
936991	AD2-133 C	2.1296
938951	AE1-123	4.1434
939171	AE1-147 C	1.4423
939291	AE1-160 C	4.6863
939381	AE1-169 C O1	18.2141
940201	AE2-001 C	1.4391
940861	AE2-074 C	3.2045
941191	AE2-113 C	13.8465
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.6880
941261	AE2-120 C	1.4374
941271	AE2-121 C	0.7697
941321	AE2-126 C	1.9350
941331	AE2-129 C	1.5399
941351	AE2-131 C	1.5399
941421	AE2-139 C	7.2982
942351	AE2-248 C	1.1288

Bus #	Bus	MW Impact
942491	AE2-262 C	6.6768
942501	AE2-263 C	6.2761
942811	AE2-299 C	15.7184
942961	AE2-316 C	6.6875
943151	AE2-344 C	35.4183
943351	AF1-006 C	6.7809
943751	AF1-043	7.6053
943871	AF1-055 C O1	17.5857
944001	AF1-068 C O1	0.7943
944181	AF1-086 C O1	1.3393
944261	AF1-094 C	5.4823
944281	AF1-096 C	4.4280
944301	AF1-098 C	22.9061
944311	AF1-099 C	5.3717
944321	AF1-100 C O1	11.3938
944381	AF1-103 O1	7.1436
944391	AF1-104 O1	11.2794
944411	AF1-106 O1	1.4398
944471	AF1-112 C	0.7506
944671	AF1-132 C O1	0.7428
944691	AF1-134 C O1	0.6922
944701	AF1-135 C	0.8307
944741	AF1-139 C O1	0.8209
944771	AF1-142 C	8.5947
944841	AF1-149 C	1.4372
944881	AF1-153 C O1	1.0525
944901	AF1-155 C	1.0529
945021	AF1-167 C	0.7979
945051	AF1-170 C	24.9728
945071	AF1-172 C	11.1039
945121	AF1-177	1.7859
945161	AF1-181	0.0608
945171	AF1-182	0.3038
945181	AF1-183	0.0753
945331	AF1-198	0.1826
945451	AF1-210 C	0.7391
945481	AF1-213 C	6.5400
945491	AF1-214 C	0.7619
945551	AF1-220 C	18.7806
945751	AF1-240 C O1	1.0269
945771	AF1-242 C	1.0529
946091	AF1-274 C	4.4697
946131	AF1-278	47.4740
946211	AF1-286 C O1	0.5831
946221	AF1-287 C	6.0526
946381	AF1-302 C	1.5478
946401	AF1-304 C	21.0258
946421	AF1-306 C	5.2606
946771	AF1-217 C O1	6.0526
DUCKCREEK	DUCKCREEK	3.9681
NEWTON	NEWTON	3.5437
FARMERCITY	FARMERCITY	0.1822

Bus #	Bus	MW Impact
G-007A	G-007A	8.9475
VFT	VFT	24.3810
PRAIRIE	PRAIRIE	8.2294
COFFEEN	COFFEEN	1.7546
EDWARDS	EDWARDS	1.2166
CHEOAH	CHEOAH	1.2397
TILTON	TILTON	2.1565
MADISON	MADISON	0.0907
GIBSON	GIBSON	1.8040
CALDERWOOD	CALDERWOOD	1.2405
BLUEG	BLUEG	5.6368
TRIMBLE	TRIMBLE	1.8103
CATAWBA	CATAWBA	0.6755

18.13 Index 13

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
42539314	200675	26E.TWANDA	PENELEC	200924	26CANYON	PENELEC	1	Base Case	single	515.0	116.01	117.65	DC	8.47

Bus #	Bus	MW Impact
200642	26SENECA#1	2.7894
200643	26SENECA#2	2.6344
200649	26PENNTech	0.5618
200665	26SHAWVL 3	2.3763
200666	26SHAWVL 4	2.3188
200715	26SHAWVL 1	1.5716
200722	26SHAWVL 2	1.6043
200887	26ARMNA MT	0.6693
200898	26AA1-106	6.0058
200913	26SHAW-D	0.0723
200949	26X1-109	42.4561
201477	26Y2-055	1.9054
203261	26BLOSSBCT	0.6572
203283	26MANOR_T86	0.0501
203349	26Z1-069 C	0.3211
203350	26MILZ1-092	0.7063
203351	26GROZ1-110	0.8383
203352	26CANZ2-011	0.8383
919201	AA1-144 OP	63.7835
919491	AA2-000	87.5163
920351	AA2-133	0.3184
922932	AB1-082 OP	2.7054
923442	AB1-160 C	0.0917
930511	AB1-092	3.2133
934801	AD1-108	0.0632
934811	AD1-109	0.0463
935061	AD1-142	0.0390
936421	AD2-055	6.6157
939171	AE1-147 C	0.8133
940201	AE2-001 C	0.8099
940681	AE2-055 C	0.7569
940861	AE2-074 C	2.0542
941191	AE2-113 C	6.3051
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.0362
941261	AE2-120 C	0.8079
941271	AE2-121 C	0.4356
941321	AE2-126 C	1.0838
941331	AE2-129 C	0.7609
941351	AE2-131 C	0.7609
941421	AE2-139 C	21.7122
942351	AE2-248 C	0.6232
942491	AE2-262 C	4.8485

Bus #	Bus	MW Impact
942501	AE2-263 C	4.5576
942961	AE2-316 C	2.5479
943751	AF1-043	19.8471
944001	AF1-068 C O1	0.4366
944311	AF1-099 C	7.3600
944321	AF1-100 C O1	14.5725
944381	AF1-103 O1	0.6960
944411	AF1-106 O1	5.0856
944471	AF1-112 C	0.4159
944671	AF1-132 C O1	0.4073
944771	AF1-142 C	11.7760
944841	AF1-149 C	0.8077
944881	AF1-153 C O1	1.0640
944901	AF1-155 C	1.0591
945071	AF1-172 C	23.3955
945121	AF1-177	0.1740
945161	AF1-181	0.0782
945171	AF1-182	0.3886
945181	AF1-183	0.0923
945331	AF1-198	0.6195
945481	AF1-213 C	3.1726
945491	AF1-214 C	0.4283
945551	AF1-220 C	8.4685
945771	AF1-242 C	1.0591
946091	AF1-274 C	4.6466
946131	AF1-278	17.9548
946211	AF1-286 C O1	2.0597
946381	AF1-302 C	0.5897
946421	AF1-306 C	5.4706
LGEE	LGEE	0.5414
CPL	CPL	0.3698
WEC	WEC	0.3100
CBM-W2	CBM-W2	7.3546
CBM-W1	CBM-W1	12.8728
TVA	TVA	1.1746
CBM-S2	CBM-S2	3.7223
CBM-S1	CBM-S1	7.3187
MEC	MEC	1.5111

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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
41312069	200714	26SHAWVL 1	PENELEC	200872	26BIOEN TP	PENELEC	1	AP-P1-2-WP-230-323T	single	185.0	105.31	110.07	DC	8.8

Bus #	Bus	MW Impact
200649	26PENNTech	0.5047
200665	26SHAWVL 3	2.7440
200666	26SHAWVL 4	2.6938
200715	26SHAWVL 1	2.4684
200722	26SHAWVL 2	2.5301
200905	26Q36	0.1308
200913	26SHAW-D	0.1508
919491	AA2-000	36.2622
930511	AB1-092	1.3314
936421	AD2-055	2.7412
936991	AD2-133 C	1.6870
939171	AE1-147 C	1.2415
940201	AE2-001 C	1.2422
940681	AE2-055 C	1.2522
941191	AE2-113 C	3.6709
941251	AE2-119 C (Withdrawn : 12/16/2019)	2.1578
941261	AE2-120 C	1.2426
941271	AE2-121 C	0.6595
941321	AE2-126 C	1.5686
941331	AE2-129 C	1.5845
941351	AE2-131 C	1.5845
942351	AE2-248 C	0.9984
942491	AE2-262 C	5.0350
942501	AE2-263 C	4.7329
943751	AF1-043	8.2236
944001	AF1-068 C O1	1.3326
944311	AF1-099 C	7.6431
944321	AF1-100 C O1	16.9290
944471	AF1-112 C	1.2469
944671	AF1-132 C O1	1.2500
944771	AF1-142 C	12.2290
944841	AF1-149 C	1.2426
944881	AF1-153 C O1	0.8714
944901	AF1-155 C	0.8630
945071	AF1-172 C	13.0230
945161	AF1-181	0.0903
945171	AF1-182	0.4514
945181	AF1-183	0.1450
945491	AF1-214 C	1.2426
945551	AF1-220 C	8.8042

Bus #	Bus	MW Impact
945771	AF1-242 C	0.8630
946091	AF1-274 C	6.1644
946421	AF1-306 C	4.7183
DUCKCREEK	DUCKCREEK	0.1105
NEWTON	NEWTON	0.1053
FARMERCITY	FARMERCITY	0.0055
G-007A	G-007A	0.1630
VFT	VFT	0.5031
PRAIRIE	PRAIRIE	0.2557
COFFEEN	COFFEEN	0.0518
EDWARDS	EDWARDS	0.0336
CHEOAH	CHEOAH	0.0531
TILTON	TILTON	0.0611
MADISON	MADISON	0.0040
GIBSON	GIBSON	0.0535
CALDERWOOD	CALDERWOOD	0.0527
BLUEG	BLUEG	0.1736
TRIMBLE	TRIMBLE	0.0557
CATAWBA	CATAWBA	0.0385

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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
41855580	200714	26SHAWVL 1	PENELEC	200727	26SHAW. 2	PENELEC	ZB	PN-P2-2-PN-230-013T	bus	191.0	104.95	115.83	DC	20.78

Bus #	Bus	MW Impact
200715	26SHAWVL 1	8.5549
200805	26COLVER13 (Deactivation : 09/01/20)	6.6151
200913	26SHAW-D	0.4236
941251	AE2-119 C (Withdrawn : 12/16/2019)	4.0824
941252	AE2-119 E (Withdrawn : 12/16/2019)	2.7216
941321	AE2-126 C	3.4324
941322	AE2-126 E	2.2882
944181	AF1-086 C O1	3.8233
944182	AF1-086 E O1	16.6335
944323	AF1-100 BAT	5.7801
944691	AF1-134 C O1	3.2190
944692	AF1-134 E O1	3.2190
944701	AF1-135 C	3.8628
944702	AF1-135 E	2.5752
945181	AF1-183	0.5024
945481	AF1-213 C	37.2636
945482	AF1-213 E	24.8424
945551	AF1-220 C	12.4625
945552	AF1-220 E	8.3129
946091	AF1-274 C	12.3843
946092	AF1-274 E	8.2562
LGEE	LGEE	0.0291
CPL	CPL	0.0013
WEC	WEC	0.0176
CBM-W2	CBM-W2	0.3685
NY	NY	0.0088
CBM-W1	CBM-W1	0.7756
TVA	TVA	0.0518
O-066	O-066	1.3642
CBM-S2	CBM-S2	0.0751
CBM-S1	CBM-S1	0.3408
G-007	G-007	0.2111
MEC	MEC	0.0826

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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
41855426	200714	26SHAWVL 1	PENELEC	999394	STAR599	PENELEC	1A	PN-P2-2-PN-230-014T	bus	126.0	155.57	159.07	DC	9.78

Bus #	Bus	MW Impact
200722	26SHAWVL 2	5.5954
200805	26COLVER13 (Deactivation : 09/01/20)	5.3622
200883	Q-053 E	2.8740
200905	26Q36	0.2661
200913	26SHAW-D	0.2690
235007	AC1-025 BAT	0.0869
236828	01GRAYMONT	-0.2139
290086	Q-036 E	7.6260
293393	V3-030E	1.6446
936991	AD2-133 C	3.4317
936992	AD2-133 E	15.6962
941251	AE2-119 C (Withdrawn : 12/16/2019)	3.8524
941252	AE2-119 E (Withdrawn : 12/16/2019)	2.5682
941321	AE2-126 C	2.0305
941322	AE2-126 E	1.3537
941331	AE2-129 C	2.9881
941332	AE2-129 E	1.9921
941351	AE2-131 C	2.9881
941352	AE2-131 E	1.9921
944181	AF1-086 C O1	2.6632
944182	AF1-086 E O1	11.5864
944313	AF1-099 BAT	3.6183
944321	AF1-100 C O1	48.0690
944322	AF1-100 E O1	32.0460
944691	AF1-134 C O1	2.1188
944692	AF1-134 E O1	2.1188
944701	AF1-135 C	2.5426
944702	AF1-135 E	1.6950
944773	AF1-142 BAT	5.7720
944841	AF1-149 C	-0.6423
944842	AF1-149 E	-0.4282
945481	AF1-213 C	24.1098
945482	AF1-213 E	16.0732
945551	AF1-220 C	2.6438
945552	AF1-220 E	1.7635
946091	AF1-274 C	7.0819
946092	AF1-274 E	4.7212
LGEE	LGEE	0.0685
CPL	CPL	0.0549
WEC	WEC	0.0381

Bus #	Bus	MW Impact
CBM-W2	CBM-W2	0.9419
NY	NY	0.3069
CBM-W1	CBM-W1	1.5262
TVA	TVA	0.1540
O-066	O-066	2.0429
CBM-S2	CBM-S2	0.5260
CBM-S1	CBM-S1	0.9542
G-007	G-007	0.3026
MEC	MEC	0.1891

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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
41631012	200716	26PHILIPSB	PENELEC	200904	26EAGL VAL	PENELEC	1	AP-P2-3-WP-230-460T	breaker	174.0	123.95	127.49	DC	13.63

Bus #	Bus	MW Impact
200665	26SHAWVL 3	2.5587
200666	26SHAWVL 4	2.5143
200715	26SHAWVL 1	2.2640
200722	26SHAWVL 2	2.3277
200913	26SHAW-D	0.1367
235003	AC1-025 E	0.1151
236828	01GRAYMONT	0.3073
919491	AA2-000	28.4615
930511	AB1-092	1.0450
936421	AD2-055	2.1515
939171	AE1-147 C	0.9222
939172	AE1-147 E	0.6148
940201	AE2-001 C	0.9221
940202	AE2-001 E	0.6147
940681	AE2-055 C	0.9209
940682	AE2-055 E	0.6139
941191	AE2-113 C	2.9356
941192	AE2-113 E	3.1607
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.9622
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.3082
941261	AE2-120 C	0.9220
941262	AE2-120 E	0.6147
941271	AE2-121 C	0.4903
941272	AE2-121 E	0.3274
941321	AE2-126 C	1.4376
941322	AE2-126 E	0.9584
941331	AE2-129 C	4.2830
941332	AE2-129 E	2.8554
941351	AE2-131 C	4.2830
941352	AE2-131 E	2.8554
942351	AE2-248 C	0.7371
942352	AE2-248 E	0.4914
942491	AE2-262 C	3.8594
942492	AE2-262 E	2.5935
942501	AE2-263 C	3.6279
942502	AE2-263 E	2.4222
943751	AF1-043	3.4209
944001	AF1-068 C O1	0.5208
944002	AF1-068 E O1	0.2929
944181	AF1-086 C O1	0.4680

Bus #	Bus	MW Impact
944182	AF1-086 E O1	2.0362
944311	AF1-099 C	3.1051
944312	AF1-099 E	2.0700
944321	AF1-100 C O1	15.8010
944322	AF1-100 E O1	10.5340
944471	AF1-112 C	0.4884
944472	AF1-112 E	0.3256
944671	AF1-132 C O1	0.4882
944672	AF1-132 E O1	0.3254
944691	AF1-134 C O1	0.4457
944692	AF1-134 E O1	0.4457
944701	AF1-135 C	0.5349
944702	AF1-135 E	0.3566
944771	AF1-142 C	4.9681
944772	AF1-142 E	3.3121
944841	AF1-149 C	0.9220
944842	AF1-149 E	0.6147
944881	AF1-153 C O1	0.3830
944882	AF1-153 E O1	0.2553
944901	AF1-155 C	0.3801
944902	AF1-155 E	0.2534
945071	AF1-172 C	5.4202
945072	AF1-172 E	3.6135
945161	AF1-181	0.0842
945171	AF1-182	0.4214
945181	AF1-183	0.1329
945481	AF1-213 C	11.8413
945482	AF1-213 E	7.8942
945491	AF1-214 C	0.4887
945492	AF1-214 E	0.3258
945551	AF1-220 C	3.6843
945552	AF1-220 E	2.4575
945771	AF1-242 C	0.3801
945772	AF1-242 E	0.2534
946091	AF1-274 C	5.6671
946092	AF1-274 E	3.7781
946421	AF1-306 C	2.0140
946422	AF1-306 E	8.0561
DUCKCREEK	DUCKCREEK	0.0046
NEWTON	NEWTON	0.0097
FARMERCITY	FARMERCITY	0.0006
CBM-W1	CBM-W1	0.1126
PRAIRIE	PRAIRIE	0.0310
O-066	O-066	0.3091
COFFEEN	COFFEEN	0.0042
EDWARDS	EDWARDS	0.0010
CHEOAH	CHEOAH	0.0175
TILTON	TILTON	0.0031
G-007	G-007	0.0634
GIBSON	GIBSON	0.0044
CALDERWOOD	CALDERWOOD	0.0169
BLUEG	BLUEG	0.0174

Bus #	Bus	MW Impact
TRIMBLE	TRIMBLE	0.0056
CATAWBA	CATAWBA	0.0182

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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
41311922	200726	26SHAWVL 2	PENELEC	235248	01SHINGL	AP	1	AP-P1-2-WP-230-005B	single	554.0	120.69	123.54	DC	16.34

Bus #	Bus	MW Impact
200642	26SENECA#1	3.6203
200643	26SENECA#2	3.4192
200644	26SENECA#3	0.3418
200649	26PENNTech	1.0374
200665	26SHAWVL 3	6.7845
200666	26SHAWVL 4	6.7293
200715	26SHAWVL 1	4.2656
200722	26SHAWVL 2	4.3937
200898	26AA1-106	1.8413
200905	26Q36	0.1735
200913	26SHAW-D	0.1837
201201	26WRREN CT	0.7527
201477	26Y2-055	2.7463
203261	26BLOSSBCT	0.1992
203349	26Z1-069 C	0.1377
203351	26GROZ1-110	0.2570
203352	26CANZ2-011	0.2570
919201	AA1-144 OP	11.2160
919491	AA2-000	88.6275
922932	AB1-082 OP	1.6941
923442	AB1-160 C	0.0393
930511	AB1-092	3.2541
934801	AD1-108	0.0194
934811	AD1-109	0.0142
936421	AD2-055	6.6997
936991	AD2-133 C	2.2378
940861	AE2-074 C	1.2863
941191	AE2-113 C	8.1706
941251	AE2-119 C (Withdrawn : 12/16/2019)	2.6318
941321	AE2-126 C	2.3491
941331	AE2-129 C	2.0046
941351	AE2-131 C	2.0046
941421	AE2-139 C	5.2304
942491	AE2-262 C	11.9610
942501	AE2-263 C	11.2433
942961	AE2-316 C	5.5239
943751	AF1-043	20.0991
944181	AF1-086 C O1	1.9969
944311	AF1-099 C	18.1568
944321	AF1-100 C O1	42.2895

Bus #	Bus	MW Impact
944381	AF1-103 O1	1.8922
944691	AF1-134 C O1	1.4964
944701	AF1-135 C	1.7957
944771	AF1-142 C	29.0509
944841	AF1-149 C	-3.8741
944881	AF1-153 C O1	2.2325
944901	AF1-155 C	2.2165
945071	AF1-172 C	31.7880
945121	AF1-177	0.4730
945161	AF1-181	0.2232
945171	AF1-182	1.1277
945181	AF1-183	0.2505
945331	AF1-198	0.1877
945481	AF1-213 C	16.6977
945551	AF1-220 C	16.3363
945771	AF1-242 C	2.2165
946091	AF1-274 C	9.7435
946131	AF1-278	16.8004
946381	AF1-302 C	2.4122
946421	AF1-306 C	11.5240
LGEE	LGEE	0.2305
CPL	CPL	0.0370
WEC	WEC	0.1380
CBM-W2	CBM-W2	2.9320
CBM-W1	CBM-W1	6.0173
TVA	TVA	0.4270
CBM-S2	CBM-S2	0.7572
CBM-S1	CBM-S1	2.7520
MEC	MEC	0.6467

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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
41631022	200727	26SHAW.2	PENELEC	200716	26PHILIPSB	PENELEC	1	AP-P2-3-WP-230-460T	breaker	185.0	124.15	127.47	DC	13.63

Bus #	Bus	MW Impact
200665	26SHAWVL 3	2.5587
200666	26SHAWVL 4	2.5143
200715	26SHAWVL 1	2.2640
200722	26SHAWVL 2	2.3277
200913	26SHAW-D	0.1367
235003	AC1-025 E	0.1151
236828	01GRAYMONT	0.3073
919491	AA2-000	28.4615
930511	AB1-092	1.0450
936421	AD2-055	2.1515
939171	AE1-147 C	0.9222
939172	AE1-147 E	0.6148
940201	AE2-001 C	0.9221
940202	AE2-001 E	0.6147
940681	AE2-055 C	0.9209
940682	AE2-055 E	0.6139
941191	AE2-113 C	2.9356
941192	AE2-113 E	3.1607
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.9622
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.3082
941261	AE2-120 C	0.9220
941262	AE2-120 E	0.6147
941271	AE2-121 C	0.4903
941272	AE2-121 E	0.3274
941321	AE2-126 C	1.4376
941322	AE2-126 E	0.9584
942351	AE2-248 C	0.7371
942352	AE2-248 E	0.4914
942491	AE2-262 C	3.8594
942492	AE2-262 E	2.5935
942501	AE2-263 C	3.6279
942502	AE2-263 E	2.4222
943751	AF1-043	3.4209
944001	AF1-068 C O1	0.5208
944002	AF1-068 E O1	0.2929
944311	AF1-099 C	3.1051
944312	AF1-099 E	2.0700
944321	AF1-100 C O1	15.8010
944322	AF1-100 E O1	10.5340
944471	AF1-112 C	0.4884

Bus #	Bus	MW Impact
944472	AF1-112 E	0.3256
944671	AF1-132 C O1	0.4882
944672	AF1-132 E O1	0.3254
944691	AF1-134 C O1	0.4457
944692	AF1-134 E O1	0.4457
944701	AF1-135 C	0.5349
944702	AF1-135 E	0.3566
944771	AF1-142 C	4.9681
944772	AF1-142 E	3.3121
944841	AF1-149 C	0.9220
944842	AF1-149 E	0.6147
944881	AF1-153 C O1	0.3830
944882	AF1-153 E O1	0.2553
944901	AF1-155 C	0.3801
944902	AF1-155 E	0.2534
945071	AF1-172 C	5.4202
945072	AF1-172 E	3.6135
945161	AF1-181	0.0842
945171	AF1-182	0.4214
945181	AF1-183	0.1329
945481	AF1-213 C	11.8413
945482	AF1-213 E	7.8942
945491	AF1-214 C	0.4887
945492	AF1-214 E	0.3258
945551	AF1-220 C	3.6843
945552	AF1-220 E	2.4575
945771	AF1-242 C	0.3801
945772	AF1-242 E	0.2534
946091	AF1-274 C	5.6671
946092	AF1-274 E	3.7781
946421	AF1-306 C	2.0140
946422	AF1-306 E	8.0561
DUCKCREEK	DUCKCREEK	0.0046
NEWTON	NEWTON	0.0097
FARMERCITY	FARMERCITY	0.0006
CBM-W1	CBM-W1	0.1126
PRAIRIE	PRAIRIE	0.0310
O-066	O-066	0.3091
COFFEEN	COFFEEN	0.0042
EDWARDS	EDWARDS	0.0010
CHEOAH	CHEOAH	0.0175
TILTON	TILTON	0.0031
G-007	G-007	0.0634
GIBSON	GIBSON	0.0044
CALDERWOOD	CALDERWOOD	0.0169
BLUEG	BLUEG	0.0174
TRIMBLE	TRIMBLE	0.0056
CATAWBA	CATAWBA	0.0182

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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
42235227	200767	26HOMER CT	PENELEC	200795	26SHELOCTA	PENELEC	1	PN_P4-500-002F	breaker	917.0	155.65	157.0	DC	26.96

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
42235450	200769	26HOMER CY	PENELEC	999392	STAR601	PENELEC	N	PN-P2-3-PN-230-9E	breaker	807.0	129.51	130.75	DC	21.76

Bus #	Bus	MW Impact
200823	26MHP_X3-003	2.2695
200830	26HNSMLK 3	1.8760
200831	26HNSMLK 4	1.8760
200832	26HNSMLK 5	1.8760
200838	26HOMER C2	45.1077
200839	26HOMER C3	47.7524
200894	26K02	6.9091
200898	26AA1-106	3.0352
201144	W3-099 C OP1	1.8313
201477	26Y2-055	4.7720
203349	26Z1-069 C	0.4984
203907	26Y2-042	1.4811
203909	26Z1-038	2.2372
203910	26Z1-091	3.0422
203999	P-047 E	16.3426
294573	P-028 E	13.6170
903644	W3-099 E OP1	12.2557
915951	Y3-092 FTIR	139.8800
916202	Z1-069 E	15.2211
917672	Z2-108 E	-1.9186
917673	Z2-108 BAT	2.2572
918682	AA1-082 E	8.2095
919201	AA1-144 OP	23.0963
919491	AA2-000	46.7537
920341	AA2-132	3.4204
922932	AB1-082 OP	5.4301
923442	AB1-160 C	0.1424
923443	AB1-160 E	4.3489
930511	AB1-092	1.7167
936421	AD2-055	3.5343
938352	AE1-053 BAT	1.2540
938882	AE1-116 BAT	1.3081
938951	AE1-123	1.9587
939291	AE1-160 C	1.6593
939292	AE1-160 E	0.9538
939381	AE1-169 C O1	6.6451
939382	AE1-169 E O1	4.4301
940861	AE2-074 C	4.1231
940862	AE2-074 E	5.4274
941191	AE2-113 C	11.7440
941192	AE2-113 E	12.6445

Bus #	Bus	MW Impact
941321	AE2-126 C	1.1333
941322	AE2-126 E	0.7555
941421	AE2-139 C	8.2218
941422	AE2-139 E	5.4812
942491	AE2-262 C	3.4582
942492	AE2-262 E	2.3239
942501	AE2-263 C	3.2507
942502	AE2-263 E	2.1704
942811	AE2-299 C	4.5557
942812	AE2-299 E	18.2229
942961	AE2-316 C	5.6140
942962	AE2-316 E	8.0056
943151	AE2-344 C	9.6181
943152	AE2-344 E	6.4121
943351	AF1-006 C	0.8869
943352	AF1-006 E	0.4989
943751	AF1-043	5.6195
943871	AF1-055 C O1	3.6302
943872	AF1-055 E O1	2.4201
944261	AF1-094 C	0.8477
944262	AF1-094 E	0.5651
944281	AF1-096 C	0.8310
944282	AF1-096 E	0.5540
944301	AF1-098 C	3.5963
944302	AF1-098 E	2.3975
944311	AF1-099 C	2.7823
944312	AF1-099 E	1.8549
944321	AF1-100 C O1	6.0959
944322	AF1-100 E O1	4.0640
944381	AF1-103 O1	1.7437
944391	AF1-104 O1	1.3164
944411	AF1-106 O1	1.9691
944741	AF1-139 C O1	1.0931
944742	AF1-139 E O1	0.7288
944771	AF1-142 C	4.4516
944772	AF1-142 E	2.9678
944881	AF1-153 C O1	0.7105
944882	AF1-153 E O1	0.4736
944901	AF1-155 C	0.7125
944902	AF1-155 E	0.4750
945021	AF1-167 C	0.6319
945022	AF1-167 E	0.4212
945051	AF1-170 C	3.2227
945052	AF1-170 E	2.1485
945071	AF1-172 C	7.4637
945072	AF1-172 E	4.9758
945121	AF1-177	0.4359
945161	AF1-181	0.0326
945171	AF1-182	0.1626
945331	AF1-198	0.2584
945451	AF1-210 C	0.6033
945452	AF1-210 E	0.4022

Bus #	Bus	MW Impact
945551	AF1-220 C	5.8816
945552	AF1-220 E	3.9232
945673	AF1-232 BAT	2.9052
945771	AF1-242 C	0.7125
945772	AF1-242 E	0.4750
946091	AF1-274 C	2.7681
946092	AF1-274 E	1.8454
946131	AF1-278	51.5931
946211	AF1-286 C O1	0.7975
946212	AF1-286 E O1	0.5415
946221	AF1-287 C	0.8792
946222	AF1-287 E	0.5861
946381	AF1-302 C	1.2993
946382	AF1-302 E	1.7324
946401	AF1-304 C	4.1369
946402	AF1-304 E	2.7580
946421	AF1-306 C	3.4691
946422	AF1-306 E	13.8766
946771	AF1-217 C O1	0.8792
946772	AF1-217 E O1	0.5861
LGEE	LGEE	0.0217
WEC	WEC	0.0454
CBM-W1	CBM-W1	3.6654
O-066	O-066	4.6435
CHEOAH	CHEOAH	0.1211
G-007	G-007	0.8382
MEC	MEC	0.1208
CALDERWOOD	CALDERWOOD	0.1168
CATAWBA	CATAWBA	0.1551

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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
42235237	200795	26SHELECTA	PENELEC	200810	26KEYSTONE	PENELEC	1	PN_P4-500-002A	breaker	917.0	136.42	137.91	DC	29.92

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
41855560	200801	26GARMAN	PENELEC	200507	26GLORY	PENELEC	1	PN-P2-2-PN-230-007T	bus	233.0	117.82	120.38	DC	13.23

Bus #	Bus	MW Impact
200665	26SHAWVL 3	2.4770
200666	26SHAWVL 4	2.4317
200715	26SHAWVL 1	2.2392
200722	26SHAWVL 2	2.2955
200905	26Q36	0.1437
200913	26SHAW-D	0.1372
200945	26CT_V3-030	0.3087
235003	AC1-025 E	0.1197
236828	01GRAYMONT	0.3174
290086	Q-036 E	4.1184
293393	V3-030E	11.6579
919491	AA2-000	27.7846
930511	AB1-092	1.0202
936421	AD2-055	2.1004
936991	AD2-133 C	1.8533
936992	AD2-133 E	8.4767
939171	AE1-147 C	0.9513
939172	AE1-147 E	0.6342
940201	AE2-001 C	0.9518
940202	AE2-001 E	0.6345
940681	AE2-055 C	0.9595
940682	AE2-055 E	0.6397
941191	AE2-113 C	2.8052
941192	AE2-113 E	3.0203
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.9643
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.3095
941261	AE2-120 C	0.9520
941262	AE2-120 E	0.6346
941271	AE2-121 C	0.5053
941272	AE2-121 E	0.3374
941321	AE2-126 C	1.4216
941322	AE2-126 E	0.9478
941331	AE2-129 C	1.5593
941332	AE2-129 E	1.0395
941351	AE2-131 C	1.5593
941352	AE2-131 E	1.0395
942351	AE2-248 C	0.7650
942352	AE2-248 E	0.5100
942491	AE2-262 C	3.8552
942492	AE2-262 E	2.5907

Bus #	Bus	MW Impact
942501	AE2-263 C	3.6239
942502	AE2-263 E	2.4195
943751	AF1-043	3.3396
944001	AF1-068 C O1	0.5412
944002	AF1-068 E O1	0.3044
944181	AF1-086 C O1	12.4861
944182	AF1-086 E O1	54.3211
944311	AF1-099 C	3.1016
944312	AF1-099 E	2.0678
944321	AF1-100 C O1	15.2820
944322	AF1-100 E O1	10.1880
944471	AF1-112 C	0.5064
944472	AF1-112 E	0.3376
944671	AF1-132 C O1	0.5076
944672	AF1-132 E O1	0.3384
944691	AF1-134 C O1	4.1726
944692	AF1-134 E O1	4.1726
944701	AF1-135 C	5.0071
944702	AF1-135 E	3.3381
944771	AF1-142 C	4.9626
944772	AF1-142 E	3.3084
944841	AF1-149 C	0.9521
944842	AF1-149 E	0.6347
944881	AF1-153 C O1	0.3450
944882	AF1-153 E O1	0.2300
944901	AF1-155 C	0.3412
944902	AF1-155 E	0.2275
945071	AF1-172 C	5.2850
945072	AF1-172 E	3.5234
945161	AF1-181	0.0815
945171	AF1-182	0.4075
945181	AF1-183	0.1315
945481	AF1-213 C	26.8467
945482	AF1-213 E	17.8978
945491	AF1-214 C	0.5045
945492	AF1-214 E	0.3364
945551	AF1-220 C	3.5748
945552	AF1-220 E	2.3845
945771	AF1-242 C	0.3412
945772	AF1-242 E	0.2275
946091	AF1-274 C	5.5794
946092	AF1-274 E	3.7196
946421	AF1-306 C	1.8975
946422	AF1-306 E	7.5900
DUCKCREEK	DUCKCREEK	0.1359
NEWTON	NEWTON	0.1279
FARMERCITY	FARMERCITY	0.0066
G-007A	G-007A	0.2278
VFT	VFT	0.6708
PRAIRIE	PRAIRIE	0.3074
COFFEEN	COFFEEN	0.0624
EDWARDS	EDWARDS	0.0413

Bus #	Bus	MW Impact
CHEOAH	CHEOAH	0.0596
TILTON	TILTON	0.0743
MADISON	MADISON	0.0040
GIBSON	GIBSON	0.0650
CALDERWOOD	CALDERWOOD	0.0591
BLUEG	BLUEG	0.2083
TRIMBLE	TRIMBLE	0.0668
CATAWBA	CATAWBA	0.0413

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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
42235343	200810	26KEystone	PENELEC	999401	STAR592	PJM	4	PJM500_PN_P4-500-001D	breaker	635.0	113.93	115.15	DC	16.98

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

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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
46867152	200811	26WARREN	PENELEC	200918	26ERIE S TIE	PENELEC	1	PN-P2-3-PN-345-003A	breaker	621.0	121.97	125.28	DC	20.53

Bus #	Bus	MW Impact
200642	26SENECA#1	8.8930
200643	26SENECA#2	8.3989
200644	26SENECA#3	0.8396
200649	26PENNTech	0.8482
200894	26K02	3.1059
200898	26AA1-106	0.9872
201201	26WRREN CT	2.5169
201477	26Y2-055	9.1985
203999	P-047 E	3.7552
235003	AC1-025 E	0.0953
236828	01GRAYMONT	0.2626
290086	Q-036 E	2.1740
915952	Y3-092 NFTWR	115.7800
916202	Z1-069 E	4.3265
919491	AA2-000	32.8614
922932	AB1-082 OP	2.3303
923443	AB1-160 E	1.2361
923821	AB2-019 FTWR	3.2418
930511	AB1-092	1.2066
936421	AD2-055	2.4841
936991	AD2-133 C	0.9783
936992	AD2-133 E	4.4746
939171	AE1-147 C	0.7918
939172	AE1-147 E	0.5279
940201	AE2-001 C	0.7896
940202	AE2-001 E	0.5264
940681	AE2-055 C	0.7554
940682	AE2-055 E	0.5036
940861	AE2-074 C	1.7694
940862	AE2-074 E	2.3291
941191	AE2-113 C	8.7853
941192	AE2-113 E	9.4589
941251	AE2-119 C (Withdrawn : 12/16/2019)	0.9177
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.6118
941261	AE2-120 C	0.7884
941262	AE2-120 E	0.5256
941271	AE2-121 C	0.4230
941272	AE2-121 E	0.2825
941321	AE2-126 C	1.4018
941322	AE2-126 E	0.9346

Bus #	Bus	MW Impact
941331	AE2-129 C	0.7713
941332	AE2-129 E	0.5142
941351	AE2-131 C	0.7713
941352	AE2-131 E	0.5142
941421	AE2-139 C	2.7596
941422	AE2-139 E	1.8397
942351	AE2-248 C	0.6158
942352	AE2-248 E	0.4105
942491	AE2-262 C	3.7710
942492	AE2-262 E	2.5341
942501	AE2-263 C	3.5448
942502	AE2-263 E	2.3667
942813	AE2-299 BAT	23.1728
942961	AE2-316 C	2.8790
942962	AE2-316 E	4.1055
943751	AF1-043	3.9498
944001	AF1-068 C O1	0.4327
944002	AF1-068 E O1	0.2434
944311	AF1-099 C	3.0339
944312	AF1-099 E	2.0226
944321	AF1-100 C O1	6.5555
944322	AF1-100 E O1	4.3703
944381	AF1-103 O1	6.3268
944392	AF1-104 BAT	2.3720
944471	AF1-112 C	0.4099
944472	AF1-112 E	0.2733
944671	AF1-132 C O1	0.4044
944672	AF1-132 E O1	0.2696
944691	AF1-134 C O1	0.2930
944692	AF1-134 E O1	0.2930
944701	AF1-135 C	0.3516
944702	AF1-135 E	0.2344
944771	AF1-142 C	4.8543
944772	AF1-142 E	3.2362
944841	AF1-149 C	0.7882
944842	AF1-149 E	0.5254
944881	AF1-153 C O1	1.3018
944882	AF1-153 E O1	0.8678
944901	AF1-155 C	1.2941
944902	AF1-155 E	0.8627
945071	AF1-172 C	6.0331
945072	AF1-172 E	4.0221
945121	AF1-177	1.5817
945161	AF1-181	0.0349
945171	AF1-182	0.1748
945181	AF1-183	0.0422
945331	AF1-198	0.0682
945481	AF1-213 C	3.1635
945482	AF1-213 E	2.1090
945491	AF1-214 C	0.4178
945492	AF1-214 E	0.2786
945551	AF1-220 C	12.3132

Bus #	Bus	MW Impact
945552	AF1-220 E	8.2133
945771	AF1-242 C	1.2941
945772	AF1-242 E	0.8627
946091	AF1-274 C	6.2312
946092	AF1-274 E	4.1541
946131	AF1-278	33.3216
946381	AF1-302 C	0.6663
946382	AF1-302 E	0.8884
946421	AF1-306 C	7.4982
946422	AF1-306 E	29.9930
DUCKCREEK	DUCKCREEK	1.2943
NEWTON	NEWTON	1.1615
FARMERCITY	FARMERCITY	0.0598
G-007A	G-007A	2.8602
VFT	VFT	7.8045
PRAIRIE	PRAIRIE	2.7044
COFFEEN	COFFEEN	0.5745
EDWARDS	EDWARDS	0.3966
CHEOAH	CHEOAH	0.4184
TILTON	TILTON	0.7043
MADISON	MADISON	0.0343
GIBSON	GIBSON	0.5919
CALDERWOOD	CALDERWOOD	0.4185
BLUEG	BLUEG	1.8540
TRIMBLE	TRIMBLE	0.5955
CATAWBA	CATAWBA	0.2345

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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
41855417	200904	26EAGL VAL	PENELEC	200527	26TYRONE N	PENELEC	1	AP-P2-2-WP-230-005T	bus	191.0	155.13	158.34	DC	13.62

Bus #	Bus	MW Impact
200665	26SHAWVL 3	2.5507
200666	26SHAWVL 4	2.5057
200715	26SHAWVL 1	2.2589
200722	26SHAWVL 2	2.3221
200905	26Q36	0.7172
200913	26SHAW-D	0.1365
235003	AC1-025 E	0.1219
236828	01GRAYMONT	0.3194
290086	Q-036 E	20.5528
919491	AA2-000	28.5206
930511	AB1-092	1.0472
936421	AD2-055	2.1560
936991	AD2-133 C	9.2488
936992	AD2-133 E	42.3028
939171	AE1-147 C	0.9548
939172	AE1-147 E	0.6365
940201	AE2-001 C	0.9570
940202	AE2-001 E	0.6380
940681	AE2-055 C	0.9910
940682	AE2-055 E	0.6607
941191	AE2-113 C	2.9319
941192	AE2-113 E	3.1567
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.9591
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.3061
941261	AE2-120 C	0.9578
941262	AE2-120 E	0.6385
941271	AE2-121 C	0.5067
941272	AE2-121 E	0.3383
941321	AE2-126 C	1.4356
941322	AE2-126 E	0.9570
941331	AE2-129 C	4.2805
941332	AE2-129 E	2.8537
941351	AE2-131 C	4.2805
941352	AE2-131 E	2.8537
942351	AE2-248 C	0.7794
942352	AE2-248 E	0.5196
942491	AE2-262 C	3.9032
942492	AE2-262 E	2.6230
942501	AE2-263 C	3.6690
942502	AE2-263 E	2.4496
943751	AF1-043	3.4280

Bus #	Bus	MW Impact
944001	AF1-068 C O1	0.5542
944002	AF1-068 E O1	0.3117
944181	AF1-086 C O1	0.4667
944182	AF1-086 E O1	2.0305
944311	AF1-099 C	3.1403
944312	AF1-099 E	2.0935
944321	AF1-100 C O1	15.7470
944322	AF1-100 E O1	10.4980
944471	AF1-112 C	0.5150
944472	AF1-112 E	0.3433
944671	AF1-132 C O1	0.5210
944672	AF1-132 E O1	0.3473
944691	AF1-134 C O1	0.4449
944692	AF1-134 E O1	0.4449
944701	AF1-135 C	0.5338
944702	AF1-135 E	0.3559
944771	AF1-142 C	5.0244
944772	AF1-142 E	3.3496
944841	AF1-149 C	0.9578
944842	AF1-149 E	0.6385
944881	AF1-153 C O1	0.3827
944882	AF1-153 E O1	0.2552
944901	AF1-155 C	0.3798
944902	AF1-155 E	0.2532
945071	AF1-172 C	5.4317
945072	AF1-172 E	3.6211
945161	AF1-181	0.0839
945171	AF1-182	0.4199
945181	AF1-183	0.1327
945481	AF1-213 C	11.8213
945482	AF1-213 E	7.8808
945491	AF1-214 C	0.5076
945492	AF1-214 E	0.3384
945551	AF1-220 C	3.6798
945552	AF1-220 E	2.4545
945771	AF1-242 C	0.3798
945772	AF1-242 E	0.2532
946091	AF1-274 C	5.6595
946092	AF1-274 E	3.7730
946421	AF1-306 C	2.0125
946422	AF1-306 E	8.0498
DUCKCREEK	DUCKCREEK	0.0115
NEWTON	NEWTON	0.0161
FARMERCITY	FARMERCITY	0.0009
CBM-W1	CBM-W1	0.0375
PRAIRIE	PRAIRIE	0.0465
O-066	O-066	0.3494
COFFEEN	COFFEEN	0.0074
EDWARDS	EDWARDS	0.0032
CHEOAH	CHEOAH	0.0205
TILTON	TILTON	0.0069
G-007	G-007	0.0686

Bus #	Bus	MW Impact
GIBSON	GIBSON	0.0082
CALDERWOOD	CALDERWOOD	0.0199
BLUEG	BLUEG	0.0278
TRIMBLE	TRIMBLE	0.0089
CATAWBA	CATAWBA	0.0203

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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
42539410	200924	26CANYON	PENELEC	200706	26N.MESHPN	PENELEC	1	Base Case	single	546.0	108.43	109.98	DC	8.47

Bus #	Bus	MW Impact
200642	26SENECA#1	2.7894
200643	26SENECA#2	2.6344
200649	26PENNTech	0.5618
200665	26SHAWVL 3	2.3763
200666	26SHAWVL 4	2.3188
200715	26SHAWVL 1	1.5716
200722	26SHAWVL 2	1.6043
200887	26ARMNA MT	0.6693
200898	26AA1-106	6.0058
200913	26SHAW-D	0.0723
200949	26X1-109	42.4561
201477	26Y2-055	1.9054
203261	26BLOSSBCT	0.6572
203283	26MANOR_T86	0.0501
203349	26Z1-069 C	0.3211
203350	26MILZ1-092	0.7063
203351	26GROZ1-110	0.8383
203352	26CANZ2-011	0.8383
919201	AA1-144 OP	63.7835
919491	AA2-000	87.5163
920351	AA2-133	0.3184
922932	AB1-082 OP	2.7054
923442	AB1-160 C	0.0917
930511	AB1-092	3.2133
934801	AD1-108	0.0632
934811	AD1-109	0.0463
935061	AD1-142	0.0390
936421	AD2-055	6.6157
939171	AE1-147 C	0.8133
940201	AE2-001 C	0.8099
940681	AE2-055 C	0.7569
940861	AE2-074 C	2.0542
941191	AE2-113 C	6.3051
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.0362
941261	AE2-120 C	0.8079
941271	AE2-121 C	0.4356
941321	AE2-126 C	1.0838
941331	AE2-129 C	0.7609
941351	AE2-131 C	0.7609
941421	AE2-139 C	21.7122
942351	AE2-248 C	0.6232
942491	AE2-262 C	4.8485

Bus #	Bus	MW Impact
942501	AE2-263 C	4.5576
942961	AE2-316 C	2.5479
943751	AF1-043	19.8471
944001	AF1-068 C O1	0.4366
944311	AF1-099 C	7.3600
944321	AF1-100 C O1	14.5725
944381	AF1-103 O1	0.6960
944411	AF1-106 O1	5.0856
944471	AF1-112 C	0.4159
944671	AF1-132 C O1	0.4073
944771	AF1-142 C	11.7760
944841	AF1-149 C	0.8077
944881	AF1-153 C O1	1.0640
944901	AF1-155 C	1.0591
945071	AF1-172 C	23.3955
945121	AF1-177	0.1740
945161	AF1-181	0.0782
945171	AF1-182	0.3886
945181	AF1-183	0.0923
945331	AF1-198	0.6195
945481	AF1-213 C	3.1726
945491	AF1-214 C	0.4283
945551	AF1-220 C	8.4685
945771	AF1-242 C	1.0591
946091	AF1-274 C	4.6466
946131	AF1-278	17.9548
946211	AF1-286 C O1	2.0597
946381	AF1-302 C	0.5897
946421	AF1-306 C	5.4706
LGEE	LGEE	0.5414
CPL	CPL	0.3698
WEC	WEC	0.3100
CBM-W2	CBM-W2	7.3546
CBM-W1	CBM-W1	12.8728
TVA	TVA	1.1746
CBM-S2	CBM-S2	3.7223
CBM-S1	CBM-S1	7.3187
MEC	MEC	1.5111

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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
41631106	200927	26FOURMILE	PENELEC	200820	26ERIE SE	PENELEC	1	PN-P2-3-PN-230-6G	breaker	245.0	156.54	158.14	DC	8.69

Bus #	Bus	MW Impact
200642	26SENECA#1	3.4420
200643	26SENECA#2	3.2507
200644	26SENECA#3	0.3250
201144	W3-099 C OP1	5.7161
201201	26WRREN CT	1.2187
201477	26Y2-055	4.4216
203910	26Z1-091	0.8507
203999	P-047 E	3.5759
903644	W3-099 E OP1	38.2539
915952	Y3-092 NFTWR	52.7800
916202	Z1-069 E	2.9992
920341	AA2-132	0.9444
922932	AB1-082 OP	1.1683
923443	AB1-160 E	0.8569
923821	AB2-019 FTWR	1.4778
940861	AE2-074 C	0.8871
940862	AE2-074 E	1.1677
941191	AE2-113 C	3.6151
941192	AE2-113 E	3.8923
942811	AE2-299 C	13.8966
942812	AE2-299 E	55.5866
944301	AF1-098 C	21.8875
944302	AF1-098 E	14.5917
944381	AF1-103 O1	3.0636
944392	AF1-104 BAT	1.0838
944411	AF1-106 O1	0.5235
944741	AF1-139 C O1	0.3018
944742	AF1-139 E O1	0.2012
945121	AF1-177	0.7659
945331	AF1-198	0.0587
945551	AF1-220 C	2.3482
945552	AF1-220 E	1.5663
946091	AF1-274 C	1.1848
946092	AF1-274 E	0.7899
946131	AF1-278	7.2284
946211	AF1-286 C O1	0.2120
946212	AF1-286 E O1	0.1440
946403	AF1-304 BAT	6.4440
946421	AF1-306 C	1.3686
946422	AF1-306 E	5.4745
DUCKCREEK	DUCKCREEK	0.6840

Bus #	Bus	MW Impact
NEWTON	NEWTON	0.6168
FARMERCITY	FARMERCITY	0.0318
G-007A	G-007A	1.7813
VFT	VFT	4.9020
AA3-300	AA3-300	5.2330
PRAIRIE	PRAIRIE	1.4387
COFFEEN	COFFEEN	0.3049
EDWARDS	EDWARDS	0.2096
CHEOAH	CHEOAH	0.2272
TILTON	TILTON	0.3730
MADISON	MADISON	0.0222
GIBSON	GIBSON	0.3145
CALDERWOOD	CALDERWOOD	0.2271
BLUEG	BLUEG	0.9878
TRIMBLE	TRIMBLE	0.3166
CATAWBA	CATAWBA	0.1295

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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
42539217	200940	26SCOTCHILLW	PENELEC	200675	26E.TWANDA	PENELEC	1	AP-P1-3-WP-230-326T	single	570.0	104.61	106.82	DC	12.6

Bus #	Bus	MW Impact
200642	26SENECA#1	2.4712
200643	26SENECA#2	2.3339
200644	26SENECA#3	0.2333
200649	26PENNTech	0.8035
200665	26SHAWVL 3	5.0678
200666	26SHAWVL 4	4.9477
200715	26SHAWVL 1	3.1969
200722	26SHAWVL 2	3.2629
200898	26AA1-106	9.3590
200905	26Q36	0.1414
200913	26SHAW-D	0.1383
201201	26WRREN CT	0.5020
201477	26Y2-055	1.8316
203261	26BLOSSBCT	0.4513
203351	26GROZ1-110	1.3064
203352	26CANZ2-011	1.3064
919201	AA1-144 OP	134.4375
919491	AA2-000	184.1166
930511	AB1-092	6.7602
934801	AD1-108	0.0985
934811	AD1-109	0.0722
936421	AD2-055	13.9181
936991	AD2-133 C	1.8229
939171	AE1-147 C	2.7844
940201	AE2-001 C	2.7786
940681	AE2-055 C	2.6890
941191	AE2-113 C	5.3967
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.9814
941261	AE2-120 C	2.7766
941271	AE2-121 C	1.4827
941321	AE2-126 C	1.7920
941331	AE2-129 C	1.5599
941351	AE2-131 C	1.5599
941421	AE2-139 C	45.4318
942351	AE2-248 C	2.1867
942491	AE2-262 C	11.8070
942501	AE2-263 C	11.0986
942961	AE2-316 C	4.5462
943751	AF1-043	41.7543
944001	AF1-068 C O1	2.8983

Bus #	Bus	MW Impact
944181	AF1-086 C O1	1.5485
944311	AF1-099 C	17.9230
944321	AF1-100 C O1	31.0935
944381	AF1-103 O1	1.2618
944471	AF1-112 C	2.7400
944671	AF1-132 C O1	2.7103
944691	AF1-134 C O1	1.1392
944701	AF1-135 C	1.3670
944771	AF1-142 C	28.6768
944841	AF1-149 C	2.7764
944881	AF1-153 C O1	1.8734
944901	AF1-155 C	1.8593
945071	AF1-172 C	49.5645
945121	AF1-177	0.3154
945161	AF1-181	0.1667
945171	AF1-182	0.8292
945181	AF1-183	0.1877
945331	AF1-198	0.4254
945481	AF1-213 C	12.6301
945491	AF1-214 C	2.7767
945551	AF1-220 C	12.5980
945771	AF1-242 C	1.8593
946091	AF1-274 C	7.4547
946381	AF1-302 C	1.9852
946421	AF1-306 C	9.6164
LGEE	LGEE	0.2995
CPL	CPL	0.2176
WEC	WEC	0.1710
CBM-W2	CBM-W2	4.0868
NY	NY	1.6419
CBM-W1	CBM-W1	7.0807
TVA	TVA	0.6566
CBM-S2	CBM-S2	2.1444
CBM-S1	CBM-S1	4.0896
MEC	MEC	0.8358

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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
42235475	208005	JUNI BU2	PPL	208004	JUNI BU1	PPL	1	PL_P42_000451	breaker	641.0	104.92	106.02	DC	16.06

Bus #	Bus	MW Impact
200665	26SHAWVL 3	3.4647
200666	26SHAWVL 4	3.4094
200715	26SHAWVL 1	2.2754
200722	26SHAWVL 2	2.3337
200812	26ALY HYDR	0.6450
200852	26WARR RDG	0.1843
200883	Q-053 E	3.4370
200886	26ARWF_N39	0.2572
200894	26K02	3.6990
200913	26SHAW-D	0.1038
201477	26Y2-055	1.6165
203034	26NA_O38_P22	0.2250
235003	AC1-025 E	0.3095
236828	01GRAYMONT	0.7964
290086	Q-036 E	3.6023
293301	N-039 E	7.3696
293393	V3-030E	1.6705
293603	O-018 E	2.8544
294515	O38_P22	6.4484
296332	R-032 E	3.2936
919491	AA2-000	52.4996
930511	AB1-092	1.6385
936421	AD2-055	3.3734
936991	AD2-133 C	1.6210
936992	AD2-133 E	7.4144
937271	AD2-166	-5.2256
938381	AE1-071 C	5.7673
938382	AE1-071 E	3.5291
939171	AE1-147 C	2.3755
939172	AE1-147 E	1.5837
940201	AE2-001 C	2.3832
940202	AE2-001 E	1.5888
940681	AE2-055 C	2.5008
940682	AE2-055 E	1.6672
941191	AE2-113 C	4.4824
941192	AE2-113 E	4.8261
941231	AE2-117 C	2.6405
941232	AE2-117 E	1.7603
941241	AE2-118 C	2.6405
941242	AE2-118 E	1.7603
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.4872
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.9914

Bus #	Bus	MW Impact
941261	AE2-120 C	2.3874
941262	AE2-120 E	1.5916
941271	AE2-121 C	1.2558
941272	AE2-121 E	0.8385
941321	AE2-126 C	1.1550
941322	AE2-126 E	0.7700
941331	AE2-129 C	1.3687
941332	AE2-129 E	0.9125
941351	AE2-131 C	1.3687
941352	AE2-131 E	0.9125
942031	AE2-215 C	8.2444
942032	AE2-215 E	5.4962
942121	AE2-224 C	3.9316
942122	AE2-224 E	2.6211
942351	AE2-248 C	1.9614
942352	AE2-248 E	1.3076
942491	AE2-262 C	8.2710
942492	AE2-262 E	5.5581
942501	AE2-263 C	7.7747
942502	AE2-263 E	5.1909
942511	AE2-264 C	8.7240
942512	AE2-264 E	5.8160
942961	AE2-316 C	2.9795
942962	AE2-316 E	4.2489
943751	AF1-043	11.9059
944001	AF1-068 C O1	2.6310
944002	AF1-068 E O1	1.4800
944181	AF1-086 C O1	0.7201
944182	AF1-086 E O1	3.1328
944311	AF1-099 C	12.5554
944312	AF1-099 E	8.3703
944321	AF1-100 C O1	21.4260
944322	AF1-100 E O1	14.2840
944381	AF1-103 O1	0.5905
944471	AF1-112 C	2.4389
944472	AF1-112 E	1.6259
944671	AF1-132 C O1	2.4749
944672	AF1-132 E O1	1.6499
944691	AF1-134 C O1	0.4397
944692	AF1-134 E O1	0.4397
944701	AF1-135 C	0.5277
944702	AF1-135 E	0.3518
944731	AF1-138 C O1	2.6405
944732	AF1-138 E O1	1.7603
944751	AF1-140 C	0.3173
944752	AF1-140 E	0.2115
944771	AF1-142 C	20.0886
944772	AF1-142 E	13.3924
944841	AF1-149 C	2.3879
944842	AF1-149 E	1.5919
944881	AF1-153 C O1	0.5875
944882	AF1-153 E O1	0.3917

Bus #	Bus	MW Impact
944901	AF1-155 C	0.5842
944902	AF1-155 E	0.3895
945071	AF1-172 C	18.7035
945072	AF1-172 E	12.4690
945121	AF1-177	0.1476
945161	AF1-181	0.1140
945171	AF1-182	0.5714
945181	AF1-183	0.1336
945481	AF1-213 C	4.5270
945482	AF1-213 E	3.0180
945491	AF1-214 C	2.3872
945492	AF1-214 E	1.5914
945551	AF1-220 C	4.3406
945552	AF1-220 E	2.8953
945771	AF1-242 C	0.5842
945772	AF1-242 E	0.3895
945901	AF1-255 C	0.1691
945902	AF1-255 E	0.2336
946091	AF1-274 C	2.5528
946092	AF1-274 E	1.7019
946131	AF1-278	5.5863
946241	AF1-289 C O1	0.7678
946242	AF1-289 E O1	0.5118
946311	AF1-295	2.7481
946381	AF1-302 C	0.6896
946382	AF1-302 E	0.9195
946421	AF1-306 C	6.6369
946422	AF1-306 E	26.5478
LGEE	LGEE	0.5203
CPL	CPL	0.2745
WEC	WEC	0.2986
CBM-W2	CBM-W2	6.9124
CBM-W1	CBM-W1	12.3974
TVA	TVA	1.0808
O-066	O-066	12.5328
CBM-S2	CBM-S2	3.0287
CBM-S1	CBM-S1	6.7990
G-007	G-007	2.0010
MEC	MEC	1.4428

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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
41630783	235248	01SHINGL	AP	200513	26LEWISTWN	PENELEC	1	AP-P2-3-WP-230-446T	breaker	570.0	206.44	208.12	DC	21.34

Bus #	Bus	MW Impact
200665	26SHAWVL 3	11.2213
200666	26SHAWVL 4	11.0429
200715	26SHAWVL 1	6.8508
200722	26SHAWVL 2	7.0237
200894	26K02	13.1208
200898	26AA1-106	2.6976
200905	26Q36	0.2708
200913	26SHAW-D	0.2828
203352	26CANZ2-011	0.4430
235003	AC1-025 E	0.9180
236828	01GRAYMONT	2.3847
290086	Q-036 E	7.7608
919491	AA2-000	169.8793
930511	AB1-092	6.2375
936421	AD2-055	12.8419
936991	AD2-133 C	3.4924
936992	AD2-133 E	15.9737
939171	AE1-147 C	7.1243
939172	AE1-147 E	4.7495
940201	AE2-001 C	7.1412
940202	AE2-001 E	4.7608
940681	AE2-055 C	7.3998
940682	AE2-055 E	4.9332
941251	AE2-119 C (Withdrawn : 12/16/2019)	4.0520
941252	AE2-119 E (Withdrawn : 12/16/2019)	2.7014
941261	AE2-120 C	7.1504
941262	AE2-120 E	4.7670
941271	AE2-121 C	3.7720
941272	AE2-121 E	2.5186
941321	AE2-126 C	2.6525
941322	AE2-126 E	1.7683
941331	AE2-129 C	3.1049
941332	AE2-129 E	2.0699
941351	AE2-131 C	3.1049
941352	AE2-131 E	2.0699
941421	AE2-139 C	7.8236
941422	AE2-139 E	5.2157
942351	AE2-248 C	5.8335
942352	AE2-248 E	3.8890
942491	AE2-262 C	26.1095

Bus #	Bus	MW Impact
942492	AE2-262 E	17.5456
942501	AE2-263 C	24.5429
942502	AE2-263 E	16.3863
943751	AF1-043	38.5255
944001	AF1-068 C O1	7.8127
944002	AF1-068 E O1	4.3947
944181	AF1-086 C O1	1.2931
944182	AF1-086 E O1	5.6255
944311	AF1-099 C	39.6342
944312	AF1-099 E	26.4228
944321	AF1-100 C O1	69.3975
944322	AF1-100 E O1	46.2650
944471	AF1-112 C	7.2636
944472	AF1-112 E	4.8424
944671	AF1-132 C O1	7.3427
944672	AF1-132 E O1	4.8951
944691	AF1-134 C O1	2.2470
944692	AF1-134 E O1	2.2470
944701	AF1-135 C	2.6964
944702	AF1-135 E	1.7976
944771	AF1-142 C	63.4148
944772	AF1-142 E	42.2765
944841	AF1-149 C	7.1515
944842	AF1-149 E	4.7677
945071	AF1-172 C	61.3380
945072	AF1-172 E	40.8920
945161	AF1-181	0.3692
945171	AF1-182	1.8506
945181	AF1-183	0.4023
945481	AF1-213 C	25.4386
945482	AF1-213 E	16.9591
945491	AF1-214 C	7.1500
945492	AF1-214 E	4.7666
945551	AF1-220 C	5.7668
945552	AF1-220 E	3.8467
946091	AF1-274 C	10.0853
946092	AF1-274 E	6.7235
946312	AF1-295 BAT	1.5296
LGEE	LGEE	0.0673
WEC	WEC	0.0444
CBM-W2	CBM-W2	0.6962
CBM-W1	CBM-W1	2.1267
TVA	TVA	0.0672
O-066	O-066	5.0266
CBM-S1	CBM-S1	0.5197
G-007	G-007	0.8403
MEC	MEC	0.1907
CATAWBA	CATAWBA	0.0231

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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
42767364	239036	02PERRY	ATSI	239334	02L.CENTER	ATSI	1	ATSI-P7-1-CEI-345-012	tower	1667.0	135.46	136.03	DC	20.81

Bus #	Bus	MW Impact
200828	26HNSMLK 1	1.8459
200829	26HNSMLK 2	1.8459
200830	26HNSMLK 3	1.8459
200831	26HNSMLK 4	1.8459
200832	26HNSMLK 5	1.8459
200849	26LAKVU GN	0.2451
200894	26K02	4.6600
200898	26AA1-106	1.6646
201144	W3-099 C OP1	4.3853
201477	26Y2-055	5.9490
203999	P-047 E	7.1703
239035	02PERRG1 (Deactivation : 05/31/21)	86.6075
903644	W3-099 E OP1	29.3477
915951	Y3-092 FTIR	401.4900
916202	Z1-069 E	6.1087
919491	AA2-000	41.5667
920341	AA2-132	1.6820
922932	AB1-082 OP	2.3870
923443	AB1-160 E	1.7453
930511	AB1-092	1.5262
935191	AD1-154	2.1388
936421	AD2-055	3.1422
938951	AE1-123	2.3510
939291	AE1-160 C	3.1714
939292	AE1-160 E	1.8230
939381	AE1-169 C O1	10.4699
939382	AE1-169 E O1	6.9799
940861	AE2-074 C	1.8125
940862	AE2-074 E	2.3858
941191	AE2-113 C	7.8448
941192	AE2-113 E	8.4463
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.1107
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7405
941321	AE2-126 C	1.2815
941322	AE2-126 E	0.8544
941331	AE2-129 C	1.0082
941332	AE2-129 E	0.6721
941351	AE2-131 C	1.0082
941352	AE2-131 E	0.6721
941421	AE2-139 C	4.7616
941422	AE2-139 E	3.1744

Bus #	Bus	MW Impact
942491	AE2-262 C	4.3809
942492	AE2-262 E	2.9440
942501	AE2-263 C	4.1180
942502	AE2-263 E	2.7495
942811	AE2-299 C	10.6970
942812	AE2-299 E	42.7878
942961	AE2-316 C	4.4304
942962	AE2-316 E	6.3178
943151	AE2-344 C	24.1162
943152	AE2-344 E	16.0775
943351	AF1-006 C	4.6204
943352	AF1-006 E	2.5990
943751	AF1-043	4.9961
943871	AF1-055 C O1	11.9345
943872	AF1-055 E O1	7.9564
944181	AF1-086 C O1	0.8747
944182	AF1-086 E O1	3.8055
944261	AF1-094 C	3.7262
944262	AF1-094 E	2.4842
944281	AF1-096 C	2.9966
944282	AF1-096 E	1.9978
944301	AF1-098 C	15.5808
944302	AF1-098 E	10.3872
944311	AF1-099 C	3.5246
944312	AF1-099 E	2.3497
944321	AF1-100 C O1	7.5035
944322	AF1-100 E O1	5.0024
944381	AF1-103 O1	2.1763
944391	AF1-104 O1	7.6928
944411	AF1-106 O1	0.9455
944691	AF1-134 C O1	0.4537
944692	AF1-134 E O1	0.4537
944701	AF1-135 C	0.5444
944702	AF1-135 E	0.3629
944741	AF1-139 C O1	0.5376
944742	AF1-139 E O1	0.3584
944771	AF1-142 C	5.6394
944772	AF1-142 E	3.7596
944881	AF1-153 C O1	0.6979
944882	AF1-153 E O1	0.4653
944901	AF1-155 C	0.6981
944902	AF1-155 E	0.4654
945021	AF1-167 C	0.5280
945022	AF1-167 E	0.3520
945051	AF1-170 C	17.0195
945052	AF1-170 E	11.3463
945071	AF1-172 C	7.3028
945072	AF1-172 E	4.8686
945121	AF1-177	0.5441
945161	AF1-181	0.0400
945171	AF1-182	0.2001
945181	AF1-183	0.0496

Bus #	Bus	MW Impact
945331	AF1-198	0.1200
945451	AF1-210 C	0.4873
945452	AF1-210 E	0.3249
945481	AF1-213 C	4.2944
945482	AF1-213 E	2.8629
945551	AF1-220 C	5.6238
945552	AF1-220 E	3.7512
945751	AF1-240 C O1	0.6801
945752	AF1-240 E O1	0.4534
945771	AF1-242 C	0.6981
945772	AF1-242 E	0.4654
946091	AF1-274 C	2.9636
946092	AF1-274 E	1.9757
946131	AF1-278	14.3242
946211	AF1-286 C O1	0.3829
946212	AF1-286 E O1	0.2600
946221	AF1-287 C	4.1209
946222	AF1-287 E	2.7473
946381	AF1-302 C	1.0254
946382	AF1-302 E	1.3672
946401	AF1-304 C	6.4026
946402	AF1-304 E	4.2684
946421	AF1-306 C	3.4932
946422	AF1-306 E	13.9727
946771	AF1-217 C O1	4.1209
946772	AF1-217 E O1	2.7473
DUCKCREEK	DUCKCREEK	3.4130
NEWTON	NEWTON	3.0752
FARMERCITY	FARMERCITY	0.1585
G-007A	G-007A	4.8382
VFT	VFT	13.2289
PRAIRIE	PRAIRIE	7.1911
COFFEEN	COFFEEN	1.5205
EDWARDS	EDWARDS	1.0448
CHEOAH	CHEOAH	1.1461
TILTON	TILTON	1.8579
MADISON	MADISON	0.0625
GIBSON	GIBSON	1.5648
CALDERWOOD	CALDERWOOD	1.1451
BLUEG	BLUEG	4.9059
TRIMBLE	TRIMBLE	1.5749
CATAWBA	CATAWBA	0.6685

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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
42767434	239036	02PERRY	ATSI	238684	02EASTLK	ATSI	1	ATSI-P7-1-CEI-345-016	tower	1667.0	127.53	128.08	DC	20.1

Bus #	Bus	MW Impact
200828	26HNSMLK 1	1.7839
200829	26HNSMLK 2	1.7839
200830	26HNSMLK 3	1.7839
200831	26HNSMLK 4	1.7839
200832	26HNSMLK 5	1.7839
200849	26LAKVU GN	0.2369
200894	26K02	4.5011
200898	26AA1-106	1.6078
201144	W3-099 C OP1	4.2385
201477	26Y2-055	5.7491
203999	P-047 E	6.9260
239035	02PERRG1 (Deactivation : 05/31/21)	81.5353
903644	W3-099 E OP1	28.3655
915951	Y3-092 FTIR	388.0700
916202	Z1-069 E	5.9015
919491	AA2-000	40.1539
920341	AA2-132	1.6247
922932	AB1-082 OP	2.3062
923443	AB1-160 E	1.6861
930511	AB1-092	1.4743
935191	AD1-154	2.0660
936421	AD2-055	3.0354
938951	AE1-123	2.2713
939291	AE1-160 C	3.0649
939292	AE1-160 E	1.7617
939381	AE1-169 C O1	10.1175
939382	AE1-169 E O1	6.7450
940861	AE2-074 C	1.7511
940862	AE2-074 E	2.3050
941191	AE2-113 C	7.5792
941192	AE2-113 E	8.1604
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.0728
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7152
941321	AE2-126 C	1.2381
941322	AE2-126 E	0.8254
941331	AE2-129 C	0.9737
941332	AE2-129 E	0.6491
941351	AE2-131 C	0.9737
941352	AE2-131 E	0.6491
941421	AE2-139 C	4.5986
941422	AE2-139 E	3.0657

Bus #	Bus	MW Impact
942491	AE2-262 C	4.2317
942492	AE2-262 E	2.8437
942501	AE2-263 C	3.9778
942502	AE2-263 E	2.6558
942811	AE2-299 C	10.3389
942812	AE2-299 E	41.3555
942961	AE2-316 C	4.2798
942962	AE2-316 E	6.1030
943151	AE2-344 C	23.3096
943152	AE2-344 E	15.5397
943351	AF1-006 C	4.4658
943352	AF1-006 E	2.5120
943751	AF1-043	4.8263
943871	AF1-055 C O1	11.5342
943872	AF1-055 E O1	7.6895
944181	AF1-086 C O1	0.8447
944182	AF1-086 E O1	3.6750
944261	AF1-094 C	3.6013
944262	AF1-094 E	2.4009
944281	AF1-096 C	2.8960
944282	AF1-096 E	1.9306
944301	AF1-098 C	15.0590
944302	AF1-098 E	10.0394
944311	AF1-099 C	3.4046
944312	AF1-099 E	2.2697
944321	AF1-100 C O1	7.2481
944322	AF1-100 E O1	4.8321
944381	AF1-103 O1	2.1031
944391	AF1-104 O1	7.4356
944411	AF1-106 O1	0.9133
944691	AF1-134 C O1	0.4382
944692	AF1-134 E O1	0.4382
944701	AF1-135 C	0.5258
944702	AF1-135 E	0.3505
944741	AF1-139 C O1	0.5192
944742	AF1-139 E O1	0.3462
944771	AF1-142 C	5.4473
944772	AF1-142 E	3.6316
944881	AF1-153 C O1	0.6742
944882	AF1-153 E O1	0.4495
944901	AF1-155 C	0.6744
944902	AF1-155 E	0.4496
945021	AF1-167 C	0.5100
945022	AF1-167 E	0.3400
945051	AF1-170 C	16.4503
945052	AF1-170 E	10.9669
945071	AF1-172 C	7.0542
945072	AF1-172 E	4.7028
945121	AF1-177	0.5258
945161	AF1-181	0.0387
945171	AF1-182	0.1933
945181	AF1-183	0.0479

Bus #	Bus	MW Impact
945331	AF1-198	0.1159
945451	AF1-210 C	0.4706
945452	AF1-210 E	0.3137
945481	AF1-213 C	4.1479
945482	AF1-213 E	2.7653
945551	AF1-220 C	5.4331
945552	AF1-220 E	3.6241
945751	AF1-240 C O1	0.6570
945752	AF1-240 E O1	0.4380
945771	AF1-242 C	0.6744
945772	AF1-242 E	0.4496
946091	AF1-274 C	2.8630
946092	AF1-274 E	1.9087
946131	AF1-278	13.8404
946211	AF1-286 C O1	0.3699
946212	AF1-286 E O1	0.2512
946221	AF1-287 C	3.9829
946222	AF1-287 E	2.6553
946381	AF1-302 C	0.9905
946382	AF1-302 E	1.3207
946401	AF1-304 C	6.1872
946402	AF1-304 E	4.1248
946421	AF1-306 C	3.3746
946422	AF1-306 E	13.4982
946771	AF1-217 C O1	3.9829
946772	AF1-217 E O1	2.6553
DUCKCREEK	DUCKCREEK	3.2587
NEWTON	NEWTON	2.9366
FARMERCITY	FARMERCITY	0.1514
G-007A	G-007A	4.6607
VFT	VFT	12.7452
PRAIRIE	PRAIRIE	6.8682
COFFEEN	COFFEEN	1.4518
EDWARDS	EDWARDS	0.9975
CHEOAH	CHEOAH	1.0961
TILTON	TILTON	1.7741
MADISON	MADISON	0.0645
GIBSON	GIBSON	1.4944
CALDERWOOD	CALDERWOOD	1.0944
BLUEG	BLUEG	4.6872
TRIMBLE	TRIMBLE	1.5048
CATAWBA	CATAWBA	0.6395

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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
41630956	941190	AE2-113 TAP	PENELEC	200668	26FARM VLY	PENELEC	1	PN-P2-3-PN-230-8M_SUM_WIN	breaker	160.0	104.53	124.71	DC	32.29

Bus #	Bus	MW Impact
200649	26PENNTech	1.3795
235003	AC1-025 E	0.0787
236828	01GRAYMONT	0.2178
290086	Q-036 E	1.8098
919491	AA2-000	22.9558
930511	AB1-092	0.8429
936421	AD2-055	1.7353
936991	AD2-133 C	0.8144
936992	AD2-133 E	3.7251
939171	AE1-147 C	0.6573
939172	AE1-147 E	0.4382
940201	AE2-001 C	0.6551
940202	AE2-001 E	0.4368
940681	AE2-055 C	0.6228
940682	AE2-055 E	0.4152
941191	AE2-113 C	33.8453
941192	AE2-113 E	36.4405
941251	AE2-119 C (Withdrawn : 12/16/2019)	0.9191
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.6127
941261	AE2-120 C	0.6539
941262	AE2-120 E	0.4359
941271	AE2-121 C	0.3514
941272	AE2-121 E	0.2346
941321	AE2-126 C	1.9535
941322	AE2-126 E	1.3023
941331	AE2-129 C	0.7112
941332	AE2-129 E	0.4742
941351	AE2-131 C	0.7112
941352	AE2-131 E	0.4742
942351	AE2-248 C	0.5090
942352	AE2-248 E	0.3393
942491	AE2-262 C	3.1858
942492	AE2-262 E	2.1409
942501	AE2-263 C	2.9947
942502	AE2-263 E	1.9994
942961	AE2-316 C	2.2928
942962	AE2-316 E	3.2696
943751	AF1-043	2.7592
944001	AF1-068 C O1	0.3574
944002	AF1-068 E O1	0.2010
944311	AF1-099 C	2.5631

Bus #	Bus	MW Impact
944312	AF1-099 E	1.7087
944321	AF1-100 C O1	5.8202
944322	AF1-100 E O1	3.8802
944382	AF1-103 BAT	1.1864
944471	AF1-112 C	0.3391
944472	AF1-112 E	0.2261
944671	AF1-132 C O1	0.3339
944672	AF1-132 E O1	0.2226
944691	AF1-134 C O1	0.2654
944692	AF1-134 E O1	0.2654
944701	AF1-135 C	0.3185
944702	AF1-135 E	0.2123
944771	AF1-142 C	4.1010
944772	AF1-142 E	2.7340
944841	AF1-149 C	0.6538
944842	AF1-149 E	0.4359
944881	AF1-153 C O1	0.5178
944882	AF1-153 E O1	0.3452
944901	AF1-155 C	0.5143
944902	AF1-155 E	0.3429
945071	AF1-172 C	4.6431
945072	AF1-172 E	3.0954
945161	AF1-181	0.0310
945171	AF1-182	0.1552
945181	AF1-183	0.0396
945481	AF1-213 C	3.0372
945482	AF1-213 E	2.0248
945491	AF1-214 C	0.3466
945492	AF1-214 E	0.2311
945551	AF1-220 C	19.3684
945552	AF1-220 E	12.9194
945771	AF1-242 C	0.5143
945772	AF1-242 E	0.3429
946091	AF1-274 C	9.0418
946092	AF1-274 E	6.0279
946381	AF1-302 C	0.5307
946382	AF1-302 E	0.7075
946421	AF1-306 C	6.7576
946422	AF1-306 E	27.0303
DUCKCREEK	DUCKCREEK	0.1842
NEWTON	NEWTON	0.1655
FARMERCITY	FARMERCITY	0.0085
G-007A	G-007A	0.5131
VFT	VFT	1.3674
NY	NY	0.4911
PRAIRIE	PRAIRIE	0.3823
COFFEEN	COFFEEN	0.0819
EDWARDS	EDWARDS	0.0564
CHEOAH	CHEOAH	0.0576
TILTON	TILTON	0.1002
MADISON	MADISON	0.0081
GIBSON	GIBSON	0.0841

Bus #	Bus	MW Impact
CALDERWOOD	CALDERWOOD	0.0577
BLUEG	BLUEG	0.2639
TRIMBLE	TRIMBLE	0.0851
CATAWBA	CATAWBA	0.0308

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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
42235455	999392	STAR601	PENELEC	200767	26HOMER CT	PENELEC	N	PN-P2-3-PN-230-9E	breaker	807.0	129.51	130.75	DC	21.76

Bus #	Bus	MW Impact
200823	26MHP_X3-003	2.2695
200830	26HNSMLK 3	1.8760
200831	26HNSMLK 4	1.8760
200832	26HNSMLK 5	1.8760
200838	26HOMER C2	45.1077
200839	26HOMER C3	47.7524
200894	26K02	6.9091
200898	26AA1-106	3.0352
201144	W3-099 C OP1	1.8313
201477	26Y2-055	4.7720
203349	26Z1-069 C	0.4984
203907	26Y2-042	1.4811
203909	26Z1-038	2.2372
203910	26Z1-091	3.0422
203999	P-047 E	16.3426
294573	P-028 E	13.6170
903644	W3-099 E OP1	12.2557
915951	Y3-092 FTIR	139.8800
916202	Z1-069 E	15.2211
917672	Z2-108 E	-1.9186
917673	Z2-108 BAT	2.2572
918682	AA1-082 E	8.2095
919201	AA1-144 OP	23.0963
919491	AA2-000	46.7537
920341	AA2-132	3.4204
922932	AB1-082 OP	5.4301
923442	AB1-160 C	0.1424
923443	AB1-160 E	4.3489
930511	AB1-092	1.7167
936421	AD2-055	3.5343
938352	AE1-053 BAT	1.2540
938882	AE1-116 BAT	1.3081
938951	AE1-123	1.9587
939291	AE1-160 C	1.6593
939292	AE1-160 E	0.9538
939381	AE1-169 C O1	6.6451
939382	AE1-169 E O1	4.4301
940861	AE2-074 C	4.1231
940862	AE2-074 E	5.4274
941191	AE2-113 C	11.7440
941192	AE2-113 E	12.6445

Bus #	Bus	MW Impact
941321	AE2-126 C	1.1333
941322	AE2-126 E	0.7555
941421	AE2-139 C	8.2218
941422	AE2-139 E	5.4812
942491	AE2-262 C	3.4582
942492	AE2-262 E	2.3239
942501	AE2-263 C	3.2507
942502	AE2-263 E	2.1704
942811	AE2-299 C	4.5557
942812	AE2-299 E	18.2229
942961	AE2-316 C	5.6140
942962	AE2-316 E	8.0056
943151	AE2-344 C	9.6181
943152	AE2-344 E	6.4121
943351	AF1-006 C	0.8869
943352	AF1-006 E	0.4989
943751	AF1-043	5.6195
943871	AF1-055 C O1	3.6302
943872	AF1-055 E O1	2.4201
944261	AF1-094 C	0.8477
944262	AF1-094 E	0.5651
944281	AF1-096 C	0.8310
944282	AF1-096 E	0.5540
944301	AF1-098 C	3.5963
944302	AF1-098 E	2.3975
944311	AF1-099 C	2.7823
944312	AF1-099 E	1.8549
944321	AF1-100 C O1	6.0959
944322	AF1-100 E O1	4.0640
944381	AF1-103 O1	1.7437
944391	AF1-104 O1	1.3164
944411	AF1-106 O1	1.9691
944741	AF1-139 C O1	1.0931
944742	AF1-139 E O1	0.7288
944771	AF1-142 C	4.4516
944772	AF1-142 E	2.9678
944881	AF1-153 C O1	0.7105
944882	AF1-153 E O1	0.4736
944901	AF1-155 C	0.7125
944902	AF1-155 E	0.4750
945021	AF1-167 C	0.6319
945022	AF1-167 E	0.4212
945051	AF1-170 C	3.2227
945052	AF1-170 E	2.1485
945071	AF1-172 C	7.4637
945072	AF1-172 E	4.9758
945121	AF1-177	0.4359
945161	AF1-181	0.0326
945171	AF1-182	0.1626
945331	AF1-198	0.2584
945451	AF1-210 C	0.6033
945452	AF1-210 E	0.4022

Bus #	Bus	MW Impact
945551	AF1-220 C	5.8816
945552	AF1-220 E	3.9232
945673	AF1-232 BAT	2.9052
945771	AF1-242 C	0.7125
945772	AF1-242 E	0.4750
946091	AF1-274 C	2.7681
946092	AF1-274 E	1.8454
946131	AF1-278	51.5931
946211	AF1-286 C O1	0.7975
946212	AF1-286 E O1	0.5415
946221	AF1-287 C	0.8792
946222	AF1-287 E	0.5861
946381	AF1-302 C	1.2993
946382	AF1-302 E	1.7324
946401	AF1-304 C	4.1369
946402	AF1-304 E	2.7580
946421	AF1-306 C	3.4691
946422	AF1-306 E	13.8766
946771	AF1-217 C O1	0.8792
946772	AF1-217 E O1	0.5861
LGEE	LGEE	0.0217
WEC	WEC	0.0454
CBM-W1	CBM-W1	3.6654
O-066	O-066	4.6435
CHEOAH	CHEOAH	0.1211
G-007	G-007	0.8382
MEC	MEC	0.1208
CALDERWOOD	CALDERWOOD	0.1168
CATAWBA	CATAWBA	0.1551

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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
41631038	999401	STAR592	PJM	200011	KEYSTONE	PJM	4	PJM500_PN_P4-500-001A	breaker	634.0	113.38	114.61	DC	16.98

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	0.4600
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

Affected Systems

19 Affected Systems

19.1 LG&E

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

19.2 MISO

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

19.3 TVA

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

19.4 Duke Energy Progress

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

19.5 NYISO

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

20 Contingency Descriptions

Contingency Name	Contingency Definition
PN-P2-3-PN-345-003A	CONTINGENCY 'PN-P2-3-PN-345-003A' /* WAYNE 345KV STUCK BREAKER DISCONNECT BUS 200595 /* 26WAYNE 345 END
PN-P2-3-PN-230-8M_SUM_WIN	CONTINGENCY 'PN-P2-3-PN-230-8M_SUM_WIN' /* GLADE STUCK BREAKER B42 (FOREST/SENECA) DISCONNECT BRANCH FROM BUS 200581 TO BUS 200593 CKT 1 /* 26FOREST 230 26GLADE 230 DISCONNECT BRANCH FROM BUS 200593 TO BUS 200594 CKT 1 /* 26GLADE 230 26SENECA 230 DISCONNECT BRANCH FROM BUS 200594 TO BUS 200642 CKT 1 /* 26SENECA 230 26SENECA#1 14 DISCONNECT BRANCH FROM BUS 200594 TO BUS 200643 CKT 1 /* 26SENECA 230 26SENECA#2 14 DISCONNECT BRANCH FROM BUS 200594 TO BUS 200644 CKT 1 /* 26SENECA 230 26SENECA#3 14 REMOVE MACHINE 1G FROM BUS 200642 /* 26SENECA#1 14 REMOVE MACHINE 2G FROM BUS 200643 /* 26SENECA#2 14 REMOVE MACHINE 3 FROM BUS 200644 /* 26SENECA#3 14 END
PN-P2-3-PN-230-7AT	CONTINGENCY 'PN-P2-3-PN-230-7AT' /* FOREST STUCK 230KV BREAKER DISCONNECT BRANCH FROM BUS 200581 TO BUS 200593 CKT 1 /* 26FOREST 230 26GLADE 230 DISCONNECT BRANCH FROM BUS 200581 TO BUS 235971 CKT 1 /* 26FOREST 230 01SQUABHLLW 230 DISCONNECT BRANCH FROM BUS 200647 TO BUS 200581 CKT 1 /* 26FOREST 115 26FOREST 230 END
PN-P2-2-PN-230-013T	CONTINGENCY 'PN-P2-2-PN-230-013T' /* SHAWVILLE #1 230KV BUS DISCONNECT BRANCH FROM BUS 200710 TO BUS 235220 CKT 1 /* 26SHAWVL 1 230 01MOSHAN 230 DISCONNECT BRANCH FROM BUS 200710 TO BUS 200665 CKT 1 /* 26SHAWVL 1 230 26SHAWVL 3 22 DISCONNECT BRANCH FROM BUS 200710 TO BUS 200726 CKT ZB /* 26SHAWVL 1 230 26SHAWVL 2 230 END
PL_P21_000305	CONTINGENCY 'PL_P21_000305' /* JUNI-DAUP 230KV PATHEND

Contingency Name	Contingency Definition
PN-P2-2-PN-230-007T	CONTINGENCY 'PN-P2-2-PN-230-007T' /* LEWISTOWN #2 230KV BUS DISCONNECT BRANCH FROM BUS 200513 TO BUS 200531 CKT 2 /* 26LEWISTWN 230 26YEAGRTWN 230 DISCONNECT BRANCH FROM BUS 200513 TO BUS 235248 CKT 1 /* 26LEWISTWN 230 01SHINGL 230 DISCONNECT BRANCH FROM BUS 200513 TO BUS 200517 CKT 1 /* 26LEWISTWN 230 26RAYSTOWN 230 END
AP-P1-2-WP-230-005A	CONTINGENCY 'AP-P1-2-WP-230-005A' /* MILESBERG - QUEUE AE2-262 230KV DISCONNECT BRANCH FROM BUS 235220 TO BUS 942490 CKT 1 /* 01MOSHAN 230 AE2-262 TAP 230 END
PL_P12_000196	CONTINGENCY 'PL_P12_000196' /* JUNI-DAUP 230KV LINE DISCONNECT BRANCH FROM BUS 207955 TO BUS 208005 CKT 1 /* DAUP TR2-JUNI BU2 230 DISCONNECT BRANCH FROM BUS 207955 TO BUS 209866 CKT 2 /* DAUP TR2-DAUP 230-69 END
AP-P1-2-WP-230-005B	CONTINGENCY 'AP-P1-2-WP-230-005B' /* QUEUE AE2-262 - MOSHANNON 230KV DISCONNECT BRANCH FROM BUS 942490 TO BUS 235219 CKT 1 /* AE2-262 TAP 230 01MILESB 230 END
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-P2-3-PN-115-28B_A	CONTINGENCY 'PN-P2-3-PN-115-28B_A' /* 630 DISCONNECT BRANCH FROM BUS 200755 TO BUS 200801 CKT 1 /* 26WESTOVER 115 26GARMAN 115 DISCONNECT BRANCH FROM BUS 200682 TO BUS 200755 CKT 1 /* 26WEST.SOU 35 26WESTOVER 115 DISCONNECT BRANCH FROM BUS 200524 TO BUS 200801 CKT 1 /* 26SPANGLER 115 26GARMAN 115 DISCONNECT BRANCH FROM BUS 200524 TO BUS 200533 CKT 2 /* 26SPANGLER 115 26SPANGLER 46 END

Contingency Name	Contingency Definition
AP-P1-3-WP-230-326T	CONTINGENCY 'AP-P1-3-WP-230-326T' /* SHINGLETOWN #82 230/46KV XFMR DISCONNECT BRANCH FROM BUS 235248 TO BUS 236711 CKT 82 /* 01SHINGL 230 01SHINGLTN 46 DISCONNECT BRANCH FROM BUS 235248 TO BUS 200513 CKT 1 /* 01SHINGL 230 26LEWISTWN 230 DISCONNECT BRANCH FROM BUS 235248 TO BUS 235970 CKT 1 /* 01SHINGL 230 01DALE 230 DISCONNECT BUS 237058 /*SHINGLETOWN 230 KV CAPACITOR END
AP-P2-3-WP-230-443T *	CONTINGENCY 'AP-P2-3-WP-230-443T *' / UPDATED CON AJK 3-31-16 DISCONNECT BRANCH FROM BUS 200726 TO BUS 235175 CKT 1 DISCONNECT BRANCH FROM BUS 235175 TO BUS 235236 CKT 1 DISCONNECT BUS 235158 END
PN-P1-2-PN-230-003	CONTINGENCY 'PN-P1-2-PN-230-003' /* ERIE SOUTH - WARREN 230KV DISCONNECT BRANCH FROM BUS 200918 TO BUS 200811 CKT 1 /* 26ERIE S TIE230 26WARREN 230 END
PL_P42_000451	CONTINGENCY 'PL_P42_000451' /* JUNI-DAUP 230KV STUCK BREAKER CONNECTED TO JUNI TR4 DISCONNECT BRANCH FROM BUS 208005 TO BUS 209997 CKT 4 /* JUNI BU2-JUNI 230- 69 DISCONNECT BRANCH FROM BUS 207955 TO BUS 208005 CKT 1 /* DAUP TR2-JUNI BU2 230 DISCONNECT BRANCH FROM BUS 207955 TO BUS 209866 CKT 2 /* DAUP TR2-DAUP 230-69 END
PN-P1-2-PN-115-094-A	CONTINGENCY 'PN-P1-2-PN-115-094-A' /* ROXBURY - SHADE GAP 115KV DISCONNECT BRANCH FROM BUS 200520 TO BUS 938380 CKT 1 /* 26ROXBURY 115 AE1-071 TAP 115 END
PN-P2-2-PN-115-032	CONTINGENCY 'PN-P2-2-PN-115-032' /* ROXBURY 115KV BUS FAULT DISCONNECT BUS 200520 /* 26ROXBURY 115 END

Contingency Name	Contingency Definition
AP-P2-2-WP-230-005T	CONTINGENCY 'AP-P2-2-WP-230-005T' /* SHINGLETOWN #2 230KV BUS DISCONNECT BRANCH FROM BUS 235248 TO BUS 235970 CKT 1 /* 01SHINGL 230 01DALE 230 DISCONNECT BRANCH FROM BUS 235248 TO BUS 200513 CKT 1 /* 01SHINGL 230 26LEWISTWN 230 DISCONNECT BRANCH FROM BUS 235248 TO BUS 236711 CKT 82 /* 01SHINGL 230 01SHINGLTN 46 DISCONNECT BUS 237058 /*SHINGLETOWN 230 KV CAPACITOR END
PN-P1-2-PN-230-004	CONTINGENCY 'PN-P1-2-PN-230-004' /* GLADE - WARREN 230KV DISCONNECT BRANCH FROM BUS 200811 TO BUS 200593 CKT 1 /* 26WARREN 230 26GLADE 230 END
PL_P42_100548	CONTINGENCY 'PL_P42_100548' /* AT JUNIATA SUB 230KV BUS TIE CB FAILED" DISCONNECT BUS 208005 /* DISCONNECT BUS 208004 /* END
AP-P2-2-WP-230-001T	CONTINGENCY 'AP-P2-2-WP-230-001T' /* ELKO #2 230KV BUS DISCONNECT BRANCH FROM BUS 235175 TO BUS 235158 CKT 1 /* 01ELKO 230 01CARB 230 DISCONNECT BRANCH FROM BUS 235175 TO BUS 235236 CKT 1 /* 01ELKO 230 01QUEHAN 230 DISCONNECT BRANCH FROM BUS 235175 TO BUS 200726 CKT 1 /* 01ELKO 230 26SHAWVL 2 230 REDUCE BUS 237007 SHUNT BY 100 PERCENT /* 01ELKO CAP 138 DISCONNECT BUS 237007 /* 01ELKO CAP 138 END
PN-P1-2-PN-115-048	CONTINGENCY 'PN-P1-2-PN-115-048' /* GARMAN - SPANGLER 115KV DISCONNECT BRANCH FROM BUS 200801 TO BUS 200524 CKT 1 /* 26GARMAN 115 26SPANGLER 115 DISCONNECT BRANCH FROM BUS 200524 TO BUS 200533 CKT 2 /* 26SPANGLER 115 26SPANGLER 46 DISCONNECT BRANCH FROM BUS 200801 TO BUS 200755 CKT 1 /* 26GARMAN 115 26WESTOVER 115 DISCONNECT BUS 200524 /* 26SPANGLER 115 END
ATSI-P7-1-CEI-345-016	CONTINGENCY 'ATSI-P7-1-CEI-345-016' /* PERRY-NORTHFEILD AND PERRY- LC 345KV LINE OUTAGES DISCONNECT BRANCH FROM BUS 239036 TO BUS 239358 CKT 1 /* 02PERRY 345 02NFIELD 345 DISCONNECT BRANCH FROM BUS 239036 TO BUS 239334 CKT 1 /* 02PERRY 345 02L.CENTER 345 END

Contingency Name	Contingency Definition
AP-P1-2-WP-230-324T_FSA_B	CONTINGENCY 'AP-P1-2-WP-230-324T_FSA_B' /* MOSHANNON-MARSHALL 230KV APS-PN TIE DISCONNECT BRANCH FROM BUS 919490 TO BUS 200909 CKT 1 /* AA2-000 TAP 230 26LOBO+ 230 DISCONNECT BRANCH FROM BUS 200857 TO BUS 200909 CKT 1 /* 26MARSHALL 230 26LOBO+ 230 DISCONNECT BRANCH FROM BUS 236829 TO BUS 200909 CKT 81 /* 01LOBO 46 46 26LOBO+ 230 REMOVE LOAD 1 FROM BUS 236829 /* 01LOBO 46 46 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
PL_P12_100598	CONTINGENCY 'PL_P12_100598' /* JUNIATA-DAUPHIN 230 LINE & DAUPHIN TR2 OUT DISCONNECT BRANCH FROM BUS 207955 TO BUS 207953 CKT 1 /* /*DAUP 230 CB DISCONNECT BRANCH FROM BUS 208005 TO BUS 207955 CKT 1 /* /*JUNI-DAUP 230 DISCONNECT BRANCH FROM BUS 207955 TO BUS 209866 CKT 2 /* /*DAUP T2 END
AP-P1-2-WP-230-323T	CONTINGENCY 'AP-P1-2-WP-230-323T' /* SHINGLETOWN-LEWISTOWN 230KV APS-PN TIE DISCONNECT BRANCH FROM BUS 235248 TO BUS 200513 CKT 1 /* 01SHINGL 230 26LEWISTWN 230 END
PN-P2-3-PN-230-21DT	CONTINGENCY 'PN-P2-3-PN-230-21DT' /* SHAWVILLE 230 KV STUCK CB - CB28 (SHAWVILLE-MOSHANNON) DISCONNECT BRANCH FROM BUS 200710 TO BUS 235220 CKT 1 /* 26SHAWVL 1 230 01MOSHAN 230 DISCONNECT BRANCH FROM BUS 200710 TO BUS 200726 CKT ZB /* 26SHAWVL 1 230 26SHAWVL 2 230 DISCONNECT BRANCH FROM BUS 200665 TO BUS 200710 CKT 1 /* 26SHAWVL 3 22 26SHAWVL 1 230 DISCONNECT BRANCH FROM BUS 200710 TO BUS 200714 TO BUS 200715 CKT 1A/* 26SHAWVL 1 230 26SHAWVL 1 115 26SHAWVL 1 18.00 END
PN-P2-3-PN-230-9E	CONTINGENCY 'PN-P2-3-PN-230-9E' /* 575 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 200837 CKT 1 /* 26HOMER CT 230 26HOMER C1 20 REMOVE MACHINE 1 FROM BUS 200837 /* 26HOMER C1 20 END

Contingency Name	Contingency Definition
ATSI-P1-3-SYS-345-722	CONTINGENCY 'ATSI-P1-3-SYS-345-722' /* TRAN 02S8-ATT 345 TO 02ASH_3 138 CK 8 DISCONNECT BRANCH FROM BUS 239082 TO BUS 238544 CKT 8 /* 02S8-ATT 345 02ASH_3 138 END
PN-P2-2-PN-230-012T	CONTINGENCY 'PN-P2-2-PN-230-012T' /* FOREST 230KV BUS DISCONNECT BRANCH FROM BUS 200581 TO BUS 200593 CKT 1 /* 26FOREST 230 26GLADE 230 DISCONNECT BRANCH FROM BUS 200581 TO BUS 235971 CKT 1 /* 26FOREST 230 01SQUABHLLW 230 DISCONNECT BRANCH FROM BUS 200581 TO BUS 200647 CKT 1 /* 26FOREST 230 26FOREST 115 DISCONNECT BUS 200581 /* 26FOREST 230 END
PN-P2-3-PN-115-71CT	CONTINGENCY 'PN-P2-3-PN-115-71CT' /* WARREN 115 KV STUCK CB - CBA (WARREN - WARREN2) DISCONNECT BRANCH FROM BUS 135277 TO BUS 200579 CKT 1 /* FALCONER 115 26WARREN 115 DISCONNECT BRANCH FROM BUS 200570 TO BUS 200579 CKT 1 /* 26CORRY E. 115 26WARREN 115 DISCONNECT BRANCH FROM BUS 200579 TO BUS 200818 CKT ZB /* 26WARREN 115 26WARREN 2 115 DISCONNECT BRANCH FROM BUS 201201 TO BUS 200579 CKT 1 /* 26WRREN CT 14 26WARREN 115 DISCONNECT BRANCH FROM BUS 200579 TO BUS 201206 CKT 1 /* 26WARREN 115 26WARRN #1 35 DISCONNECT BRANCH FROM BUS 200579 TO BUS 200863 TO BUS 201202 CKT 2/* 26WARREN 115 26WARRN #2 35 26WRREN #2 12.00 DISCONNECT BRANCH FROM BUS 200580 TO BUS 200604 CKT 1 /* 26WARREN S 115 26WARREN S 35 DISCONNECT BRANCH FROM BUS 200818 TO BUS 201210 TO BUS 201202 CKT A/* 26WARREN 2 115 26FURN.BKR 35 26WRREN #2 12.00 REDUCE BUS 200579 SHUNT BY 100 PERCENT /* 26WARREN 115 END
AP-P2-3-WP-230-460T	CONTINGENCY 'AP-P2-3-WP-230-460T' /* 467 DISCONNECT BRANCH FROM BUS 200513 TO BUS 235248 CKT 1 /* 26LEWISTWN 230 01SHINGL 230 DISCONNECT BRANCH FROM BUS 200726 TO BUS 235248 CKT 1 /* 26SHAWVL 2 230 01SHINGL 230 DISCONNECT BRANCH FROM BUS 235248 TO BUS 235970 CKT 1 /* 01SHINGL 230 01DALE 230 DISCONNECT BRANCH FROM BUS 236711 TO BUS 235248 CKT 81 /* 01SHINGLTN 46 01SHINGL 230 DISCONNECT BRANCH FROM BUS 236711 TO BUS 235248 CKT 82 /* 01SHINGLTN 46 01SHINGL 230 END

Contingency Name	Contingency Definition
PN-P1-3-PN-230-004A	CONTINGENCY 'PN-P1-3-PN-230-004A' /* HOMER CITY SOUTH 345/230KV XFMR DISCONNECT BRANCH FROM BUS 200769 TO BUS 200767 TO BUS 202641 CKT S/* 26HOMER CY 345 26HOMER CT 230 26HOMERCITYS 23.00 END
PN-P2-2-PN-230-014T	CONTINGENCY 'PN-P2-2-PN-230-014T' /* SHAWVILLE #2 230KV BUS DISCONNECT BRANCH FROM BUS 200726 TO BUS 235248 CKT 1 /* 26SHAWVL 2 230 01SHINGL 230 DISCONNECT BRANCH FROM BUS 200726 TO BUS 235175 CKT 1 /* 26SHAWVL 2 230 01ELKO 230 DISCONNECT BRANCH FROM BUS 200726 TO BUS 200666 CKT 1 /* 26SHAWVL 2 230 26SHAWVL 4 22 DISCONNECT BRANCH FROM BUS 200726 TO BUS 200710 CKT ZB /* 26SHAWVL 2 230 26SHAWVL 1 230 END
PN-P2-3-PN-115-71ET	CONTINGENCY 'PN-P2-3-PN-115-71ET' /* WARREN 115 KV STUCK CB - CBP (WARREN - CORRY EAST) DISCONNECT BRANCH FROM BUS 135277 TO BUS 200579 CKT 1 /* FALCONER 115 26WARREN 115 DISCONNECT BRANCH FROM BUS 200570 TO BUS 200579 CKT 1 /* 26CORY E. 115 26WARREN 115 DISCONNECT BRANCH FROM BUS 200579 TO BUS 200818 CKT ZB /* 26WARREN 115 26WARREN 2 115 DISCONNECT BRANCH FROM BUS 201201 TO BUS 200579 CKT 1 /* 26WRREN CT 14 26WARREN 115 DISCONNECT BRANCH FROM BUS 200579 TO BUS 201206 CKT 1 /* 26WARREN 115 26WARRN #1 35 DISCONNECT BRANCH FROM BUS 200579 TO BUS 200863 TO BUS 201202 CKT 2/* 26WARREN 115 26WARRN #2 35 26WRREN #2 12.00 DISCONNECT BRANCH FROM BUS 200580 TO BUS 200604 CKT 1 /* 26WARREN S 115 26WARREN S 35 DISCONNECT BRANCH FROM BUS 200570 TO BUS 200622 CKT 3 /* 26CORY E. 115 26CORY E. 35 REDUCE BUS 200579 SHUNT BY 100 PERCENT /* 26WARREN 115 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
Base Case	
200909 26LOBO+ 230 919490 AA2-000 TAP 230 1	CONTINGENCY '200909 26LOBO+ 230 919490 AA2-000 TAP 230 1' OPEN BRANCH FROM BUS 200909 TO BUS 919490 CKT 1 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-230-006	CONTINGENCY 'PN-P1-2-PN-230-006' /* GLADE - FOREST 230KV DISCONNECT BRANCH FROM BUS 200593 TO BUS 200581 CKT 1 /* 26GLADE 230 26FOREST 230 END
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-P1-2-PN-345-003	CONTINGENCY 'PN-P1-2-PN-345-003' /* HANDSOME LAKE - WAYNE 345KV DISCONNECT BRANCH FROM BUS 200826 TO BUS 200595 CKT 1 /* 26HANDSMLK 345 26WAYNE 345 END
AP-P1-3-WP-230-005	CONTINGENCY 'AP-P1-3-WP-230-005' /* MILESBURG #82 230/46KV XFMR DISCONNECT BRANCH FROM BUS 235219 TO BUS 236745 CKT 82 /* 01MILESB 230 01MILESBG 46 DISCONNECT BRANCH FROM BUS 942490 TO BUS 235219 CKT 1 /* AE2-262 TAP 230 01MILESB 230 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-P1-2-PN-230-103T	CONTINGENCY 'PN-P1-2-PN-230-103T' /** 26LEWISTWN - JUNI BU2 230.00 LINE DISCONNECT BRANCH FROM BUS 200513 TO BUS 208005 CKT 1 /* 26LEWISTWN - JUNI BU2 230.00 LINE END

Contingency Name	Contingency Definition
AP-P2-3-WP-230-446T	CONTINGENCY 'AP-P2-3-WP-230-446T' /* ELKO-MOSHANNON STK BKR AT ELKO DISCONNECT BRANCH FROM BUS 200726 TO BUS 235175 CKT 1 /* 26SHAWVL 2 230 01ELKO 230 DISCONNECT BRANCH FROM BUS 235158 TO BUS 235175 CKT 1 /* 01CARB 230 01ELKO 230 DISCONNECT BRANCH FROM BUS 235175 TO BUS 235236 CKT 1 /* 01ELKO 230 01QUEHAN 230 DISCONNECT BRANCH FROM BUS 235220 TO BUS 235236 CKT 1 /* 01MOSHAN 230 01QUEHAN 230 DISCONNECT BRANCH FROM BUS 235236 TO BUS 236732 CKT 81 /* 01QUEHAN 230 01QUEHANNA 46 END
PN-P2-3-PN-115-59B	CONTINGENCY 'PN-P2-3-PN-115-59B' /* GARMAN 115 KV STUCK CB - CB (SPANGLER - WESTOVER SOUTH) DISCONNECT BRANCH FROM BUS 200755 TO BUS 944180 CKT 1 /* WESTOVER-AF1-086 TAP DISCONNECT BUS 200755 DISCONNECT BRANCH FROM BUS 200801 TO BUS 200524 CKT 1 /* GARMAN-SPANGLER DISCONNECT BRANCH FROM BUS 200524 TO BUS 200533 CKT 2 /* SPANGLER TR2 DISCONNECT BUS 200524 END
AP-P2-3-WP-230-708DT	CONTINGENCY 'AP-P2-3-WP-230-708DT' /* SQUAB HOLLOW 230 STK BKR - NEW4 DISCONNECT BRANCH FROM BUS 235971 TO BUS 235972 CKT 1 /* 01SQUABHLLW 230-138 TR DISCONNECT BRANCH FROM BUS 235971 TO BUS 200581 CKT 1 /* 01SQUABHLLW 230 26FOREST 230 END
PN-P1-3-PN-230-003A	CONTINGENCY 'PN-P1-3-PN-230-003A' /* HOMER CITY NORTH 345/230KV XFMR DISCONNECT BRANCH FROM BUS 200769 TO BUS 200767 TO BUS 202640 CKT N/* 26HOMER CY 345 26HOMER CT 230 26HOMERCITYN 23.00 END
PL_P12_100618	CONTINGENCY 'PL_P12_100618' /* JUNIATA 230/69KV TR4 OUT" DISCONNECT BRANCH FROM BUS 208005 TO BUS 209997 CKT 4 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 207955 CKT 1 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 200009 CKT 2 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 208006 CKT 1 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 208004 CKT 1 /* DISCONNECT BRANCH FROM BUS 208005 TO BUS 200513 CKT 1 /* END

Contingency Name	Contingency Definition
AP-P1-2-WP-230-321T	CONTINGENCY 'AP-P1-2-WP-230-321T' /* FOREST - SQUAB HOLLOW 230KV APS-PN TIE DISCONNECT BRANCH FROM BUS 235971 TO BUS 200581 CKT 1 /* 01SQUABHLLW 230 26FOREST 230 END
ATSI-P7-1-CEI-345-012	CONTINGENCY 'ATSI-P7-1-CEI-345-012' /* PERRY-EASTLAKE AND PERRY- NORTHFIELD 345KV LINE OUTAGES DISCONNECT BRANCH FROM BUS 238684 TO BUS 239036 CKT 1 /* 02EASTLK 345 02PERRY 345 DISCONNECT BRANCH FROM BUS 239358 TO BUS 239036 CKT 1 /* 02NFIELD 345 02PERRY 345 END
ATSI-P1-1-CEI-345-711	CONTINGENCY 'ATSI-P1-1-CEI-345-711' /* GEN 02PERRG1 22.0 UNIT 1 REMOVE MACHINE 1 FROM BUS 239035 /* 02PERRG1 22 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-230-6G	CONTINGENCY 'PN-P2-3-PN-230-6G' /* ERIE SOUTH 230KV SB 35 OPEN BUS 200819 /*ERIE SOUTH 1 230KV BUS OPEN BUS 200918 /*ERIE SOUTH 230 KV BUS TIE END

Short Circuit

21 Short Circuit

The following Breakers are overduty:

None

22 Attachment One: One Line Diagram