



**Generation Interconnection
Feasibility Study Report
for
Queue Project AE2-154
MEADOW LAKE 345 KV (MLV VIII)
32.5 MW Capacity / 250 MW Energy**

October, 2019

Table Of Contents

1	Preface.....	4
2	General.....	6
2.1	Point of Interconnection	7
2.2	Cost Summary.....	7
3	Transmission Owner Scope of Work.....	8
4	Attachment Facilities	8
5	Direct Connection Cost Estimate.....	9
6	Non-Direct Connection Cost Estimate.....	10
7	Incremental Capacity Transfer Rights (ICTRs)	11
8	Schedule.....	12
9	Transmission Owner Analysis.....	13
10	Interconnection Customer Requirements.....	14
11	Revenue Metering and SCADA Requirements	15
11.1	PJM Requirements	15
11.2	AEP Requirements.....	15
12	Network Impacts.....	16
13	Generation Deliverability	18
14	Multiple Facility Contingency	18
15	Contribution to Previously Identified Overloads	18
16	Potential Congestion due to Local Energy Deliverability.....	18
17	System Reinforcements.....	19
18	Flow Gate Details	21
18.1	Index 1	21
18.2	Index 2	24
18.3	Index 3	26
18.4	Index 4.....	31
18.5	Index 5.....	33
19	Affected Systems	38
19.1	LG&E.....	38
19.2	MISO	38
19.3	TVA.....	38

19.4	Duke Energy Progress.....	38
19.5	NYISO	38
20	Contingency Descriptions.....	39
21	Short Circuit.....	42

1 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 generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

2 General

The Interconnection Customer has proposed a Wind generating facility located in White County , Indiana. The installed facilities will have a total capability of 250 MW with 32.5 MW of this output being recognized by PJM as Capacity. The proposed PJM project #AE2-154 will connect to the existing Meadow Lake 345kV switching station which was initially constructed for PJM project #S06, and then expanded for PJM projects #T-126, #T-127 and # AB1-006 (see Figure 1). The proposed in-service date for this project is 10/31/2021. This study does not imply a TO commitment to this in-service date.

The objective of this Feasibility Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required for maintaining the reliability of the AEP transmission system.

The Feasibility Study includes Short Circuit and Peak Load steady state power flow analyses. The conduct of power flow studies at other load levels, stability analysis, and coordination with non-PJM Transmission Planners, as required under the PJM planning process, is not performed during the Generation Interconnection Feasibility Study phase of the PJM study process. Additional reinforcement requirements for this Interconnection Request may be defined during the conduct of these additional analyses which shall be performed following execution of the System Impact Study agreement.

Queue Number	AE2-154
Project Name	MEADOW LAKE 345 KV (MLV VIII)
State	Indiana
County	White
Transmission Owner	AEP
MFO	250
MWE	250
MWC	32.5
Fuel	Wind
Basecase Study Year	2022

2.1 Point of Interconnection

AE2-154 will interconnect with the AEP transmission system at the existing Meadow Lake 345kV switching station which was constructed for PJM project #S06 and then expanded for PJM projects #T-126, #T-127 and #AB1-006 (see Figure1).

Note: It is assumed that the existing 345 kV revenue metering system, gen lead and Protection & Control Equipment will be adequate for the increased generation of AE2-154. It is further assumed that at a minimum, relay settings will need to be reviewed, and some settings revised, to accommodate the connection of additional turbines through the shared facilities. Detailed engineering review will be performed in the facilities study stage of this project.

2.2 Cost Summary

The AE2-154 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$0
Direct Connection Network Upgrade	\$0
Non Direct Connection Network Upgrades	\$50,000
Total Costs	\$50,000

In addition, the AE2-154 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$460,838,000

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

3 Transmission Owner Scope of Work

4 Attachment Facilities

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

Description	Total Cost
Total Attachment Facility Costs	\$0

5 Direct Connection Cost Estimate

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

Description	Total Cost
Total Direct Connection Facility Costs	\$0

6 Non-Direct Connection Cost Estimate

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

Description	Total Cost
Review and update Protection and Control settings at the AEP Meadow Lake 345 kV station	\$50,000
Total Non-Direct Connection Facility Costs	\$50,000

7 Incremental Capacity Transfer Rights (ICTRs)

Will be determined at a later study phase

8 Schedule

It is anticipated that the time between receipt of executed Agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would generally be between 24 to 36 months after signing Agreement execution.

9 Transmission Owner Analysis

None

10 Interconnection Customer Requirements

It is understood that the Interconnection Customer is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP. The cost of Meadow Lake Wind Farm VIII LLC generating plant and the costs for the line connecting the generating plant to the Meadow Lake 345kV switching station are not included in this report; these are assumed to be the Interconnection Customer responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Requirement from the PJM Open Access Transmission Tariff:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.
2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

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 AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

<http://www.pjm.com/~media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx>

12 Network Impacts

The Queue Project AE2-154 was evaluated as a 250 MW (Capacity 32.5 MW) injection at the Meadow Lake 345kV Station in the AEP area. Project AE2-154 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-154 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)

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	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
1544156	242865	05JEFRSO	AEP	248000	06CLIFTY	OVER C	Z1	AEP_P4_#6189_05HANG R 765_D1	breaker	2354.0	110.4	111.18	DC	34.85
1545515	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P7-1_#11042	tower	3452.0	150.23	151.55	DC	45.5
1544479	243918	05ELDERBRY SS	AEP	938670	AE1-089 TAP	AEP	1	AEP_P4_#2978_05DUMON T 765_B	breaker	1409.0	121.69	122.07	DC	24.41
1544480	243918	05ELDERBRY SS	AEP	938670	AE1-089 TAP	AEP	1	COMED_P4_112-65-BT4-5	breaker	1409.0	111.73	111.99	DC	18.76
1544481	243918	05ELDERBRY SS	AEP	938670	AE1-089 TAP	AEP	1	COMED_P4_112-65-BT3-4	breaker	1409.0	111.73	111.99	DC	18.76
1544482	243918	05ELDERBRY SS	AEP	938670	AE1-089 TAP	AEP	1	COMED_P4_023-65-BT2-3	breaker	1409.0	111.73	111.99	DC	18.76
1545596	923880	AB2-028 TAP	AEP	243218	05DESOTO	AEP	1	AEP_P7-1_#11042	tower	1160.0	101.25	102.02	DC	19.75
7081160	938670	AE1-089 TAP	AEP	243219	05DUMON T	AEP	1	AEP_P4_#2978_05DUMON T 765_B	breaker	1409.0	122.33	123.11	DC	24.41

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
1545328	242865	05JEFRSO	AEP	248000	06CLIFTY	OVEC	Z1	AEP_P1-2_#709	operation	2354.0	108.85	109.61	DC	34.92
1544918	243878	05MEADOW	AEP	255205	17REYNOLDS	NIPS	1	AEP_P1-2_#8807	operation	2246.0	146.01	153.48	DC	167.72
1544922	243878	05MEADOW	AEP	255205	17REYNOLDS	NIPS	2	AEP_P1-2_#8695	operation	2246.0	146.01	153.48	DC	167.72
1545347	243918	05ELDERBRYSS	AEP	938670	AE1-089 TAP	AEP	1	AEP_P1-2_#695A	operation	1409.0	111.73	111.99	DC	18.76
7082106	938670	AE1-089 TAP	AEP	243219	05DUMONT	AEP	1	AEP_P1-2_#695A	operation	1409.0	118.65	119.25	DC	18.76

17 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
7081160	5	AE1-089 TAP 345.0 kV - 05DUMONT 345.0 kV Ckt 1	<u>AEP</u> AEP_AE1_REF_r0040 (156) : 1) A Sag Study will be required on the 7.0 miles of conductor to mitigate the overload. The new ratings after sag study will be: S/N: 1409 MVA, S/E: 1888 MVA, Depending on the sag study results, the cost for this upgrade is expected to be between \$28,000(no remediation required, just sag study) and \$14.0 million (complete line Reconstructor/rebuild). Time Estimate: a) Sag Study: 6-12 months b) Rebuild: The standard time required for construction differs from state to state. An approximate construction time would be 24 to 36 months after signing an interconnection agreement. Project Type : FAC Cost : \$28,000 Time Estimate : 6-12 Months	\$28,000
1544481,1544479,1544482,1544480	3	05ELDERBRYSS 345.0 kV - AE1-089 TAP 345.0 kV Ckt 1		
1545596	4	AB2-028 TAP 345.0 kV - 05DESOTO 345.0 kV Ckt 1	<u>AEP</u> Current AEP Ratings are S/N: 1025 MVA S/E: 1318 MVA. Current AEP ratings are sufficient to mitigate the overloads.	\$0
1544156	1	05JEFRSO 345.0 kV - 06CLIFTY 345.0 kV Ckt Z1	<u>AEP</u> n5034 (194) : Rebuilding a new Sullivan - Reynolds 765kV line which is driven by X3-028 MTX project will mitigate the identified overloads. Project Type : FAC Cost : \$441,700,000 Time Estimate : N/A Months <u>OVEC</u> n4106 (911) : PJM Network Upgrade n4106. Perform a sag study on the 345 kV line between Jefferson and Clifty Creek. Project Type : FAC Cost : \$1,960,000 Time Estimate : N/A Months	\$443,660,000

ID	Index	Facility	Upgrade Description	Cost
1545515	2	05ROCKPT 765.0 kV - 05JEFRSO 765.0 kV Ckt 1	<u>AEP</u> AEPI0002a (82) : An engineering study will need to be conducted to determine if the Rockport Relay Thermal limits 2996 Amps settings can be adjusted to mitigate the overload, Estimated Cost \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated Cost: \$600,000 Project Type : FAC Cost : \$25,000 Time Estimate : 12-18 Months AEPI0002b (83) : An engineering study will need to be conducted to determine if the Jefferson CT Thermal limits 2996 Amps settings can be adjusted to mitigate the overload, Estimated Cost \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated Cost: \$600,000 Project Type : FAC Cost : \$25,000 Time Estimate : 12-18 Months AEPI0002c (84) : Replace 6 Rockport Current Transformers 3000Amps Project Type : FAC Cost : \$4,800,000 Time Estimate : 12-18 Months AEPI0002d (85) : Replace 2 Rockport 3000A non-oil Breakers at Rockport Project Type : FAC Cost : \$6,000,000 Time Estimate : 12-18 Months AEPI0002e (86) : Replace 3 3000A Wavetraps at Rockport Project Type : FAC Cost : \$150,000 Time Estimate : 12-18 Months AEPI0002f (87) : Replace 3 3000A wavetraps at Jefferson Project Type : FAC Cost : \$150,000 Time Estimate : 12-18 Months AEPI0002g (88) : Replace 12 3000A switches at Rockport Project Type : FAC Cost : \$6,000,000 Time Estimate : 12-18 Months	\$17,150,000
			TOTAL COST	\$460,838,000

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 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
1544156	242865	05JEFRSO	AEP	248000	06CLIFTY	OVEC	Z1	AEP_P4_#6189_05HANG R 765_D1	breaker	2354.0	110.4	111.18	DC	34.85

Bus #	Bus	MW Impact
243441	05CKG2	15.47
243442	05RKG1	52.85
243443	05RKG2	50.67
243859	05FR-11G C	0.32
243862	05FR-12G C	0.32
243864	05FR-21G C	0.34
243866	05FR-22G C	0.33
243870	05FR-3G C	0.66
243873	05FR-4G C	0.51
246909	05MDL-1G C	0.68
246910	05MDL-2G C	0.34
246976	05MDL-3G C	0.34
246979	05MDL-4G C	0.68
247556	T-127 C	0.33
247900	05FR-11G E	10.61
247901	05FR-12G E	10.44
247902	05FR-21G E	11.16
247903	05FR-22G E	10.68
247904	05FR-3G E	21.63
247905	05FR-4G E	16.27
247906	05MDL-1G E	22.26
247907	05MDL-2G E	11.04
247912	05MDL-3G E	11.54
247913	05MDL-4G E	11.15
247943	T-127 E	11.15
274788	SE CHICAG;SU	3.99

Bus #	Bus	MW Impact
274789	SE CHICAG;6U	3.99
274790	SE CHICAG;7U	3.99
274791	SE CHICAG;8U	3.99
274792	SE CHICAG;9U	3.99
274793	SE CHICAG;0U	3.99
274794	SE CHICAG;1U	3.99
274795	SE CHICAG;2U	3.99
900404	X3-028 C	257.3
900405	X3-028 E	343.06
910542	X3-005 E	0.58
915662	Y3-099 E	0.24
915672	Y3-100 E	0.24
916182	Z1-065 E	0.65
917712	Z2-114 E	0.26
925242	AB2-178 E	2.4
930041	AB1-006 C	0.44
930042	AB1-006 E	24.25
930461	AB1-087	94.34
930471	AB1-088	94.34
930501	AB1-091 O1	56.63
932601	AC2-080 C O1	3.52
932602	AC2-080 E O1	23.55
932931	AC2-117	4.75
933281	AC2-140 C	4.2
933282	AC2-140 E	0.22
933441	AC2-157 C	13.04
933442	AC2-157 E	21.27
934721	AD1-100 C	15.43
934722	AD1-100 E	72.02
935271	AD1-137 C	8.81
935272	AD1-137 E	58.96
936781	AD2-101 C	3.63
936782	AD2-101 E	16.99
937031	AD2-137 C O1	2.75
937032	AD2-137 E O1	12.87
937041	AD2-138 C	4.76
937042	AD2-138 E	22.3
937051	AD2-140 C O1	2.76
937052	AD2-140 E O1	12.9
937061	AD2-141 C O1	2.74
937062	AD2-141 E O1	12.92
937071	AD2-142 C O1	5.51
937072	AD2-142 E O1	25.81
937121	AD2-148 C O1	2.72
937122	AD2-148 E O1	12.73
937131	AD2-149 C O1	2.72
937132	AD2-149 E O1	12.73
937141	AD2-150 C O1	2.72
937142	AD2-150 E O1	12.73
937181	AD2-155 C O1	2.72
937182	AD2-155 E O1	12.73
937321	AD2-175 C	12.66

Bus #	Bus	MW Impact
937322	AD2-175 E	8.44
938012	AE1-002 E O1	5.52
938671	AE1-089 C	14.01
938672	AE1-089 E	19.23
939351	AE1-166 C O1	8.03
939352	AE1-166 E O1	7.41
939641	AE1-194 C	6.77
939642	AE1-194 E	45.28
939651	AE1-195 C	6.77
939652	AE1-195 E	45.28
940261	AE2-008	8.59
940581	AE2-045 C O1	16.56
940582	AE2-045 E O1	22.74
941341	AE2-130 C	153.54
941342	AE2-130 E	102.36
941551	AE2-152 C	10.29
941552	AE2-152 E	5.14
941561	AE2-153 C O1	3.62
941562	AE2-153 E O1	16.96
941571	AE2-154 C	4.53
941572	AE2-154 E	30.32
942601	AE2-276	8.59
942881	AE2-307 C O1	9.9
942882	AE2-307 E O1	4.66
BLUEG	BLUEG	104.26
CALDERWOOD	CALDERWOOD	1.4
CANNELTON	CANNELTON	1.91
CARR	CARR	0.73
CATAWBA	CATAWBA	0.86
CBM-W1	CBM-W1	38.74
CBM-W2	CBM-W2	61.45
CHEOAH	CHEOAH	1.28
CHILHOWEE	CHILHOWEE	0.46
CIN	CIN	6.46
ELMERSMITH	ELMERSMITH	3.11
G-007	G-007	2.19
HAMLET	HAMLET	1.4
IPL	IPL	3.67
MEC	MEC	33.85
MECS	MECS	18.37
O-066	O-066	14.04
RENSSELAER	RENSSELAER	0.58
SANTEETLA	SANTEETLA	0.38
TRIMBLE	TRIMBLE	12.57
TVA	TVA	1.97
WEC	WEC	6.28
Z1-043	Z1-043	24.63

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
1545515	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P7-1_#11042	tower	3452.0	150.23	151.55	DC	45.5

Bus #	Bus	MW Impact
243442	05RKG1	104.83
243443	05RKG2	100.5
243859	05FR-11G C	0.43
243862	05FR-12G C	0.43
243864	05FR-21G C	0.46
243866	05FR-22G C	0.44
243870	05FR-3G C	0.89
243873	05FR-4G C	0.69
246909	05MDL-1G C	0.89
246910	05MDL-2G C	0.44
246976	05MDL-3G C	0.44
246979	05MDL-4G C	0.89
247556	T-127 C	0.44
247900	05FR-11G E	14.25
247901	05FR-12G E	14.02
247902	05FR-21G E	14.98
247903	05FR-22G E	14.34
247904	05FR-3G E	29.05
247905	05FR-4G E	21.84
247906	05MDL-1G E	29.07
247907	05MDL-2G E	14.42
247912	05MDL-3G E	15.07
247913	05MDL-4G E	14.56
247943	T-127 E	14.56
274650	KINCAID ;1U	7.39
900404	X3-028 C	498.8
900405	X3-028 E	665.06
930041	AB1-006 C	0.58
930042	AB1-006 E	31.67
930461	AB1-087	182.89
930471	AB1-088	182.89
933441	AC2-157 C	25.27
933442	AC2-157 E	41.23
935271	AD1-137 C	11.83
935272	AD1-137 E	79.18
936771	AD2-100 C O1	13.45
936772	AD2-100 E O1	8.96
936972	AD2-131 E O1	2.83
941341	AE2-130 C	304.54
941342	AE2-130 E	203.03
941571	AE2-154 C	5.92
941572	AE2-154 E	39.59

Bus #	Bus	MW Impact
942481	AE2-261 C	19.75
942482	AE2-261 E	13.17
942601	AE2-276	16.66
954681	J949	22.17
954761	J468 C	4.19
954762	J468 E	16.78
BLUEG	BLUEG	8.67
CARR	CARR	0.72
CATAWBA	CATAWBA	0.12
CBM-S1	CBM-S1	8.35
CBM-W1	CBM-W1	18.52
CBM-W2	CBM-W2	172.2
CIN	CIN	26.36
G-007	G-007	2.06
HAMLET	HAMLET	0.31
IPL	IPL	17.7
MEC	MEC	29.24
O-066	O-066	13.2
RENSSELAER	RENSSELAER	0.57
TRIMBLE	TRIMBLE	1.38
WEC	WEC	2.8
Z1-043	Z1-043	14.61

18.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
1544479	243918	05ELDERBRYSS	AEP	938670	AE1-089 TAP	AEP	1	AEP_P4_#2978_05DUMONT 765_B	breaker	1409.0	121.69	122.07	DC	24.41

Bus #	Bus	MW Impact
247900	05FR-11G E	6.83
247901	05FR-12G E	6.72
247902	05FR-21G E	7.18
247903	05FR-22G E	6.87
247904	05FR-3G E	13.92
247905	05FR-4G E	10.47
247906	05MDL-1G E	15.59
247907	05MDL-2G E	7.73
247912	05MDL-3G E	8.08
247913	05MDL-4G E	7.81
247943	T-127 E	7.81
270859	PWR VTR EC;R	7.08
274722	S-055 E	6.52
274809	UNIV PK N;5U	0.64
274811	UNIV PK N;7U	0.64
274812	UNIV PK N;8U	0.64
274814	UNIV PK N;0U	0.64
274815	UNIV PK N;XU	0.64
274888	PILOT HIL;1E	10.28
275149	KEMPTON ;1E	10.28
290021	O50 E	11.42
290051	GSG-6; E	6.14
290108	LEEDK;1U E	14.18
293061	N-015 E	8.92
293644	O22 E1	5.91
293645	O22 E2	11.47
294392	P-010 E	11.33
295109	WESTBROOK E	3.29
909145	X2-052	28.77
914641	Y2-103	26.09
915011	Y3-013 1	2.17
915021	Y3-013 2	2.17
915031	Y3-013 3	2.17
916221	Z1-073 E	3.17
916502	Z1-106 E1	0.73
916504	Z1-106 E2	0.73
916512	Z1-107 E	1.49
916522	Z1-108 E	1.44
917711	Z2-114 C	0.05
917712	Z2-114 E	0.39
918052	AA1-018 E	9.77

Bus #	Bus	MW Impact
920272	AA2-123 E	1.43
924471	AB2-096	24.78
925302	AB2-191 E	0.81
926311	AC1-109 1	1.1
926321	AC1-109 2	1.1
926331	AC1-110 1	1.09
926341	AC1-110 2	1.09
926351	AC1-111 1	0.44
926361	AC1-111 2	0.44
926371	AC1-111 3	0.44
926381	AC1-111 4	0.44
926391	AC1-111 5	0.44
926401	AC1-111 6	0.44
926431	AC1-114	1.4
927091	AC1-204 1	41.76
927101	AC1-204 2	41.76
927451	AC1-142A 1	2.41
927461	AC1-142A 2	2.41
927511	AC1-113 1	0.7
927521	AC1-113 2	0.7
930042	AB1-006 E	16.99
930391	AB1-080	1.7
930481	AB1-089	38.61
930501	AB1-091 O1	40.0
930741	AB1-122 1O1	41.84
930751	AB1-122 2O1	42.51
932601	AC2-080 C O1	3.72
932602	AC2-080 E O1	24.87
932881	AC2-115 1	1.4
932891	AC2-115 2	1.4
932921	AC2-116	0.49
932931	AC2-117	5.16
933411	AC2-154 C	1.4
933412	AC2-154 E	2.28
933431	AC2-156 C O1	0.55
933432	AC2-156 E O1	0.9
933911	AD1-013 C	1.08
933912	AD1-013 E	1.73
933931	AD1-016 C	0.54
933932	AD1-016 E	0.88
934101	AD1-039 1	4.1
934111	AD1-039 2	4.17
934401	AD1-064 C O1	1.87
934402	AD1-064 E O1	8.77
934431	AD1-067 C	0.08
934432	AD1-067 E	0.32
934701	AD1-098 C O1	4.04
934702	AD1-098 E O1	2.95
934721	AD1-100 C	11.08
934722	AD1-100 E	51.72
934871	AD1-116 C	0.57
934872	AD1-116 E	0.93

Bus #	Bus	MW Impact
934971	AD1-129 C	0.53
934972	AD1-129 E	0.35
935001	AD1-133 C O1	11.14
935002	AD1-133 E O1	7.43
935271	AD1-137 C	5.67
935272	AD1-137 E	37.94
936291	AD2-038 C O1	1.4
936292	AD2-038 E O1	9.4
936371	AD2-047 C O1	1.25
936372	AD2-047 E O1	13.44
936461	AD2-060	1.47
936511	AD2-066 C O1	4.97
936512	AD2-066 E O1	3.31
936781	AD2-101 C	2.47
936782	AD2-101 E	11.55
937001	AD2-134 C	1.61
937002	AD2-134 E	6.63
937031	AD2-137 C O1	1.91
937032	AD2-137 E O1	8.97
937041	AD2-138 C	5.03
937042	AD2-138 E	23.55
937051	AD2-140 C O1	1.91
937052	AD2-140 E O1	8.96
937061	AD2-141 C O1	1.9
937062	AD2-141 E O1	8.97
937071	AD2-142 C O1	3.83
937072	AD2-142 E O1	17.91
937121	AD2-148 C O1	1.92
937122	AD2-148 E O1	8.99
937131	AD2-149 C O1	1.92
937132	AD2-149 E O1	8.99
937141	AD2-150 C O1	1.92
937142	AD2-150 E O1	8.99
937181	AD2-155 C O1	1.92
937182	AD2-155 E O1	8.99
937321	AD2-175 C	8.94
937322	AD2-175 E	5.96
937331	AD2-176 C O1	4.28
937332	AD2-176 E O1	2.85
937401	AD2-194 1	4.49
937411	AD2-194 2	4.49
938012	AE1-002 E O1	3.84
938511	AE1-070 1	5.28
938521	AE1-070 2	4.83
938851	AE1-113 C O1	5.17
938852	AE1-113 E O1	16.24
939321	AE1-163 C O1	3.53
939322	AE1-163 E O1	21.69
939351	AE1-166 C O1	5.83
939352	AE1-166 E O1	5.39
939401	AE1-172 C O1	3.7
939402	AE1-172 E O1	17.32

Bus #	Bus	MW Impact
939641	AE1-194 C	5.59
939642	AE1-194 E	37.41
939651	AE1-195 C	5.59
939652	AE1-195 E	37.41
939691	AE1-199	1.4
939701	AE1-201 C	1.17
939702	AE1-201 E	0.26
939732	AE1-204 E	0.17
939861	AE1-222 1	46.21
939871	AE1-222 2	46.95
939921	AE1-228 C O1	5.9
939922	AE1-228 E O1	3.93
940101	AE1-252 C O1	6.31
940102	AE1-252 E O1	4.2
940262	AE2-008 BAT	34.37
940581	AE2-045 C O1	12.66
940582	AE2-045 E O1	17.38
940752	AE2-062 E	0.07
940762	AE2-063 E	0.07
941131	AE2-107 C	4.26
941132	AE2-107 E	2.84
941551	AE2-152 C	7.48
941552	AE2-152 E	3.74
941561	AE2-153 C O1	2.67
941562	AE2-153 E O1	12.48
941571	AE2-154 C	3.17
941572	AE2-154 E	21.24
942421	AE2-255 C O1	1.78
942422	AE2-255 E O1	5.35
942651	AE2-281 C	0.5
942652	AE2-281 E	3.1
942881	AE2-307 C O1	19.7
942882	AE2-307 E O1	9.27
942911	AE2-310 C O1	10.0
942912	AE2-310 E O1	4.71
942991	AE2-321 C O1	4.77
942992	AE2-321 E O1	2.35
943121	AE2-341 C	7.34
943122	AE2-341 E	3.61
CARR	CARR	0.6
CATAWBA	CATAWBA	0.06
CBM-S1	CBM-S1	4.5
CBM-W1	CBM-W1	19.69
CBM-W2	CBM-W2	68.05
CIN	CIN	6.99
G-007	G-007	1.67
HAMLET	HAMLET	0.18
IPL	IPL	3.23
LGEE	LGEE	0.71
MEC	MEC	25.2
O-066	O-066	10.74
RENSSELAER	RENSSELAER	0.48

Bus #	Bus	MW Impact
WEC	WEC	4.68
Z1-043	Z1-043	17.58

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
1545596	923880	AB2-028 TAP	AEP	243218	05DESOTO	AEP	1	AEP_P7-1_#11042	tower	1160.0	101.25	102.02	DC	19.75

Bus #	Bus	MW Impact
247285	05AND G1	0.8
247286	05AND G2	0.8
247287	05AND G3	1.68
247900	05FR-11G E	6.19
247901	05FR-12G E	6.08
247902	05FR-21G E	6.5
247903	05FR-22G E	6.23
247904	05FR-3G E	12.61
247905	05FR-4G E	9.48
247906	05MDL-1G E	12.62
247907	05MDL-2G E	6.26
247912	05MDL-3G E	6.54
247913	05MDL-4G E	6.32
247943	T-127 E	6.32
920501	AA2-148 C O1	2.39
920502	AA2-148 E O1	16.03
923881	AB2-028 C	12.83
923882	AB2-028 E	85.84
930042	AB1-006 E	13.75
930461	AB1-087	37.87
930471	AB1-088	37.87
933441	AC2-157 C	5.23
933442	AC2-157 E	8.54
934161	AD1-043 C O1	3.11
934162	AD1-043 E O1	5.08
935271	AD1-137 C	5.14
935272	AD1-137 E	34.37
941571	AE2-154 C	2.57
941572	AE2-154 E	17.18
941692	AE2-169 BAT	1.07
941702	AE2-170 BAT	2.57
941711	AE2-171	2.06
941722	AE2-172 BAT	1.57
942601	AE2-276	3.45
942791	AE2-297 C O1	9.99
942792	AE2-297 E O1	6.66
950161	J401	3.11
950302	J453 E	1.19
950981	J333	12.48
950991	J334	12.51
952471	J708	20.13
952801	J754 C	2.55

Bus #	Bus	MW Impact
952802	J754 E	13.79
953101	J714 C	1.75
953102	J714 E	9.48
953351	J805	32.88
953501	J478 C	1.99
953502	J478 E	10.79
953721	J824	17.31
953761	J829	17.08
953831	J842 C	2.1
953832	J842 E	11.37
953841	J843 C	2.17
953842	J843 E	11.74
953931	J856	4.73
954351	J903	16.06
954772	J515 E	27.88
CARR	CARR	0.11
CBM-S1	CBM-S1	10.24
CBM-S2	CBM-S2	2.01
CBM-W1	CBM-W1	2.94
CBM-W2	CBM-W2	117.1
CIN	CIN	26.41
CPLE	CPLE	0.61
G-007	G-007	0.26
IPL	IPL	22.65
LGEE	LGEE	2.77
MEC	MEC	10.81
O-066	O-066	1.66
RENSSELAER	RENSSELAER	0.09
WEC	WEC	0.58

18.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
7081160	938670	AE1-089 TAP	AEP	243219	05DUMONT	AEP	1	AEP_P4_#2978_05DUMONT 765_B	breaker	1409.0	122.33	123.11	DC	24.41

Bus #	Bus	MW Impact
247900	05FR-11G E	6.83
247901	05FR-12G E	6.72
247902	05FR-21G E	7.18
247903	05FR-22G E	6.87
247904	05FR-3G E	13.92
247905	05FR-4G E	10.47
247906	05MDL-1G E	15.59
247907	05MDL-2G E	7.73
247912	05MDL-3G E	8.08
247913	05MDL-4G E	7.81
247943	T-127 E	7.81
274722	S-055 E	6.52
274809	UNIV PK N;5U	0.64
274811	UNIV PK N;7U	0.64
274812	UNIV PK N;8U	0.64
274814	UNIV PK N;0U	0.64
274815	UNIV PK N;XU	0.64
274888	PILOT HIL;1E	10.28
275149	KEMPTON ;1E	10.28
290021	O50 E	11.42
293061	N-015 E	8.92
293644	O22 E1	5.91
293645	O22 E2	11.47
294392	P-010 E	11.33
909145	X2-052	28.77
914641	Y2-103	26.09
915011	Y3-013 1	2.17
915021	Y3-013 2	2.17
915031	Y3-013 3	2.17
916502	Z1-106 E1	0.73
916504	Z1-106 E2	0.73
916512	Z1-107 E	1.49
916522	Z1-108 E	1.44
917711	Z2-114 C	0.05
917712	Z2-114 E	0.39
918052	AA1-018 E	9.77
920272	AA2-123 E	1.43
926311	AC1-109 1	1.1
926321	AC1-109 2	1.1
926331	AC1-110 1	1.09
926341	AC1-110 2	1.09

Bus #	Bus	MW Impact
926351	AC1-111 1	0.44
926361	AC1-111 2	0.44
926371	AC1-111 3	0.44
926381	AC1-111 4	0.44
926391	AC1-111 5	0.44
926401	AC1-111 6	0.44
927091	AC1-204 1	41.76
927101	AC1-204 2	41.76
927451	AC1-142A 1	2.41
927461	AC1-142A 2	2.41
930042	AB1-006 E	16.99
930391	AB1-080	1.7
930501	AB1-091 O1	40.0
930741	AB1-122 1O1	41.84
930751	AB1-122 2O1	42.51
932601	AC2-080 C O1	3.72
932602	AC2-080 E O1	24.87
932931	AC2-117	5.16
933411	AC2-154 C	1.4
933412	AC2-154 E	2.28
933431	AC2-156 C O1	0.55
933432	AC2-156 E O1	0.9
933931	AD1-016 C	0.54
933932	AD1-016 E	0.88
934101	AD1-039 1	4.1
934111	AD1-039 2	4.17
934721	AD1-100 C	11.08
934722	AD1-100 E	51.72
934871	AD1-116 C	0.57
934872	AD1-116 E	0.93
935271	AD1-137 C	5.67
935272	AD1-137 E	37.94
936291	AD2-038 C O1	1.4
936292	AD2-038 E O1	9.4
936371	AD2-047 C O1	1.25
936372	AD2-047 E O1	13.44
936461	AD2-060	1.47
936511	AD2-066 C O1	4.97
936512	AD2-066 E O1	3.31
937031	AD2-137 C O1	1.91
937032	AD2-137 E O1	8.97
937041	AD2-138 C	5.03
937042	AD2-138 E	23.55
937051	AD2-140 C O1	1.91
937052	AD2-140 E O1	8.96
937061	AD2-141 C O1	1.9
937062	AD2-141 E O1	8.97
937071	AD2-142 C O1	3.83
937072	AD2-142 E O1	17.91
937121	AD2-148 C O1	1.92
937122	AD2-148 E O1	8.99
937131	AD2-149 C O1	1.92

Bus #	Bus	MW Impact
937132	AD2-149 E O1	8.99
937141	AD2-150 C O1	1.92
937142	AD2-150 E O1	8.99
937181	AD2-155 C O1	1.92
937182	AD2-155 E O1	8.99
937321	AD2-175 C	8.94
937322	AD2-175 E	5.96
937331	AD2-176 C O1	4.28
937332	AD2-176 E O1	2.85
937401	AD2-194 1	4.49
937411	AD2-194 2	4.49
938012	AE1-002 E O1	3.84
938511	AE1-070 1	5.28
938521	AE1-070 2	4.83
938671	AE1-089 C	74.51
938672	AE1-089 E	102.29
938851	AE1-113 C O1	5.17
938852	AE1-113 E O1	16.24
939321	AE1-163 C O1	3.53
939322	AE1-163 E O1	21.69
939351	AE1-166 C O1	5.83
939352	AE1-166 E O1	5.39
939641	AE1-194 C	5.59
939642	AE1-194 E	37.41
939651	AE1-195 C	5.59
939652	AE1-195 E	37.41
939701	AE1-201 C	1.17
939702	AE1-201 E	0.26
939732	AE1-204 E	0.17
939861	AE1-222 1	46.21
939871	AE1-222 2	46.95
940261	AE2-008	45.68
940581	AE2-045 C O1	12.66
940582	AE2-045 E O1	17.38
940752	AE2-062 E	0.07
940762	AE2-063 E	0.07
941131	AE2-107 C	4.26
941132	AE2-107 E	2.84
941551	AE2-152 C	7.48
941552	AE2-152 E	3.74
941561	AE2-153 C O1	2.67
941562	AE2-153 E O1	12.48
941571	AE2-154 C	3.17
941572	AE2-154 E	21.24
942421	AE2-255 C O1	1.78
942422	AE2-255 E O1	5.35
942651	AE2-281 C	0.5
942652	AE2-281 E	3.1
942881	AE2-307 C O1	19.7
942882	AE2-307 E O1	9.27
942911	AE2-310 C O1	10.0
942912	AE2-310 E O1	4.71

Bus #	Bus	MW Impact
942991	AE2-321 C O1	4.77
942992	AE2-321 E O1	2.35
943121	AE2-341 C	7.34
943122	AE2-341 E	3.61
CARR	CARR	0.6
CATAWBA	CATAWBA	0.06
CBM-S1	CBM-S1	4.5
CBM-W1	CBM-W1	19.69
CBM-W2	CBM-W2	68.05
CIN	CIN	6.99
G-007	G-007	1.67
HAMLET	HAMLET	0.18
IPL	IPL	3.23
LGEE	LGEE	0.71
MEC	MEC	25.2
O-066	O-066	10.74
RENSSELAER	RENSSELAER	0.48
WEC	WEC	4.68
Z1-043	Z1-043	17.58

Affected Systems

19 Affected Systems

19.1 LG&E

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

19.2 MISO

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

19.3 TVA

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

19.4 Duke Energy Progress

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

19.5 NYISO

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

20 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#695A	CONTINGENCY 'AEP_P1-2_#695A' OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END
AEP_P1-2_#8807	CONTINGENCY 'AEP_P1-2_#8807' OPEN BRANCH FROM BUS 243878 TO BUS 255205 CKT 2 / 243878 05MEADOW 345 255205 17REYNOLDS 345 2 END
AEP_P1-2_#709	CONTINGENCY 'AEP_P1-2_#709' OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END
AEP_P4_#6189_05HANG R 765_D1	CONTINGENCY 'AEP_P4_#6189_05HANG R 765_D1' OPEN BRANCH FROM BUS 242921 TO BUS 242924 CKT 1 / 242921 05CORNNU 765 242924 05HANG R 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242921 TO BUS 242934 CKT 1 / 242921 05CORNNU 765 242934 05CORNNU 345 1 REMOVE UNIT 1A FROM BUS 247245 / 247245 05HRKG1A 18.0 REMOVE UNIT 1B FROM BUS 247246 / 247246 05HRKG1B 18.0 REMOVE UNIT 1S FROM BUS 247247 / 247247 05HRKG1S 18.0 REMOVE UNIT 2A FROM BUS 247248 / 247248 05HRKG2A 18.0 REMOVE UNIT 2B FROM BUS 247249 / 247249 05HRKG2B 18.0 REMOVE UNIT 2S FROM BUS 247250 / 247250 05HRKG2S 18.0 END
COMED_P4_112-65-BT3-4__	CONTINGENCY 'COMED_P4_112-65-BT3-4__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33 END
AEP_P4_#2978_05DUMONT 765_B	CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B' OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END
AEP_P1-2_#8695	CONTINGENCY 'AEP_P1-2_#8695' OPEN BRANCH FROM BUS 243878 TO BUS 255205 CKT 1 / 243878 05MEADOW 345 255205 17REYNOLDS 345 1 END

Contingency Name	Contingency Definition
COMED_P4_023-65-BT2-3__	CONTINGENCY 'COMED_P4_023-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765 END
AEP_P7-1_#11042	CONTINGENCY 'AEP_P7-1_#11042' OPEN BRANCH FROM BUS 243878 TO BUS 255205 CKT 1 / 243878 05MEADOW 345 255205 17REYNOLDS 345 1 OPEN BRANCH FROM BUS 243878 TO BUS 255205 CKT 2 / 243878 05MEADOW 345 255205 17REYNOLDS 345 2 END
COMED_P4_112-65-BT4-5__	CONTINGENCY 'COMED_P4_112-65-BT4-5__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END

Short Circuit

21 Short Circuit

The following Breakers are overduty

None