Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-309

CARLOS JUNCTION-LONACONING 34.5 KV

16.66 MW Capacity / 19.84 MW Energy

July, 2019

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 The Potomac Edison Company.

2 Preface

The intent of the feasibility study is to determine a plan, with approximate 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 and storage generating facility located in Allegany County, Maryland. The installed facilities will have a total capability of 19.84 MW with 16.66 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 10/30/2020. This study does not imply a TO commitment to this in-service date.

Queue Number	**AE2-309**
Project Name	CARLOS JUNCTION-LONACONING 34.5 kV
Interconnection Customer	
State	Maryland
County	Allegany
Transmission Owner	The Potomac Edison Company - APS
MFO	19.8
MWE	19.84
MWC	16.66
Fuel	Solar / Storage
Basecase Study Year	2022

3.1 Point of Interconnection

3.1.1 Primary POI

The interconnection of the project at the Primary POI will be accomplished by tapping the Carlos Junction - Lonaconing 34.5 kV line and constructing a one span tap. The transmission line tap will be located approximately 0.4 miles from Carlos Junction substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection line tap and the associated attachment facilities. The project will also require non-direct connection upgrades at Carlos Junction and Westernport substations.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AE2-309 generation project to connect to the FirstEnergy ("FE") transmission system. Attachment 2 provides the proposed location for the point of interconnection. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the FE transmission system's direct connection facilities.

3.2 Cost Summary

The AE2-309 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrade	$ 134,800
Non Direct Connection Network Upgrades	$ 28,800
Total Costs	**$ 163,600**

In addition, the AE2-309 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	**$ 29,984,500**

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

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

degree of engineering specificity as provided in the Facilities Study Agreement, good faith estimates of the cost, determined in accordance with Section 217 of the Tariff,

(a) to be charged to each affected New Service Customer for the Facilities and System Upgrades that are necessary to accommodate this queue project;

(b) the time required to complete detailed design and construction of the facilities and upgrades; and

(c) a description of any site-specific environmental issues or requirements that could reasonably be anticipated to affect the cost or time required to complete construction of such facilities and upgrades.

The required Attachment Facilities and Direct and Non-Direct Connection work for the interconnection of the AE2-309 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 tapping the Carlos Junction - Lonaconing 34.5 kV line and constructing a one span tap. The transmission line tap will be located approximately 0.4 miles from Carlos Junction substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection line tap and the associated attachment facilities. The project will also require non-direct connection upgrades at Carlos Junction and Westernport substations.

5 Attachment Facilities

There is no Attachment Facilities scope of work required for this project.

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
Tap the Carlos Junction-Lonaconing 34.5 kV line to interconnect AE2-309 with a three-switch tap configuration. Install new 34.5 kV meter and all necessary equipment	$ 134,800
Total Direct Connection Facility Costs	**$ 134,800**

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
Carlos Junction 34.5kV SS. Adjust Remote Relay and Metering Settings.	$ 14,400
Lonaconing 34.5kV SS. Adjust Remote Relay and Metering Settings.	$ 14,400
Total Non-Direct Connection Facility Costs	**$ 28,800**

8 Schedule

Based on the scope of work for the Attachment Facilities and the Direct and Non-Direct Connection facilities, it is expected to take a minimum of 12 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

FE performed an analysis of its underlying transmission <100 kV system. The AE2-309 project did not contribute to any overloads on the FE transmission system.

10 Interconnection Customer Requirements

10.1 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.

The IC has requested a non-standard GSU transformer winding configuration. This transformer is in violation of section 14.2.6 of FE's "Requirements for Transmission Connected Facilities" document and will not be accepted. The GSU transformer must have a grounded wye connection on the high (utility) side and a delta connection on the low (generator) side. Notification to the developer of the transformer winding configuration requirement has been previously communicated, however an updated project single line has not been received.

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 34.5 kV circuit breaker to protect the AE2-309 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 AE2-309 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.

1.1.1 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 APS 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 AE2-309 was evaluated as a 19.84 MW (Capacity 16.66 MW) injection on the Carlos Junction - Lonaconing 34.5 kV line in the APS area. Project AE2-309 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-309 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)

None

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	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
7411631	235504	01RIDGLY	AP	235454	01CUMBRL	AP	1	AP-P7-1-MP-138-056-B	tower	343.0	99.31	100.31	DC	3.44

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	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
7409367	200746	26ROCKWOOD	PENELEC	200744	26SOMERST	PENELEC	1	AP-P2-2-MP-138-101	bus	179.0	120.16	121.69	DC	2.73
7409988	200746	26ROCKWOOD	PENELEC	200744	26SOMERST	PENELEC	1	AP-P2-3-MP-138-153	breaker	179.0	122.67	124.29	DC	2.89
7409989	200746	26ROCKWOOD	PENELEC	200744	26SOMERST	PENELEC	1	AP-P2-3-MP-138-159	breaker	179.0	121.28	122.85	DC	2.81
7409990	200746	26ROCKWOOD	PENELEC	200744	26SOMERST	PENELEC	1	AP-P2-4-MP-138-200	breaker	179.0	120.86	122.44	DC	2.84
7410186	235449	01CARLOS	AP	235469	01GARRET	AP	1	AP-P2-3-MP-138-150	breaker	206.0	107.66	110.64	DC	6.14
7410083	235469	01GARRET	AP	934440	AD1-068 TAP	AP	1	AP-P2-3-MP-138-150	breaker	191.0	115.73	118.06	DC	4.43
7409748	934440	AD1-068 TAP	AP	235120	01ALBRIG	AP	1	AP-P2-3-MP-138-150	breaker	191.0	145.07	147.39	DC	4.43
7409329	938800	AE1-106 TAP	AP	235122	01LKLYNN	AP	1	AP-P2-2-MP-138-001	bus	306.0	124.81	126.07	DC	3.85
7409962	938800	AE1-106 TAP	AP	235122	01LKLYNN	AP	1	AP-P2-3-MP-138-001	breaker	306.0	124.81	126.07	DC	3.85

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
7409963	938800	AE1-106 TAP	AP	235122	01LKLYNN	AP	1	AP-P2-3-MP-138-151	breaker	306.0	124.72	125.98	DC	3.85
7409964	938800	AE1-106 TAP	AP	235122	01LKLYNN	AP	1	AP-P2-3-MP-138-153	breaker	306.0	114.44	115.77	DC	4.07
7409965	938800	AE1-106 TAP	AP	235122	01LKLYNN	AP	1	AP-P2-4-MP-138-200	breaker	306.0	108.9	110.17	DC	3.89

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	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
7411201	200762	26GARRETT	PENELEC	235470	01GARRET	AP	1	235104 01CABOT 500 239280 02CRNBRY 500 1	operation	160.0	99.74	100.03	DC	0.9
7411056	235120	01ALBRIG	AP	235398	01RUTHBL	AP	1	AP-P1-2-MP-138-040-B	operation	186.0	110.97	112.08	DC	2.06
7410758	235305	01 106 J	AP	235120	01ALBRIG	AP	1	AP-P1-2-MP-138-040-B	operation	186.0	130.94	132.28	DC	2.5
7411051	235469	01GARRET	AP	934440	AD1-068 TAP	AP	1	PN-P1-2-PN-115-068	operation	191.0	109.94	112.14	DC	4.2
7411220	235504	01RIDGLY	AP	235454	01CUMBRL	AP	1	AP-P1-2-WP-138-071-A	operation	343.0	99.25	100.22	DC	3.33
7411211	235802	01CHEATL	AP	235122	01LKLYNN	AP	1	AP-P1-2-MP-138-040-B	operation	213.0	99.74	100.82	DC	2.32
7410636	934440	AD1-068 TAP	AP	235120	01ALBRIG	AP	1	PN-P1-2-PN-115-068	operation	191.0	144.91	147.11	DC	4.2
7410641	934440	AD1-068 TAP	AP	235120	01ALBRIG	AP	1	Base Case	operation	164.0	119.92	121.85	DC	3.16

17 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
7410083	5	01GARRET 138.0 kV - AD1-068 TAP 138.0 kV Ckt 1	PE-0001a (234) : Replace KD and KD-1 Line Relays at Garret Project Type : FAC Cost : $325,000 Time Estimate : 12.0 Months PE-0001b (235) : Replace Disconnect Switch and Wave Trap at Garrett Project Type : FAC Cost : $130,000 Time Estimate : 9.0 Months	$ 455,000
7410186	4	01CARLOS 138.0 kV - 01GARRET 138.0 kV Ckt 1	PE-0002 (237) : Replace Bus Side Disconnect Switch at Garrett and SW #1315 at Carlos Jct. Project Type : FAC Cost : $195,000 Time Estimate : 9.0 Months	$ 195,000
7409990,7409367, 7409988,7409989	2	26ROCKWOOD 115.0 kV - 26SOMERST 115.0 kV Ckt 1	PN-0011a (799) : Reconductor line with 397 ACSS high temperature conductor (8.12 miles) Project Type : FAC Cost : $15,600,000 Time Estimate : 22.0 Months PN-0011b (800) : At Rockwood, adjust CT ratios and relay settings. Project Type : FAC Cost : $19,500 Time Estimate : 6.0 Months	$ 15,619,500
7409748, 7409962, 7409963,7409964, 7409965,7409329	7	AD1-068 TAP 138.0 kV - 01ALBRIG 138.0 kV Ckt 1 AE1-106 TAP 138.0 kV - 01LKLYNN 138.0 kV Ckt 1	MP-0001 (160) : Reconfigure Albright 138 kV SS to breaker-and-a-half layout Project Type : CON Cost : $13,000,000 Time Estimate : 24.0 Months WP-0014a (227) : Replace Relays at Lake Lynn Project Type : FAC Cost : $325,000 Time Estimate : 12.0 Months WP-0014b (228) : Replace Wavetrap at Lake Lynn Project Type : FAC Cost : $130,000 Time Estimate : 9.0 Months WP-0014c (229) : Replace Disconnect Leads at Lake Lynn Project Type : FAC Cost : $130,000 Time Estimate : 9.0 Months	$ 13,585,000
7411631	1	01RIDGLY 138.0 kV - 01CUMBRL 138.0 kV Ckt 1	PE-0005 (243) : Replace Wave Traps at Cumberland and Ridgeley Project Type : FAC Cost : $130,000 Time Estimate : 9.0 Months	$ 130,000

ID	Index	Facility	Upgrade Description	Cost
			TOTAL COST	$ 29,984,500

18 Flow Gate Details

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, 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 Contingency Descriptions

Contingency Name	Contingency Definition
AP-P2-2-MP-138-101	CONTINGENCY 'AP-P2-2-MP-138-101' /* ALBRIGHT-138-SOUTH DISCONNECT BRANCH FROM BUS 235120 TO BUS 235320 CKT 1 /* 01ALBRIG 138 01DENVER 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235402 CKT 1 /* 01ALBRIG 138 01SNOW T 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 934440 CKT 1 /* 01ALBRIG 138 AD1-068 TAP 138 /* CONTINGENCY LINE ADDED FOR AE1 BUILD DISCONNECT BRANCH FROM BUS 235120 TO BUS 235485 CKT 1 /* 01ALBRIG 138 01METTIK 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 /* 01ALBRIG 138 01 106 J 138 END
AP-P1-2-WP-138-071-A	CONTINGENCY 'AP-P1-2-WP-138-071-A' /* ALBRIGHT - HAZELTON - LAKE LYNN 138KV (BRANDONVILLE JUNCTION) DISCONNECT BRANCH FROM BUS 938800 TO BUS 235305 CKT 1 /* AE1-106 TAP 138 01 106 J 138 DISCONNECT BRANCH FROM BUS 235305 TO BUS 235297 CKT 1 /* 01 106 J 138 01HAZELT 138 DISCONNECT BRANCH FROM BUS 235305 TO BUS 235120 CKT 1 /* 01 106 J 138 01ALBRIG 138 DISCONNECT BUS 235297 /* 01HAZELT 138 DISCONNECT BUS 235305 /* 01 106 J 138 END
235104 01CABOT 500 239280 02CRNBRY 500 1	CONTINGENCY '235104 01CABOT 500 239280 02CRNBRY 500 1' / 8388 OPEN BRANCH FROM BUS 235104 TO BUS 239280 CKT 1 / 235104 01CABOT 500 239280 02CRNBRY 500 1 END
AP-P2-2-MP-138-001	CONTINGENCY 'AP-P2-2-MP-138-001' /* ALBRIGHT-138-NORTH DISCONNECT BRANCH FROM BUS 235120 TO BUS 235356 CKT 1 /* 01ALBRIG 138 01KINGWD 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235398 CKT 1 /* 01ALBRIG 138 01RUTHBL 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235304 CKT 1 /* 01ALBRIG 138 01BRANDN 138 END
PN-P1-2-PN-115-068	CONTINGENCY 'PN-P1-2-PN-115-068' /* ROCKWOOD - SOMERSET 115KV DISCONNECT BRANCH FROM BUS 200744 TO BUS 200746 CKT 1 /* 26SOMERST 115 26ROCKWOOD 115 DISCONNECT BRANCH FROM BUS 200746 TO BUS 200773 CKT 1 /* 26ROCKWOOD 115 26ROCKWOOD 23 END

Contingency Name	Contingency Definition
AP-P7-1-MP-138-056-B	CONTINGENCY 'AP-P7-1-MP-138-056-B' /* LL-BVJ-LL-RBL DISCONNECT BRANCH FROM BUS 235122 TO BUS 235802 CKT 1 /* 01LKLYNN 138 01CHEATL 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 /* 01ALBRIG 138 01 106 J 138 DISCONNECT BRANCH FROM BUS 938800 TO BUS 235305 CKT 1 /* AE1-106 TAP 138 01 106 J 138 DISCONNECT BRANCH FROM BUS 235297 TO BUS 235305 CKT 1 /* 01HAZELT 138 01 106 J 138 END
AP-P2-3-MP-138-150	CONTINGENCY 'AP-P2-3-MP-138-150' /* ALBRIGHT-BRANDONVILLE 106 JCT. STK BKR AT ALBRIGHT DISCONNECT BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 /* 01ALBRIG 138 01 106 J 138 DISCONNECT BRANCH FROM BUS 938800 TO BUS 235305 CKT 1 /* AE1-106 TAP 138 01 106 J 138 /* CONTINGENCY LINE ADDED FOR AE1 BUILD DISCONNECT BRANCH FROM BUS 235297 TO BUS 235305 CKT 1 /* 01HAZELT 138 01 106 J 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235492 CKT 1 /* 01ALBRIG 138 01MTZION 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235402 CKT 1 /* 01ALBRIG 138 01SNOW T 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235320 CKT 1 /* 01ALBRIG 138 01DENVER 138 END
AP-P2-3-MP-138-151	CONTINGENCY 'AP-P2-3-MP-138-151' /* ALBRIGHT-BRANDONVILLE STK BKR AT ALBRIGHT DISCONNECT BRANCH FROM BUS 235120 TO BUS 235398 CKT 1 /* 01ALBRIG 138 01RUTHBL 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235356 CKT 1 /* 01ALBRIG 138 01KINGWD 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235304 CKT 1 /* 01ALBRIG 138 01BRANDN 138 DISCONNECT BRANCH FROM BUS 235304 TO BUS 237504 CKT 1 /* 01BRANDN 138 01ELLIOTTS 138 END
AP-P2-3-MP-138-153	CONTINGENCY 'AP-P2-3-MP-138-153' /* OAK PARK-KELSO GAP STK BKR AT ALBRIGHT DISCONNECT BRANCH FROM BUS 235120 TO BUS 235485 CKT 1 /* 01ALBRIG 138 01METTIK 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235492 CKT 1 /* 01ALBRIG 138 01MTZION 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 /* 01ALBRIG 138 01 106 J 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235320 CKT 1 /* 01ALBRIG 138 01DENVER 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 934440 CKT 1 /* 01ALBRIG 138 AD1-068 TAP 138 /* CONTINGENCY LINE ADDED FOR AE1 BUILD DISCONNECT BRANCH FROM BUS 235120 TO BUS 235402 CKT 1 /* 01ALBRIG 138 01SNOW T 138 DISCONNECT BRANCH FROM BUS 235402 TO BUS 235403 CKT 1 /* 01SNOW T 138 01SNWYCK 138 DISCONNECT BRANCH FROM BUS 235402 TO BUS 235497 CKT 1 /* 01SNOW T 138 01OAKPRK 138 DISCONNECT BRANCH FROM BUS 235403 TO BUS 237273 CKT 1 /* 01SNWYCK 138 01SNOW C 66 DISCONNECT BRANCH FROM BUS 235497 TO BUS 237313 CKT 1 /* 01OAKPRK 138 01KELSOG 138 END
Base Case	
AP-P2-4-MP-138-200	CONTINGENCY 'AP-P2-4-MP-138-200' /* ALBRIGHT BREAKER FAILURE - TIE BREAKER DISCONNECT BRANCH FROM BUS 235120 TO BUS 235304 CKT 1 /* 01ALBRIG 138 01BRANDN 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 /* 01ALBRIG 138 01 106 J 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235320 CKT 1 /* 01ALBRIG 138 01DENVER 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235356 CKT 1 /* 01ALBRIG 138 01KINGWD 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235398 CKT 1 /* 01ALBRIG 138 01RUTHBL 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235402 CKT 1 /* 01ALBRIG 138 01SNOW T 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 934440 CKT 1 /* 01ALBRIG 138 AD1-068 TAP 138 /* CONTINGENCY LINE ADDED FOR AE1 BUILD DISCONNECT BRANCH FROM BUS 235120 TO BUS 235485 CKT 1 /* 01ALBRIG 138 01METTIK 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235492 CKT 1 /* 01ALBRIG 138 01MTZION 138 END

Contingency Name	Contingency Definition
AP-P1-2-MP-138-040-B	CONTINGENCY 'AP-P1-2-MP-138-040-B' /* 1513B DISCONNECT BRANCH FROM BUS 235122 TO BUS 938800 CKT 1 /* 01LKLYNN 138 01 AE1-106 TAP 138 END
AP-P2-3-MP-138-159	CONTINGENCY 'AP-P2-3-MP-138-159' /* ALBRIGHT-DENVER STK BKR AT ALBRIGHT DISCONNECT BRANCH FROM BUS 235120 TO BUS 235320 CKT 1 /* 01ALBRIG 138 01DENVER 138 DISCONNECT BRANCH FROM BUS 235320 TO BUS 235810 CKT 1 /* 01DENVER 138 01INT COAL 138 DISCONNECT BRANCH FROM BUS 235338 TO BUS 235810 CKT 1 /* 01GRAFTN 138 01INT COAL 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 934440 CKT 1 /* 01ALBRIG 138 AD1-068 TAP 138 /* CONTINGENCY LINE ADDED FOR AE1 BUILD DISCONNECT BRANCH FROM BUS 235120 TO BUS 235402 CKT 1 /* 01ALBRIG 138 01SNOW T 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235492 CKT 1 /* 01ALBRIG 138 01MTZION 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 /* 01ALBRIG 138 01 106 J 138 END
AP-P2-3-MP-138-001	CONTINGENCY 'AP-P2-3-MP-138-001' /* ALBRIGHT-RUTHBELLE STK BKR AT ALBRIGHT DISCONNECT BRANCH FROM BUS 235120 TO BUS 235304 CKT 1 /* 01ALBRIG 138 01BRANDN 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235356 CKT 1 /* 01ALBRIG 138 01KINGWD 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235398 CKT 1 /* 01ALBRIG 138 01RUTHBL 138 END

18.2 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7411631	235504	01RIDGLY	AP	235454	01CUMBRL	AP	1	AP-P7-1-MP-138-056-B	tower	343.0	99.31	100.31	DC	3.44

Bus #	Bus	MW Impact
200813	26YOUGH	0.08
200840	26DEEPCRK1	0.19
200841	26DEEPCRK2	0.19
235098	U2-073A E	64.83
235099	U2-073B E	28.4
235530	01TR_Y2_073A	1.18
235531	01TR_Y2_073B	0.52
236001	01WARRIOR RN	11.75
237312	01DANS_S-014	6.39
237319	01FMR_U2-030	0.51
290229	S-014 E	25.57
913142	Y1-033 E OP1	3.34
917091	Z2-013	0.46
918341	AA1-047 C	4.88
918342	AA1-047 E	32.42
918812	AA1-100 E	5.89
923971	AB2-038	0.27
924001	AB2-041 C	0.24
924002	AB2-041 E	8.41
929522	U2-030 E	27.97
930261	AB1-065 C	2.21
930262	AB1-065 E	3.61
933951	AD1-018 C	1.33
933952	AD1-018 E	2.17
934441	AD1-068 C	1.26
934442	AD1-068 E	7.31
938831	AE1-109 C	1.47
938832	AE1-109 E	1.91
940461	AE2-030 C	4.07
940462	AE2-030 E	5.57
942731	AE2-289 C	6.3
942732	AE2-289 E	36.56
942901	AE2-309 C	2.87
942902	AE2-309 E	0.57
CALDERWOOD	CALDERWOOD	0.02
CATAWBA	CATAWBA	0.03
CBM-N	CBM-N	0.0
CBM-W1	CBM-W1	0.09
CHEOAH	CHEOAH	0.02
CHILHOWEE	CHILHOWEE	0.01
CIN	CIN	0.02

Bus #	Bus	MW Impact
COTTONWOOD	COTTONWOOD	0.05
FARMERCITY	FARMERCITY	0.0
G-007	G-007	0.13
HAMLET	HAMLET	0.07
IPL	IPL	0.02
LGEE	LGEE	0.01
MEC	MEC	0.01
MECS	MECS	0.13
NYISO	NYISO	0.02
O-066	O-066	0.81
PRAIRIE	PRAIRIE	0.01
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.0
TVA	TVA	0.05
UNIONPOWER	UNIONPOWER	0.03
WEC	WEC	0.01

18.3 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7409988	200746	26ROCKWOOD	PENELEC	200744	26SOMERST	PENELEC	1	AP-P2-3-MP-138-153	breaker	179.0	122.67	124.29	DC	2.89

Bus #	Bus	MW Impact
200813	26YOUGH	0.45
200835	26DSGENWIN	8.06
200840	26DEEPCRK1	0.56
200841	26DEEPCRK2	0.56
200890	26BF_G21_K23	0.48
200891	26CSLMN_L13	0.76
200892	26LOOKOUT	0.72
235098	U2-073A E	14.32
235099	U2-073B E	6.27
235530	01TR_Y2_073A	0.26
235531	01TR_Y2_073B	0.12
236001	01WARRIOR RN	2.98
237312	01DANS_S-014	2.57
237319	01FMR_U2-030	0.1
290229	S-014 E	10.27
292350	K-023	24.8
292542	L-013 1	24.8
293432	R-040 E	1.4
293902	O-048 E	22.32
913141	Y1-033 C OP1	0.41
913142	Y1-033 E OP1	22.63
917091	Z2-013	0.1
917672	Z2-108 E	15.5
918812	AA1-100 E	1.49
923971	AB2-038	0.06
924001	AB2-041 C	0.05
924002	AB2-041 E	1.86
929522	U2-030 E	5.61
933951	AD1-018 C	1.11
933952	AD1-018 E	1.81
934441	AD1-068 C	4.47
934442	AD1-068 E	25.93
938351	AE1-053	7.75
938882	AE1-116 CBAT	0.61
938883	AE1-116 EBAT	0.61
940461	AE2-030 C	0.96
940462	AE2-030 E	1.31
942731	AE2-289 C	1.39
942732	AE2-289 E	8.08
942901	AE2-309 C	2.42

Bus #	Bus	MW Impact
942902	AE2-309 E	0.48
CARR	CARR	0.22
CBM-S1	CBM-S1	0.58
CBM-S2	CBM-S2	0.35
CBM-W1	CBM-W1	0.78
CBM-W2	CBM-W2	4.01
CIN	CIN	0.38
CPLE	CPLE	0.15
G-007	G-007	0.32
IPL	IPL	0.25
LGEE	LGEE	0.11
MEC	MEC	0.73
MECS	MECS	0.33
O-066	O-066	2.17
RENSSELAER	RENSSELAER	0.18
WEC	WEC	0.1

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
7410186	235449	01CARLOS	AP	235469	01GARRET	AP	1	AP-P2-3-MP-138-150	breaker	206.0	107.66	110.64	DC	6.14

Bus #	Bus	MW Impact
235098	U2-073A E	36.78
235099	U2-073B E	16.11
235520	01WVACO_S38	8.08
235530	01TR_Y2_073A	0.67
235531	01TR_Y2_073B	0.3
235854	01KL_K28_T16	0.38
236001	01WARRIOR RN	6.67
237312	01DANS_S-014	5.44
237319	01FMR_U2-030	0.29
237507	01CROSSCHOOL	0.28
290229	S-014 E	21.78
292401	K-028 E	9.72
885642	T-016 E	2.91
917091	Z2-013	0.26
917672	Z2-108 E	1.89
918341	AA1-047 C	2.77
918342	AA1-047 E	18.39
918812	AA1-100 E	3.34
923971	AB2-038	0.16
924001	AB2-041 C	0.14
924002	AB2-041 E	4.77
929522	U2-030 E	15.87
930261	AB1-065 C	1.26
930262	AB1-065 E	2.05
932141	AC2-021	2.02
933951	AD1-018 C	2.36
933952	AD1-018 E	3.86
934931	AD1-125 C	1.3
934932	AD1-125 E	7.55
937361	AD2-180 C O1	1.99
937362	AD2-180 E O1	12.55
938351	AE1-053	0.5
938831	AE1-109 C	1.58
938832	AE1-109 E	2.05
938882	AE1-116 CBAT	0.14
938883	AE1-116 EBAT	0.14
940461	AE2-030 C	2.31
940462	AE2-030 E	3.16
942731	AE2-289 C	3.57
942732	AE2-289 E	20.74
942901	AE2-309 C	5.13

Bus #	Bus	MW Impact
942902	AE2-309 E	1.01
BLUEG	BLUEG	0.68
CALDERWOOD	CALDERWOOD	0.03
CANNELTON	CANNELTON	0.04
CARR	CARR	0.06
CBM-S2	CBM-S2	0.04
CHEOAH	CHEOAH	0.03
CHILHOWEE	CHILHOWEE	0.01
COFFEEN	COFFEEN	0.07
COTTONWOOD	COTTONWOOD	0.17
CPLE	CPLE	0.05
DUCKCREEK	DUCKCREEK	0.16
EDWARDS	EDWARDS	0.07
ELMERSMITH	ELMERSMITH	0.06
FARMERCITY	FARMERCITY	0.04
G-007A	G-007A	0.06
GIBSON	GIBSON	0.03
NEWTON	NEWTON	0.18
PRAIRIE	PRAIRIE	0.3
RENSSELAER	RENSSELAER	0.05
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.08
TILTON	TILTON	0.09
TRIMBLE	TRIMBLE	0.08
TVA	TVA	0.13
UNIONPOWER	UNIONPOWER	0.05
VFT	VFT	0.12

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
7410083	235469	01GARRET	AP	934440	AD1-068 TAP	AP	1	AP-P2-3-MP-138-150	breaker	191.0	115.73	118.06	DC	4.43

Bus #	Bus	MW Impact
200813	26YOUGH	0.25
200834	26SW_E13_K22	0.43
200835	26DSGENWIN	2.09
200840	26DEEPCRK1	0.58
200841	26DEEPCRK2	0.58
200864	K-013 E	1.49
200890	26BF_G21_K23	0.12
200891	26CSLMN_L13	0.2
200892	26LOOKOUT	0.19
202225	26SCI_S29B	0.04
235098	U2-073A E	26.7
235099	U2-073B E	11.7
235520	01WVACO_S38	5.59
235530	01TR_Y2_073A	0.48
235531	01TR_Y2_073B	0.22
236001	01WARRIOR RN	4.84
237312	01DANS_S-014	4.0
237319	01FMR_U2-030	0.21
290229	S-014 E	16.01
292340	K-022	0.01
292350	K-023	6.42
292401	K-028 E	5.48
292542	L-013 1	6.42
293432	R-040 E	0.36
293902	O-048 E	5.78
294903	P-060 E	4.03
885642	T-016 E	1.64
913141	Y1-033 C OP1	0.19
913142	Y1-033 E OP1	10.18
917091	Z2-013	0.19
917672	Z2-108 E	4.01
918341	AA1-047 C	2.01
918342	AA1-047 E	13.35
918812	AA1-100 E	2.43
923971	AB2-038	0.11
924001	AB2-041 C	0.1
924002	AB2-041 E	3.46
929522	U2-030 E	11.52
930261	AB1-065 C	0.91
930262	AB1-065 E	1.49
932141	AC2-021	1.4

Bus #	Bus	MW Impact
933951	AD1-018 C	1.71
933952	AD1-018 E	2.79
937361	AD2-180 C O1	1.19
937362	AD2-180 E O1	7.47
938341	AE1-052	0.41
938351	AE1-053	2.01
938831	AE1-109 C	1.06
938832	AE1-109 E	1.38
938881	AE1-116	0.54
938991	AE1-128 C	4.68
938992	AE1-128 E	3.12
940461	AE2-030 C	1.68
940462	AE2-030 E	2.29
942361	AE2-249 C	0.53
942362	AE2-249 E	0.35
942731	AE2-289 C	2.6
942732	AE2-289 E	15.06
942901	AE2-309 C	3.71
942902	AE2-309 E	0.73
943212	AE2-000A E	3.03
BLUEG	BLUEG	2.36
CALDERWOOD	CALDERWOOD	0.22
CANNELTON	CANNELTON	0.14
CATAWBA	CATAWBA	0.12
CBM-N	CBM-N	0.47
CHEOAH	CHEOAH	0.2
CHILHOWEE	CHILHOWEE	0.07
COFFEEN	COFFEEN	0.24
COTTONWOOD	COTTONWOOD	0.89
DUCKCREEK	DUCKCREEK	0.53
EDWARDS	EDWARDS	0.24
ELMERSMITH	ELMERSMITH	0.24
FARMERCITY	FARMERCITY	0.16
G-007A	G-007A	1.09
GIBSON	GIBSON	0.1
HAMLET	HAMLET	0.18
NEWTON	NEWTON	0.64
NYISO	NYISO	2.02
PRAIRIE	PRAIRIE	1.16
SANTEETLA	SANTEETLA	0.06
SMITHLAND	SMITHLAND	0.09
TATANKA	TATANKA	0.29
TILTON	TILTON	0.29
TRIMBLE	TRIMBLE	0.26
TVA	TVA	0.74
UNIONPOWER	UNIONPOWER	0.32
VFT	VFT	2.95

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
7409748	934440	AD1-068 TAP	AP	235120	01ALBRIG	AP	1	AP-P2-3-MP-138-150	breaker	191.0	145.07	147.39	DC	4.43

Bus #	Bus	MW Impact
200813	26YOUGH	0.25
200834	26SW_E13_K22	0.43
200835	26DSGENWIN	2.09
200840	26DEEPCRK1	0.58
200841	26DEEPCRK2	0.58
200890	26BF_G21_K23	0.12
200891	26CSLMN_L13	0.2
200892	26LOOKOUT	0.19
202225	26SCI_S29B	0.04
235098	U2-073A E	26.7
235099	U2-073B E	11.7
235520	01WVACO_S38	5.59
235530	01TR_Y2_073A	0.48
235531	01TR_Y2_073B	0.22
236001	01WARRIOR RN	4.84
237312	01DANS_S-014	4.0
237319	01FMR_U2-030	0.21
290229	S-014 E	16.01
292340	K-022	0.01
292350	K-023	6.42
292401	K-028 E	5.48
292542	L-013 1	6.42
293432	R-040 E	0.36
293902	O-048 E	5.78
294903	P-060 E	4.03
885642	T-016 E	1.64
913141	Y1-033 C OP1	0.19
913142	Y1-033 E OP1	10.18
917091	Z2-013	0.19
917672	Z2-108 E	4.01
918341	AA1-047 C	2.01
918342	AA1-047 E	13.35
918812	AA1-100 E	2.43
923971	AB2-038	0.11
924001	AB2-041 C	0.1
924002	AB2-041 E	3.46
929522	U2-030 E	11.52
930261	AB1-065 C	0.91
930262	AB1-065 E	1.49
932141	AC2-021	1.4
933951	AD1-018 C	1.71

Bus #	Bus	MW Impact
933952	AD1-018 E	2.79
934441	AD1-068 C	8.42
934442	AD1-068 E	48.88
937361	AD2-180 C O1	1.19
937362	AD2-180 E O1	7.47
938341	AE1-052	0.41
938351	AE1-053	2.01
938831	AE1-109 C	1.06
938832	AE1-109 E	1.38
938881	AE1-116	0.54
938991	AE1-128 C	4.68
938992	AE1-128 E	3.12
940461	AE2-030 C	1.68
940462	AE2-030 E	2.29
942361	AE2-249 C	0.53
942362	AE2-249 E	0.35
942731	AE2-289 C	2.6
942732	AE2-289 E	15.06
942901	AE2-309 C	3.71
942902	AE2-309 E	0.73
943212	AE2-000A E	3.03
BLUEG	BLUEG	2.36
CALDERWOOD	CALDERWOOD	0.22
CANNELTON	CANNELTON	0.14
CATAWBA	CATAWBA	0.12
CBM-N	CBM-N	0.47
CHEOAH	CHEOAH	0.2
CHILHOWEE	CHILHOWEE	0.07
COFFEEN	COFFEEN	0.24
COTTONWOOD	COTTONWOOD	0.89
DUCKCREEK	DUCKCREEK	0.53
EDWARDS	EDWARDS	0.24
ELMERSMITH	ELMERSMITH	0.24
FARMERCITY	FARMERCITY	0.16
G-007A	G-007A	1.09
GIBSON	GIBSON	0.1
HAMLET	HAMLET	0.18
NEWTON	NEWTON	0.64
NYISO	NYISO	2.02
PRAIRIE	PRAIRIE	1.16
SANTEETLA	SANTEETLA	0.06
SMITHLAND	SMITHLAND	0.09
TATANKA	TATANKA	0.29
TILTON	TILTON	0.29
TRIMBLE	TRIMBLE	0.26
TVA	TVA	0.74
UNIONPOWER	UNIONPOWER	0.32
VFT	VFT	2.95

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
7409962	938800	AE1-106 TAP	AP	235122	01LKLYNN	AP	1	AP-P2-3-MP-138-001	breaker	306.0	124.81	126.07	DC	3.85

Bus #	Bus	MW Impact
200813	26YOUGH	0.09
200835	26DSGENWIN	0.69
200840	26DEEPCRK1	0.2
200841	26DEEPCRK2	0.2
235091	U2-061_E	6.88
235098	U2-073A E	31.16
235099	U2-073B E	13.65
235520	01WVACO_S38	8.49
235530	01TR_Y2_073A	0.56
235531	01TR_Y2_073B	0.25
235625	01BACKB	6.31
235854	01KL_K28_T16	0.61
236001	01WARRIOR RN	4.47
237312	01DANS_S-014	2.82
237319	01FMR_U2-030	0.28
237507	01CROSSCHOOL	0.29
237512	01ROTHROCK	0.13
290229	S-014 E	11.26
292310	K-019	0.24
292350	K-023	2.12
292401	K-028 E	15.68
292542	L-013 1	2.12
293432	R-040 E	0.12
293902	O-048 E	1.91
885642	T-016 E	4.69
913141	Y1-033 C OP1	0.06
913142	Y1-033 E OP1	3.44
917091	Z2-013	0.22
917672	Z2-108 E	1.33
918341	AA1-047 C	3.87
918342	AA1-047 E	25.75
918471	AA1-062 C	2.87
918472	AA1-062 E	19.28
918812	AA1-100 E	2.24
920072	AA2-103 E	2.95
923971	AB2-038	0.13
924001	AB2-041 C	0.12
924002	AB2-041 E	4.04
929522	U2-030 E	15.2
930261	AB1-065 C	1.44
930262	AB1-065 E	2.35

Bus #	Bus	MW Impact
932141	AC2-021	2.27
933951	AD1-018 C	1.47
933952	AD1-018 E	2.4
934441	AD1-068 C	2.48
934442	AD1-068 E	14.42
934931	AD1-125 C	1.81
934932	AD1-125 E	10.53
937361	AD2-180 C O1	2.78
937362	AD2-180 E O1	17.49
938341	AE1-052	1.47
938351	AE1-053	0.35
938801	AE1-106 C	34.08
938802	AE1-106 E	23.45
938831	AE1-109 C	1.45
938832	AE1-109 E	1.88
940461	AE2-030 C	1.77
940462	AE2-030 E	2.43
942731	AE2-289 C	3.03
942732	AE2-289 E	17.58
942901	AE2-309 C	3.22
942902	AE2-309 E	0.63
943212	AE2-000A E	10.91
BLUEG	BLUEG	1.18
CALDERWOOD	CALDERWOOD	0.06
CANNELTON	CANNELTON	0.07
CATAWBA	CATAWBA	0.01
CBM-N	CBM-N	0.08
CHEOAH	CHEOAH	0.06
CHILHOWEE	CHILHOWEE	0.02
COFFEEN	COFFEEN	0.12
COTTONWOOD	COTTONWOOD	0.33
CPLE	CPLE	0.03
DUCKCREEK	DUCKCREEK	0.28
EDWARDS	EDWARDS	0.13
ELMERSMITH	ELMERSMITH	0.11
FARMERCITY	FARMERCITY	0.08
G-007A	G-007A	0.4
GIBSON	GIBSON	0.05
NEWTON	NEWTON	0.32
NYISO	NYISO	0.34
PRAIRIE	PRAIRIE	0.55
SANTEETLA	SANTEETLA	0.02
SMITHLAND	SMITHLAND	0.04
TATANKA	TATANKA	0.15
TILTON	TILTON	0.16
TRIMBLE	TRIMBLE	0.13
TVA	TVA	0.26
UNIONPOWER	UNIONPOWER	0.11
VFT	VFT	1.05

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).

Short Circuit

20 Short Circuit

The following Breakers are overduty: None

Attachment 1 – One Line

Attachment 2 – Project Location