Generation Interconnection

Feasibility Study Report

for

Queue Project AF1-170

SPRINGBORO-VENANGO JUNCTION 115 KV

46.5 MW Capacity / 77.5 MW Energy

January 2020

Table of Contents

1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Mid-Atlantic Interstate Transmission, LLC (MAIT), PENELEC Zone.

2 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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 Crawford County, Pennsylvania. The installed facilities will have a total capability of 77.5 MW with 46.5 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is February 15, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF1-170
Project Name	SPRINGBORO-VENANGO JUNCTION 115 KV
State	Pennsylvania
County	Crawford
Transmission Owner	PENELEC
MFO	77.5
MWE	77.5
MWC	46.5
Fuel	Solar
Basecase Study Year	2023

3.1 Point of Interconnection

The interconnection of the project at the Primary POI will be accomplished by constructing a new 115 kV three (3) breaker ring bus substation and looping the Edinboro South – Morgan Street - Springboro 115 kV line into the new station. The new substation will be located approximately 4.66 miles from Springboro 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 Edinboro South, Morgan Street, Venango Junction, Springboro, and AE2-344 substations.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF1-170 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 AF1-170 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$ 307,700
Direct Connection Network Upgrade	$ 7,120,900
Non Direct Connection Network Upgrades	$ 3,356,000
Total Costs	$10,784,600

In addition, the AF1-170 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	$288,808,850

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

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

The required Attachment Facilities and Direct and Non-Direct Connection work for the interconnection of the AF1-170 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 at the Primary POI will be accomplished by constructing a new 115 kV three (3) breaker ring bus substation and looping the Edinboro South – Morgan Street - Springboro 115 kV line into the new station. The new substation will be located approximately 4.66 miles from Springboro 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 Edinboro South, Morgan Street, Venango Junction, Springboro, and AE2-344 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 in new AF1-170 interconnection substation.	$242,700
Review drawings and provide nameplates for customer's switchyard.	$65,000
Total Attachment Facility Costs	$307,700

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.	$7,120,900
Total Direct Connection Facility Costs	$7,120,900

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
Upgrade relaying at Springboro substation.	$592,900
Upgrade relaying at Venango Junction substation.	$592,900
Upgrade relaying at Morgan Street substation.	$349,400

Description	Total Cost
Upgrade relaying at Edinboro South substation.	$349,400
Upgrade relaying at AE2-344 interconnection substation.	$349,400
Loop the Edinboro South – Morgan Street – Springboro 115 kV line into the new interconnection substation.	$1,122,000
Total Non-Direct Connection Facility Costs	$3,356,000

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 19 months after the signing of an Interconnection Construction Service Agreement to complete the installation. This includes the requirement for the IC to make a preliminary payment that compensates FE for the first three months of the engineering design work that is related to the construction of the interconnection substation. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined direct connection and network upgrades, and that all transmission system outages will be allowed when requested.

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

9 Transmission Owner Analysis

9.1 Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AF1-170 project did not contribute to any overloads on the FE transmission <100 kV system.

10 Interconnection Customer Requirements

System Protection

The IC must design it's 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.

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 AF1-170 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 AF1-170 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.

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.

11.2 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 AF1-170 was evaluated as a 77.5 MW (Capacity 46.5 MW) injection tapping the Springboro to Venango Junction 115 kV line in the PENELEC area. Project AF1-170 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-170 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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
49536783	200599	26ERIE W	345.0	PENELEC	238547	02AT	345.0	ATSI	1	ATSI-P1-1-CEI-345-711	single	1900.0	99.77	101.09	DC	24.97

14 Multiple Facility Contingency

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

None

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
49536780	200599	26ERIE W	345.0	PENELEC	238547	02AT	345.0	ATSI	1	Base Case	single	1560.0	107.31	108.91	DC	24.97
42192743	200767	26HOMER CT	230.0	PENELEC	200795	26SHELOCT A	230.0	PENELEC	1	PN_P4-500-002A	breaker	917.0	151.49	151.96	DC	9.41
42192744	200767	26HOMER CT	230.0	PENELEC	200795	26SHELOCT A	230.0	PENELEC	1	PN_P4-500-002F	breaker	917.0	151.5	151.98	DC	9.41
42192967	200769	26HOMER CY	345.0	PENELEC	999392	STAR601	1.0	PENELEC	N	PN-P2-3-PN-230-9E	breaker	807.0	126.83	127.51	DC	11.92
42192753	200795	26SHELOCT A	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	PN_P4-500-002F	breaker	917.0	131.55	132.05	DC	10.05
42192754	200795	26SHELOCT A	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	PN_P4-500-002A	breaker	917.0	131.55	132.05	DC	10.05
42739924	239036	02PERRY	345.0	ATSI	239334	02L.CENTER	345.0	ATSI	1	ATSI-P7-1-CEI-345-012	tower	1667.0	132.0	133.74	DC	28.37
42739994	239036	02PERRY	345.0	ATSI	238684	02EASTLK	345.0	ATSI	1	ATSI-P7-1-CEI-345-016	tower	1667.0	124.19	125.87	DC	27.42
50484415	943150	AE2-344 TAP	115.0	PENELEC	200572	26EDINB S.	115.0	PENELEC	1	ATSI-P2-3-CEI-345-004D	breaker	179.0	106.88	117.12	DC	18.33

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
4219297 2	999392	STAR601	1.0	PENELEC	200767	26HOMER CT	230.0	PENELEC	N	PN-P2-3-PN-230-9E	breaker	807.0	126.83	127.51	DC	11.92

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
4125728 9	200599	26ERIE W	345.0	PENELEC	238547	02AT	345.0	ATSI	1	Base Case	operation	1560.0	124.34	127.01	DC	41.62
4125729 0	200599	26ERIE W	345.0	PENELEC	238547	02AT	345.0	ATSI	1	ATSI-P1-1-CEI-345-711	operation	1900.0	113.75	115.95	DC	41.62
4248812 9	200767	26HOMER CT	230.0	PENELEC	200795	26SHELOCTA	230.0	PENELEC	1	PN-P1-3-PN-230-001T	operation	917.0	146.79	147.26	DC	9.43
4248813 0	200767	26HOMER CT	230.0	PENELEC	200795	26SHELOCTA	230.0	PENELEC	1	PN-P1-2-PN-230-025	operation	917.0	146.79	147.26	DC	9.43
4248866 8	200769	26HOMER CY	345.0	PENELEC	999392	STAR601	1.0	PENELEC	N	PN-P1-3-PN-230-004A	operation	807.0	109.39	110.07	DC	11.99
4248869 8	200769	26HOMER CY	345.0	PENELEC	999391	STAR602	1.0	PENELEC	S	PN-P1-3-PN-230-003A	operation	824.0	106.55	107.21	DC	11.93
4248814 5	200795	26SHELOCTA	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	PN-P1-2-PN-230-025	operation	917.0	126.2	126.7	DC	10.07

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
42488146	200795	26SHELOCTA	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	PN-P1-3-PN-230-001T	operation	917.0	126.2	126.7	DC	10.07
42488147	200795	26SHELOCTA	230.0	PENELEC	200810	26KEYSTONE	230.0	PENELEC	1	Base Case	operation	731.0	128.24	128.72	DC	7.75
49537246	238547	02AT	345.0	ATSI	239036	02PERRY	345.0	ATSI	1	ATSI-P1-3-SYS-345-722	operation	1891.0	97.93	100.07	DC	40.44
42488700	999391	STAR602	1.0	PENELEC	200767	26HOMERCT	230.0	PENELEC	S	PN-P1-3-PN-230-003A	operation	824.0	106.54	107.2	DC	11.93
42488671	999392	STAR601	1.0	PENELEC	200767	26HOMERCT	230.0	PENELEC	N	PN-P1-3-PN-230-004A	operation	807.0	109.39	110.07	DC	11.99

17 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
49536780,49536783	1	26ERIE W 345.0 kV - 02AT 345.0 kV Ckt 1	**PENELEC** **PN-AF1-F-0090a: Reconductor line (13.7 miles).** **Project Type : FAC** **Cost : $48,909,000** **Time Estimate : 36.0 Months** **PN-AF1-F-0090b: Reconductor line (7.2 miles).** **Project Type : FAC** **Cost : $25,704,000** **Time Estimate : 30.0 Months** **ATSI** **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**	$163,533,000
42739924	5	02PERRY 345.0 kV - 02L.CENTER 345.0 kV Ckt 1	**ATSI** **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
42739994	6	02PERRY 345.0 kV - 02EASTLK 345.0 kV Ckt 1	**ATSI** **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

ID	Index	Facility	Upgrade Description	Cost
42192744,42192743	2	26HOMER CT 230.0 kV - 26SHELOCTA 230.0 kV Ckt 1	**PENELEC** **PN-AF1-F-0040a : Replace Wave Trap at Homer City** **Project Type : FAC** **Cost : $119,000** **Time Estimate : 9.0 Months** **PN-AF1-F-0040b : Reconductor Homer City - Sheloctoa 230 kV (~11 miles)** **Project Type : FAC** **Cost : $19,188,750** **Time Estimate : 6.0 Months** **PN-AF1-F-0040c : Replace line drops at Shelocta** **Project Type : FAC** **Cost : $119,000** **Time Estimate : 6.0 Months** **PN-AF1-F-0040d : Replace disconnect switch at Shelocta** **Project Type : FAC** **Cost : $119,000** **Time Estimate : 9.0 Months**	$19,545,750
42192753,42192754	4	26SHELOCTA 230.0 kV - 26KEYSTONE 230.0 kV Ckt 1	**PENELEC** **PN-AF1-F-0044a: Replace Wave Trap at Keystone** **Project Type : FAC** **Cost : $119,000** **Time Estimate : 9.0 Months** **PN-AF1-F-0044b: Reconductor Shelocta - Keystone 230 kV (~3 miles)** **Project Type : FAC** **Cost : $4,034,100** **Time Estimate : 6.0 Months** **PN-AF1-F-0044c: Replace substation conductor at Shelocta and Keystone** **Project Type : FAC** **Cost : $178,500** **Time Estimate : 6.0 Months** **PN-AF1-F-0044d : Replace disconnect switch at Shelocta** **Project Type : FAC** **Cost : $178,500** **Time Estimate : 6.0 Months**	$4,510,100

ID	Index	Facility	Upgrade Description	Cost
50484415	7	AE2-344 TAP 115.0 kV - 26EDINB S. 115.0 kV Ckt 1	PENELEC s1820: Supplemental upgrade s1820: Erie South - Edinboro South - Venango 115 kV Junction Terminal Equipment replacement. • Edinboro South 115 kV - replace bus section breaker, Line traps, substation conductor, line relaying and CCVTs (s1820.1) • Venango Junction 115 kV Substation - replace Substation conductor, CCVT and arresters. (s1820.2) • Erie South 115 kV Substation - replace Circuit breaker, arresters, CCVT, line trap, line relaying and substation conductor. (s1820.3) The supplemental project has a projected in-service date of 02/29/2020. Project Type: CON Cost : $0	$0
42192967	3	26HOMER CY 345.0 kV - STAR601 1.0 kV Ckt N	PENELEC 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
42192972	8	STAR601 1.0 kV - 26HOMER CT 230.0 kV Ckt N		
			TOTAL COST	$288,808,850

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
49536780	200599	26ERIE W	PENELEC	238547	02AT	ATSI	1	Base Case	single	1560.0	107.31	108.91	DC	24.97

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 (Deativation : 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

18.2 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
42192744	200767	26HOMER CT	PENELEC	200795	26SHELOCTA	PENELEC	1	PN_P4-500-002F	breaker	917.0	151.5	151.98	DC	9.41

Bus #	Bus	MW Impact
200503	**26C.SLOPE (Deativation : 06/07/19)**	**28.9164**
200794	26CONEMAGH	0.4629
200805	**26COLVER13 (Deativation : 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

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
42192967	200769	26HOMER CY	PENELEC	999392	STAR601	PENELEC	N	PN-P2-3-PN-230-9E	breaker	807.0	126.83	127.51	DC	11.92

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

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
42192754	200795	26SHELOCTA	PENELEC	200810	26KEYSTONE	PENELEC	1	PN_P4-500-002A	breaker	917.0	131.55	132.05	DC	10.05

Bus #	Bus	MW Impact
200503	**26C.SLOPE (Deativation : 06/07/19)**	**32.5076**
200636	26IUP CO-G	0.6752
200794	26CONEMAGH	0.5468
200805	**26COLVER13 (Deativation : 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

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
42739924	239036	02PERRY	ATSI	239334	02L.CENTER	ATSI	1	ATSI-P7-1-CEI-345-012	tower	1667.0	132.0	133.74	DC	28.37

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 (Deativation : 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

Bus #	Bus	MW Impact
941422	AE2-139 E	3.1744
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

Bus #	Bus	MW Impact
945181	AF1-183	0.0496
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

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
42739994	239036	02PERRY	ATSI	238684	02EASTLK	ATSI	1	ATSI-P7-1-CEI-345-016	tower	1667.0	124.19	125.87	DC	27.42

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 (Deativation : 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

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
50484415	943150	AE2-344 TAP	PENELEC	200572	26EDINB S.	PENELEC	1	ATSI-P2-3-CEI-345-004D	breaker	179.0	106.88	117.12	DC	18.33

Bus #	Bus	MW Impact
915951	Y3-092 FTIR	77.2200
942813	AE2-299 BAT	18.6224
943151	AE2-344 C	34.8200
943152	AE2-344 E	23.2133
943871	AF1-055 C O1	1.6088
943872	AF1-055 E O1	1.0725
944382	AF1-103 BAT	1.4442
944391	AF1-104 O1	0.8105
945051	AF1-170 C	10.9972
945052	AF1-170 E	7.3315
LGEE	LGEE	0.0399
CPLE	CPLE	0.0370
WEC	WEC	0.0220
CBM-W2	CBM-W2	0.5569
NY	NY	0.4247
CBM-W1	CBM-W1	0.8632
TVA	TVA	0.0924
O-066	O-066	0.8198
CBM-S2	CBM-S2	0.3410
CBM-S1	CBM-S1	0.5708
G-007	G-007	0.1196
MEC	MEC	0.1096

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
42192972	999392	STAR601	PENELEC	200767	26HOMER CT	PENELEC	N	PN-P2-3-PN-230-9E	breaker	807.0	126.83	127.51	DC	11.92

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

19 Contingency Details

Contingency Name	Contingency Definition
ATSI-P2-3-CEI-345-004D	CONTINGENCY 'ATSI-P2-3-CEI-345-004D' /* ERIE WEST 345KV BKR 8 DISCONNECT BRANCH FROM BUS 200599 TO BUS 200600 CKT 1 /* 26ERIE W 345 26ERIE SO 345 DISCONNECT BRANCH FROM BUS 200599 TO BUS 238547 CKT 1 /* 26ERIE W 345 02AT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239036 CKT 1 /* 02AT 345 02PERRY 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345 02S8-ATT 345 DISCONNECT BUS 200600 /* 26ERIE SO 345 DISCONNECT BUS 238547 /* 02AT 345 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
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
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-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
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_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
Base Case	
PN_P4-500-002A	CONTINGENCY 'PN_P4-500-002A' /* CONEMAUGH 500KV BKR 1 DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 DISCONNECT BUS 200031 /* CONE G2 22 END

Contingency Name	Contingency Definition
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-P1-2-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-P1-3-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-230-9E	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

Affected Systems

20 Affected Systems

20.1 LG&E

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

20.2 MISO

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

20.3 TVA

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

20.4 Duke Energy Progress

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

20.5 NYISO

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

Short Circuit

21 Short Circuit

The following Breakers are overdutied:

None.

22 Attachment 1 – One Line