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**Generation Interconnection
Feasibility Study Report
for
Queue Project AE2-130
ROCKPORT 765 KV
480 MW Capacity / 800 MW Energy**

October, 2019

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

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

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

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

2 General

The Interconnection Customer, has proposed a Solar and Storage generating facility located in Spencer County, Indiana. The installed photovoltaic generation facilities will have a total capability of 800 MW with 480 MW of this output being recognized by PJM as Capacity. The project also includes 200MW of AC-connected battery storage. It is assumed that at times the Interconnection Customer will charge the batteries from the grid. The proposed in-service date for this project is 12/01/2022. 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	AE2-130
Project Name	ROCKPORT 765 KV
State	Indiana
County	Spencer
Transmission Owner	AEP
MFO	800
MWE	800
MWC	480
Fuel	Solar; Storage
Basecase Study Year	2022

2.1 Point of Interconnection

AE2-130 will interconnect with the AEP transmission system at the Rockport 765 kV substation.

To accommodate the interconnection at the Rockport 765 kV substation, the substation will have to be expanded requiring the installation of one 765 kV circuit breaker (see Figure 1). Installation of associated protection and control equipment, 765kV line risers, SCADA, and 765 kV revenue metering will also be required.

2.2 Cost Summary

The AE2-130 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$500,000
Direct Connection Network Upgrade	\$0
Non Direct Connection Network Upgrades	\$3,500,000
Total Costs	\$4,000,000

In addition, the AE2-130 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$460,810,000

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
765kV Revenue Metering	\$500,000
Total Attachment Facility Costs	\$500,000

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
Install one new Circuit Breaker. Installation of associated protection and control equipment, 765kV line risers and SCADA.	\$3,500,000
Total Non-Direct Connection Facility Costs	\$3,500,000

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 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 the Interconnection Customer's generating plant and the costs for the line connecting the generating plant to the Rockport 765 kV station are not included in this report; these are assumed to be the Interconnection Customer's 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 AE2-130 was evaluated as a 800 MW (Capacity 480 MW) injection at the Rockport 765kV in the AEP area. Project AE2-130 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-130 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	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
1497602	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	Base Case	single	3452.0	94.58	103.21	DC	298.23
1497397	243216	05DARWIN	AEP	243221	05EUGENE	AEP	1	AEP_P1-2_#10136	single	1195.0	99.49	108.3	DC	105.21
1497369	247712	05SULLIVAN	AEP	346809	7CASEY	AMIL	1	AEP_P1-2_#10136	single	1466.0	92.03	104.07	DC	176.4
1497403	247712	05SULLIVAN	AEP	243216	05DARWIN	AEP	1	AEP_P1-2_#10136	single	1195.0	99.49	108.3	DC	105.21
1497656	247712	05SULLIVAN	AEP	243217	05DEQUIN	AEP	1	AEP_P1-2_#363	single	1318.0	96.58	101.9	DC	70.12

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
1497022	243208	05JEFRSO	AEP	242865	05JEFRSO	AEP	2	AEP_P4_#1760_05JEFRSO 765_A	breaker	3039.0	94.12	106.82	DC	386.05

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
1496745	242865	05JEFRSO	AEP	248000	06CLIFTY	OVERC	Z1	AEP_P4_#1760_05JEFRSO 765_A	breaker	2354.0	135.79	152.31	DC	386.05
1496746	242865	05JEFRSO	AEP	248000	06CLIFTY	OVERC	Z1	AEP_P4_#6189_05HANG R 765_D1	breaker	2354.0	104.3	110.04	DC	255.9
1496758	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P4_#8906_05SULLIVAN 345_C	breaker	3452.0	133.47	148.88	DC	531.98
1496760	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P4_#8910_05DEQUIN 345_C	breaker	3452.0	122.43	137.19	DC	509.36
1497597	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P1-2_#8905	single	3452.0	101.42	110.27	DC	305.38
1497600	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P1-2_#1027	single	3452.0	100.06	108.63	DC	295.86
1498105	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P7-1_#11042	tower	3452.0	135.53	150.23	DC	507.57
1498106	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P7-1_#11022	tower	3452.0	133.47	148.88	DC	531.98
1498107	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P7-1_#11013	tower	3452.0	133.47	148.88	DC	531.98
1496641	243216	05DARWIN	AEP	243221	05EUGENE	AEP	1	AEP_P4_#8648_05JEFRSO 765_B	breaker	1195.0	162.5	177.09	DC	174.42
1497396	243216	05DARWIN	AEP	243221	05EUGENE	AEP	1	AEP_P1-2_#363	single	1195.0	122.91	131.65	DC	104.48
1496603	247712	05SULLIVAN	AEP	346809	7CASEY	AMIL	1	AEP_P4_#8648_05JEFRSO 765_B	breaker	1466.0	188.12	208.03	DC	292.1

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
1496637	247712	05SULLIVAN	AEP	243216	05DARWIN	AEP	1	AEP_P4_#8648_05JEFRSO765_B	breaker	1195.0	162.5	177.09	DC	174.42
1496902	247712	05SULLIVAN	AEP	243217	05DEQUIN	AEP	1	AEP_P4_#8648_05JEFRSO765_B	breaker	1318.0	121.98	130.9	DC	117.53
1497368	247712	05SULLIVAN	AEP	346809	7CASEY	AMIL	1	AEP_P1-2_#363	single	1466.0	123.58	135.53	DC	175.17
1497402	247712	05SULLIVAN	AEP	243216	05DARWIN	AEP	1	AEP_P1-2_#363	single	1195.0	122.91	131.65	DC	104.48
2207351	248000	06CLIFTY	OVEC	248001	06DEARB1	OVEC	1	AEP_P4_#1760_05JEFRSO765_A	breaker	956.0	109.86	114.26	DC	87.14
2207667	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	AEP_P1-2_#363	single	1451.0	156.63	157.75	DC	35.81
2207669	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	AEP_P1-2_#10136	single	1451.0	150.98	152.11	DC	36.06
1496839	346809	7CASEY	AMIL	247712	05SULLIVAN	AEP	1	AEP_P4_#3128_05EUGENE345_A2	breaker	1466.0	133.13	135.3	DC	31.63

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
1497918	242865	05JEFRSO	AEP	248000	06CLIFTY	OVEC	Z1	AEP_P1-2_#709	operation	2354.0	102.9	108.5	DC	256.14
1497591	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P1-2_#8905	operation	3452.0	121.99	136.74	DC	508.96
1497596	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	Base Case	operation	3452.0	113.6	128.0	DC	497.05
1497393	243216	05DARWIN	AEP	243221	05EUGENE	AEP	1	AEP_P1-2_#363	operation	1195.0	161.58	176.15	DC	174.13
1497365	247712	05SULLIVAN	AEP	346809	7CASEY	AMIL	1	AEP_P1-2_#363	operation	1466.0	187.77	207.68	DC	291.94
1497399	247712	05SULLIVAN	AEP	243216	05DARWIN	AEP	1	AEP_P1-2_#363	operation	1195.0	161.58	176.15	DC	174.13
1497539	247712	05SULLIVAN	AEP	254529	16PETE	IPL	1	AEP_P1-2_#363	operation	1409.0	129.59	144.21	DC	205.54
1497653	247712	05SULLIVAN	AEP	243217	05DEQUIN	AEP	1	AEP_P1-2_#363	operation	1318.0	120.13	128.99	DC	116.86
2207664	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	AEP_P1-2_#363	operation	1451.0	153.89	155.84	DC	59.68
1497616	346809	7CASEY	AMIL	247712	05SULLIVAN	AEP	1	AEP_P1-2_#286	operation	1466.0	128.0	130.02	DC	29.6
1497617	346809	7CASEY	AMIL	247712	05SULLIVAN	AEP	1	Base Case	operation	1334.0	111.67	113.83	DC	28.79

17 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
2207351	8	06CLIFTY 345.0 kV - 06DEARB1 345.0 kV Ckt 1	<u>OVEC</u> b2943 (914) : PJM Baseline Upgrade b2943. Perform a LIDAR study on the Clifty Creek - Dearborn 345 kV line to increase the Summer Emergency rating. The baseline project had a projected in-service date of 12/01/2018. Project Type : FAC Cost : \$0	\$0
1496746,1496745	7	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 [JEFFERSON TO CLIFTY]</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 <u>[SULLIVAN TO CASEY]</u> NonPJMArea (284) : The external (i.e. Non-PJM) Transmission Owner, AMIL, will not evaluate this violation until the impact study phase. Project Type : FAC Cost : \$0 Time Estimate : N/A Months	\$443,660,000
1496641,1497396,1497397	2	05DARWIN 345.0 kV - 05EUGENE 345.0 kV Ckt 1		
1497402,1497403,1496637	4	05SULLIVAN 345.0 kV - 05DARWIN 345.0 kV Ckt 1		
1497656,1496902	5	05SULLIVAN 345.0 kV - 05DEQUIN 345.0 kV Ckt 1		
1496603,1497369,1497368	3	05SULLIVAN 345.0 kV - 7CASEY 345.0 kV Ckt 1		
1497022	6	05JEFRSO 765.0 kV - 05JEFRSO 345.0 kV Ckt 2		
1496839	10	7CASEY 345.0 kV - 05SULLIVAN 345.0 kV Ckt 1		
2207667,2207669	9	7TRIMBLE CO 345.0 kV - 06CLIFTY 345.0 kV Ckt 1	<u>OVEC</u> This facility is owned by LGEE. <u>LGEE</u> NonPJMArea (903) : The external (i.e. Non-PJM) Transmission Owner, LGEE, will not evaluate this violation until the impact study phase.	\$0

ID	Index	Facility	Upgrade Description	Cost
1497600,1497602,1497597,1496760,1498106,1498107,1498105,1496758	1	05ROCKPT 765.0 kV - 05JEFRSO 765.0 kV Ckt 1	<u>1497597,1497600,1497602</u> No violation. AEP Ratings: [Rate A: 3970, Rate B: 3970] 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	\$460,810,000

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
1498105	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P7-1_#11042	tower	3452.0	135.53	150.23	DC	507.58

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	498.81
900405	X3-028 E	665.08
930041	AB1-006 C	0.58
930042	AB1-006 E	31.67
930461	AB1-087	182.9
930471	AB1-088	182.9
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	304.55
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	19.76
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	8.66
CARR	CARR	0.72
CATAWBA	CATAWBA	0.12
CBM-S1	CBM-S1	8.36
CBM-W1	CBM-W1	18.53
CBM-W2	CBM-W2	172.23
CIN	CIN	26.36
G-007	G-007	2.06
HAMLET	HAMLET	0.31
IPL	IPL	17.7
MEC	MEC	29.25
O-066	O-066	13.2
RENSSELAER	RENSSELAER	0.57
TRIMBLE	TRIMBLE	1.38
WEC	WEC	2.8
Z1-043	Z1-043	14.62

18.2 Index 2

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
1496641	243216	05DARWIN	AEP	243221	05EUGENE	AEP	1	AEP_P4_#8648_05JEFRS O 765_B	breaker	1195.0	162.49	177.08	DC	174.42

Bus #	Bus	MW Impact
243442	05RKG1	36.02
243443	05RKG2	34.54
900404	X3-028 C	327.06
900405	X3-028 E	436.08
930461	AB1-087	119.92
930471	AB1-088	119.92
933441	AC2-157 C	16.57
933442	AC2-157 E	27.04
941341	AE2-130 C	104.65
941342	AE2-130 E	69.77
942601	AE2-276	10.92
CARR	CARR	0.12
CBM-S1	CBM-S1	3.27
CBM-S2	CBM-S2	0.42
CBM-W2	CBM-W2	30.28
CPL	CPL	0.08
EDWARDS	EDWARDS	0.07
G-007	G-007	0.31
IPL	IPL	4.63
LGEE	LGEE	0.4
MEC	MEC	3.09
O-066	O-066	2.01
RENSSELAER	RENSSELAER	0.09
TILTON	TILTON	4.55

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 IMPACT
1496603	247712	05SULLIVAN	AEP	346809	7CASEY	AMIL	1	AEP_P4_#8648_05JEFRS O 765_B	breaker	1466.0	188.11	208.03	DC	292.1

Bus #	Bus	MW Impact
243442	05RKG1	60.33
243443	05RKG2	57.84
247900	05FR-11G E	4.0
247901	05FR-12G E	3.93
247902	05FR-21G E	4.2
247903	05FR-22G E	4.03
247904	05FR-3G E	8.15
247905	05FR-4G E	6.13
900404	X3-028 C	547.56
900405	X3-028 E	730.08
930461	AB1-087	200.77
930471	AB1-088	200.77
933441	AC2-157 C	27.74
933442	AC2-157 E	45.27
935271	AD1-137 C	3.32
935272	AD1-137 E	22.22
936972	AD2-131 E O1	2.62
939683	AE1-198 BAT	2.43
941341	AE2-130 C	175.26
941342	AE2-130 E	116.84
941732	AE2-173 BAT	1.44
942601	AE2-276	18.29
950161	J401	1.53
951731	J446 C	1.78
951732	J446 E	9.64
951811	J513 C	0.95
951812	J513 E	5.13
952471	J708	22.71
952801	J754 C	3.01
952802	J754 E	16.29
952811	J759	4.28
952861	J783 C	4.12
952862	J783 E	0.17
953101	J714 C	1.89
953102	J714 E	10.2
953161	J837 C	2.14
953162	J837 E	11.55
953171	J838 C	2.14
953172	J838 E	11.55
953351	J805	14.18
953501	J478 C	1.69
953502	J478 E	9.15

Bus #	Bus	MW Impact
953831	J842 C	2.24
953832	J842 E	12.13
953841	J843 C	2.37
953842	J843 E	12.84
953931	J856	5.42
954171	J883 C	0.69
954172	J883 E	3.74
954351	J903	6.77
954421	J913	13.68
954772	J515 E	26.69
AC1-056	AC1-056	12.08
CALDERWOOD	CALDERWOOD	1.23
CARR	CARR	0.01
CATAWBA	CATAWBA	0.49
CHEOAH	CHEOAH	1.11
CHILHOWEE	CHILHOWEE	0.4
CIN	CIN	8.3
COFFEEN	COFFEEN	8.31
COTTONWOOD	COTTONWOOD	10.75
DUCKCREEK	DUCKCREEK	7.21
EDWARDS	EDWARDS	2.8
FARMERCITY	FARMERCITY	2.39
G-007	G-007	0.07
HAMLET	HAMLET	0.71
IPL	IPL	11.83
LGEE	LGEE	0.92
MECS	MECS	1.17
NEWTON	NEWTON	34.02
O-066	O-066	0.44
PRAIRIE	PRAIRIE	31.39
RENSSELAER	RENSSELAER	0.01
SANTEETLA	SANTEETLA	0.32
SMITHLAND	SMITHLAND	1.22
TATANKA	TATANKA	3.69
TILTON	TILTON	1.7
TVA	TVA	6.59
UNIONPOWER	UNIONPOWER	3.59

18.4 Index 4

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
1496637	247712	05SULLIVAN	AEP	243216	05DARWIN	AEP	1	AEP_P4_#8648_05JEFRS O 765_B	breaker	1195.0	162.49	177.08	DC	174.42

Bus #	Bus	MW Impact
243442	05RKG1	36.02
243443	05RKG2	34.54
900404	X3-028 C	327.06
900405	X3-028 E	436.08
930461	AB1-087	119.92
930471	AB1-088	119.92
933441	AC2-157 C	16.57
933442	AC2-157 E	27.04
941341	AE2-130 C	104.65
941342	AE2-130 E	69.77
942601	AE2-276	10.92
CARR	CARR	0.12
CBM-S1	CBM-S1	3.27
CBM-S2	CBM-S2	0.42
CBM-W2	CBM-W2	30.28
CPLE	CPLE	0.08
EDWARDS	EDWARDS	0.07
G-007	G-007	0.31
IPL	IPL	4.63
LGEE	LGEE	0.4
MEC	MEC	3.09
O-066	O-066	2.01
RENSSELAER	RENSSELAER	0.09
TILTON	TILTON	4.55

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
1496902	247712	05SULLIVAN	AEP	243217	05DEQUIN	AEP	1	AEP_P4_#8648_05JEFRS O 765_B	breaker	1318.0	121.97	130.89	DC	117.52

Bus #	Bus	MW Impact
243442	05RKG1	24.27
243443	05RKG2	23.27
900404	X3-028 C	220.37
900405	X3-028 E	293.82
930461	AB1-087	80.8
930471	AB1-088	80.8
933441	AC2-157 C	11.17
933442	AC2-157 E	18.22
941341	AE2-130 C	70.51
941342	AE2-130 E	47.01
942601	AE2-276	7.36
CARR	CARR	0.09
CBM-S1	CBM-S1	5.3
CBM-S2	CBM-S2	0.87
CBM-W2	CBM-W2	58.17
CIN	CIN	7.09
CPLE	CPLE	0.23
G-007	G-007	0.23
IPL	IPL	6.58
LGEE	LGEE	1.1
MEC	MEC	5.66
O-066	O-066	1.51
RENSSELAER	RENSSELAER	0.07

18.6 Index 6

ID	FROM BUS#	FROM BUS	FRO M BUS AREA	TO BUS#	TO BUS	TO BUS ARE A	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
1497022	243208	05JEFRS O	AEP	242865	05JEFRS O	AEP	2	AEP_P4_#1760_05JEFRS O 765_A	break er	3039.0	94.13	106.83	DC	386.06

Bus #	Bus	MW Impact
243442	05RKG1	79.74
243443	05RKG2	76.44
900404	X3-028 C	353.71
900405	X3-028 E	471.62
930461	AB1-087	129.7
930471	AB1-088	129.7
933441	AC2-157 C	17.92
933442	AC2-157 E	29.24
941341	AE2-130 C	231.64
941342	AE2-130 E	154.43
942601	AE2-276	11.81
BLUEG	BLUEG	54.3
CALDERWOOD	CALDERWOOD	0.29
CANNELTON	CANNELTON	0.33
CARR	CARR	0.59
CATAWBA	CATAWBA	0.36
CBM-W1	CBM-W1	20.17
CBM-W2	CBM-W2	92.93
CHEOAH	CHEOAH	0.27
CHILHOWEE	CHILHOWEE	0.09
CIN	CIN	11.99
ELMERSMITH	ELMERSMITH	0.5
G-007	G-007	1.7
HAMLET	HAMLET	0.63
IPL	IPL	8.51
MEC	MEC	24.26
MECS	MECS	4.46
O-066	O-066	10.91
RENSSELAER	RENSSELAER	0.47
SANTEETLA	SANTEETLA	0.08
TRIMBLE	TRIMBLE	6.67
WEC	WEC	3.29
Z1-043	Z1-043	14.62

18.7 Index 7

ID	FROM BUS#	FROM BUS	FRO M BUS AREA	TO BUS#	TO BUS	TO BUS ARE A	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPAC T
1496745	242865	05JEFRS O	AEP	248000	06CLIFT Y	OVEC	Z1	AEP_P4_#1760_05JEFRS O 765_A	break er	2354.0	135.81	152.33	DC	386.06

Bus #	Bus	MW Impact
243442	05RKG1	79.74
243443	05RKG2	76.44
247900	05FR-11G E	6.14
247901	05FR-12G E	6.04
247902	05FR-21G E	6.46
247903	05FR-22G E	6.18
247904	05FR-3G E	12.53
247905	05FR-4G E	9.42
247906	05MDL-1G E	10.72
247907	05MDL-2G E	5.31
247912	05MDL-3G E	5.56
247913	05MDL-4G E	5.37
247943	T-127 E	5.37
276150	W2-048 E	1.04
290261	S-027 E	10.96
290265	S-028 E	10.96
296125	R-030 C3	2.11
296128	R-030 E3	8.46
296271	R-030 C2	2.09
296272	R-030 E2	8.36
296308	R-030 C1	2.09
296309	R-030 E1	8.36
900404	X3-028 C	353.71
900405	X3-028 E	471.62
905082	W4-005 E	22.57
909052	X2-022 E	14.48
915662	Y3-099 E	0.13
915672	Y3-100 E	0.13
917502	Z2-087 E	10.97
924041	AB2-047 C O1	2.07
924042	AB2-047 E O1	13.84
924261	AB2-070 C O1	1.98
924262	AB2-070 E O1	13.27
925242	AB2-178 E	1.33
925771	AC1-053 C	1.99
925772	AC1-053 E	13.32
926841	AC1-171 C O1	0.66
926842	AC1-171 E O1	4.42
930042	AB1-006 E	11.68
930461	AB1-087	129.7
930471	AB1-088	129.7
933441	AC2-157 C	17.92

Bus #	Bus	MW Impact
933442	AC2-157 E	29.24
935141	AD1-148	3.78
935271	AD1-137 C	5.1
935272	AD1-137 E	34.14
936771	AD2-100 C O1	10.19
936772	AD2-100 E O1	6.79
936972	AD2-131 E O1	2.14
937161	AD2-153 C O1	1.83
937162	AD2-153 E O1	8.55
937171	AD2-154 C O1	1.83
937172	AD2-154 E O1	8.55
937211	AD2-159 C	2.44
937212	AD2-159 E	11.42
939741	AE1-205 C O1	5.28
939742	AE1-205 E O1	7.3
940581	AE2-045 C O1	7.27
940582	AE2-045 E O1	9.99
941341	AE2-130 C	231.64
941342	AE2-130 E	154.43
941571	AE2-154 C	2.18
941572	AE2-154 E	14.59
941731	AE2-173	3.19
942111	AE2-223 C	1.23
942112	AE2-223 E	8.22
942481	AE2-261 C	14.79
942482	AE2-261 E	9.86
942601	AE2-276	11.81
954681	J949	13.19
954761	J468 C	2.45
954762	J468 E	9.81
BLUEG	BLUEG	54.3
CALDERWOOD	CALDERWOOD	0.29
CANNELTON	CANNELTON	0.33
CARR	CARR	0.59
CATAWBA	CATAWBA	0.36
CBM-W1	CBM-W1	20.17
CBM-W2	CBM-W2	92.93
CHEOAH	CHEOAH	0.27
CHILHOWEE	CHILHOWEE	0.09
CIN	CIN	11.99
ELMERSMITH	ELMERSMITH	0.5
G-007	G-007	1.7
HAMLET	HAMLET	0.63
IPL	IPL	8.51
MEC	MEC	24.26
MECS	MECS	4.46
O-066	O-066	10.91
RENSSELAER	RENSSELAER	0.47
SANTEETLA	SANTEETLA	0.08
TRIMBLE	TRIMBLE	6.67
WEC	WEC	3.29
Z1-043	Z1-043	14.62

18.8 Index 8

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
2207351	248000	06CLIFT Y	OVEC	248001	06DEARB1	OVEC	1	AEP_P4_#1760_05JEFRS O 765_A	breaker	956.0	109.87	114.27	DC	87.15

Bus #	Bus	MW Impact
930461	AB1-087	31.0
930471	AB1-088	31.0
933441	AC2-157 C	4.28
933442	AC2-157 E	6.99
941341	AE2-130 C	52.29
941342	AE2-130 E	18.48
942601	AE2-276	2.82
CARR	CARR	0.05
CBM-S1	CBM-S1	12.48
CBM-S2	CBM-S2	1.66
CBM-W1	CBM-W1	5.75
CBM-W2	CBM-W2	59.02
CIN	CIN	6.97
CPL	CPL	0.5
G-007	G-007	0.11
IPL	IPL	2.26
LGEE	LGEE	6.81
MEC	MEC	7.83
O-066	O-066	0.73
RENSSELAER	RENSSELAER	0.04
WEC	WEC	0.64

18.9 Index 9

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
2207667	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	AEP_P1-2_#363	single	1451.0	156.64	157.75	DC	35.82

Bus #	Bus	MW Impact
342900	1COOPER1 G	2.08
342903	1COOPER2 G	4.04
342918	1JKCT 1G	1.65
342921	1JKCT 2G	1.65
342924	1JKCT 3G	1.65
342927	1JKCT 4G	1.09
342930	1JKCT 5G	1.09
342933	1JKCT 6G	1.09
342936	1JKCT 7G	1.09
342939	1JKCT 9G	1.12
342942	1JKCT 10G	1.12
342945	1LAUREL 1G	1.18
900404	X3-028 C	112.03
925981	AC1-074 C O1	4.94
930461	AB1-087	41.08
930471	AB1-088	41.08
932551	AC2-075 C	1.17
933441	AC2-157 C	5.68
935011	AD1-134	8.71
936281	AD2-036 C	3.53
936381	AD2-048 C	4.32
936571	AD2-072 C O1	12.29
936821	AD2-105 C O1	3.59
936831	AD2-106 C O1	2.12
936841	AD2-107 C O1	1.42
939131	AE1-143 C	11.65
940041	AE1-246 C O1	14.54
940051	AE1-247 C O1	24.7
940831	AE2-071 C O1	3.68
941341	AE2-130 C	35.82
941411	AE2-138 C	18.35
941961	AE2-208	1.54
941981	AE2-210 C O1	6.45
942231	AE2-235 C O1	2.22
942411	AE2-254 C O1	4.88
942481	AE2-261 C	9.07
942591	AE2-275 C O1	8.29
942601	AE2-276	3.74
942891	AE2-308 C O1	13.79
943111	AE2-339 C	3.94
952471	J708	48.63
952811	J759	11.49

Bus #	Bus	MW Impact
952821	J762	35.64
952861	J783 C	10.9
953611	J800	16.58
953831	J842 C	3.57
953841	J843 C	3.84
953931	J856	11.02
CARR	CARR	0.23
CBM-S1	CBM-S1	45.85
CBM-S2	CBM-S2	4.68
CBM-W1	CBM-W1	9.44
CBM-W2	CBM-W2	190.69
CIN	CIN	28.78
CPLE	CPLE	1.3
IPL	IPL	15.36
LGEE	LGEE	27.66
MEC	MEC	20.02
RENSSELAER	RENSSELAER	0.18
WEC	WEC	1.45

18.10 Index 10

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
1496839	346809	7CASEY	AMIL	247712	05SULLIVAN	AEP	1	AEP_P4_#3128_05EUGENE 345_A2	breaker	1466.0	133.14	135.3	DC	31.63

Bus #	Bus	MW Impact
270859	PWR VTR EC;R	6.22
274650	KINCAID ;1U	11.68
274651	KINCAID ;2U	11.7
274832	U4-027	8.52
274853	TWINGROVE;U1	0.59
274854	TWINGROVE;U2	0.59
274859	EASYR;U1 E	6.79
274860	EASYR;U2 E	6.79
274890	CAYUG;1U E	10.12
274891	CAYUG;2U E	10.12
276150	W2-048 E	2.05
290021	O50 E	10.76
290051	GSG-6; E	5.67
290108	LEEDK;1U E	12.37
290261	S-027 E	19.34
290265	S-028 E	19.34
293516	O-009 E1	6.46
293517	O-009 E2	3.28
293518	O-009 E3	3.61
293644	O22 E1	4.89
293645	O22 E2	9.49
293715	O-029 E	6.64
293716	O-029 E	3.64
293717	O-029 E	3.35
293771	O-035 E	5.18
294401	BSHIL;1U E	7.07
294410	BSHIL;2U E	7.07
294763	P-046 E	5.37
295109	WESTBROOK E	3.03
295111	SUBLETTE E	1.65
296125	R-030 C3	3.33
296128	R-030 E3	13.32
296271	R-030 C2	3.29
296272	R-030 E2	13.17
296308	R-030 C1	3.29
296309	R-030 E1	13.17
905081	W4-005 C	0.77
905082	W4-005 E	42.58
909052	X2-022 E	28.48
916211	Z1-072 E	3.92
916221	Z1-073 E	2.92
917502	Z2-087 E	17.3

Bus #	Bus	MW Impact
918052	AA1-018 E	7.9
919221	AA1-146	11.63
919581	AA2-030	11.63
919621	AA2-039 C	1.72
919622	AA2-039 E	11.53
920272	AA2-123 E	1.22
924041	AB2-047 C O1	3.3
924042	AB2-047 E O1	22.08
924261	AB2-070 C O1	3.83
924262	AB2-070 E O1	25.66
924471	AB2-096	21.78
925161	AB2-173	2.07
925302	AB2-191 E	0.75
925581	AC1-033 C	1.16
925582	AC1-033 E	7.75
925771	AC1-053 C	3.87
925772	AC1-053 E	25.91
926431	AC1-114	1.29
926821	AC1-168 C O1	0.82
926822	AC1-168 E O1	5.53
926841	AC1-171 C O1	1.14
926842	AC1-171 E O1	7.6
927201	AC1-214 C O1	1.66
927202	AC1-214 E O1	5.28
927511	AC1-113 1	0.65
927521	AC1-113 2	0.65
927531	AC1-185 1	0.42
927541	AC1-185 2	0.42
927551	AC1-185 3	0.42
927561	AC1-185 4	0.42
927571	AC1-185 5	0.42
927581	AC1-185 6	0.42
927591	AC1-185 7	0.42
927601	AC1-185 8	0.42
930481	AB1-089	35.25
930741	AB1-122 1O1	34.87
932881	AC2-115 1	1.29
932891	AC2-115 2	1.29
932921	AC2-116	0.45
933341	AC2-147 C	0.54
933342	AC2-147 E	0.88
933911	AD1-013 C	0.99
933912	AD1-013 E	1.59
933931	AD1-016 C	0.46
933932	AD1-016 E	0.75
934051	AD1-031 C O1	2.35
934052	AD1-031 E O1	3.83
934101	AD1-039 1	3.42
934401	AD1-064 C O1	1.63
934402	AD1-064 E O1	7.64
934431	AD1-067 C	0.07
934432	AD1-067 E	0.3

Bus #	Bus	MW Impact
934651	AD1-096 C	0.51
934652	AD1-096 E	0.83
934701	AD1-098 C O1	3.76
934702	AD1-098 E O1	2.75
934871	AD1-116 C	0.46
934872	AD1-116 E	0.75
934971	AD1-129 C	0.47
934972	AD1-129 E	0.31
935001	AD1-133 C O1	14.09
935002	AD1-133 E O1	9.39
935141	AD1-148	7.44
936291	AD2-038 C O1	1.34
936292	AD2-038 E O1	8.97
936511	AD2-066 C O1	4.75
936512	AD2-066 E O1	3.16
936771	AD2-100 C O1	21.1
936772	AD2-100 E O1	14.07
936791	AD2-102 C	6.71
936792	AD2-102 E	6.45
936972	AD2-131 E O1	8.37
937001	AD2-134 C	1.48
937002	AD2-134 E	6.12
937161	AD2-153 C O1	3.2
937162	AD2-153 E O1	14.98
937171	AD2-154 C O1	3.2
937172	AD2-154 E O1	14.98
937211	AD2-159 C	4.6
937212	AD2-159 E	21.54
937311	AD2-172 C	1.41
937312	AD2-172 E	1.95
937331	AD2-176 C O1	3.65
937332	AD2-176 E O1	2.43
937531	AD2-214 C	3.23
937532	AD2-214 E	1.52
938851	AE1-113 C O1	4.87
938852	AE1-113 E O1	15.3
938861	AE1-114 C O1	2.16
938862	AE1-114 E O1	8.26
939051	AE1-134 1	0.9
939061	AE1-134 2	0.9
939321	AE1-163 C O1	3.37
939322	AE1-163 E O1	20.68
939401	AE1-172 C O1	4.01
939402	AE1-172 E O1	18.78
939631	AE1-193 C O1	5.74
939632	AE1-193 E O1	38.44
939681	AE1-198 C O1	17.05
939682	AE1-198 E O1	14.49
939691	AE1-199	1.29
939701	AE1-201 C	1.0
939702	AE1-201 E	0.22
939741	AE1-205 C O1	8.32

Bus #	Bus	MW Impact
939742	AE1-205 E O1	11.49
939861	AE1-222 1	38.51
939921	AE1-228 C O1	5.4
939922	AE1-228 E O1	3.6
940101	AE1-252 C O1	6.84
940102	AE1-252 E O1	4.56
940501	AE2-035 C	1.41
940502	AE2-035 E	1.95
940881	AE2-077 C	1.74
940882	AE2-077 E	2.84
941131	AE2-107 C	3.69
941132	AE2-107 E	2.46
941342	AE2-130 E	31.63
941731	AE2-173	5.09
942111	AE2-223 C	1.94
942112	AE2-223 E	12.98
942421	AE2-255 C O1	1.68
942422	AE2-255 E O1	5.04
942481	AE2-261 C	31.3
942482	AE2-261 E	20.87
942602	AE2-276 BAT	13.97
942651	AE2-281 C	0.48
942652	AE2-281 E	2.95
942991	AE2-321 C O1	4.09
942992	AE2-321 E O1	2.01
950291	J291	3.19
950701	J196 C	1.32
950702	J196 E	5.29
951001	J339	6.02
951741	J474 C	2.02
951742	J474 E	10.93
952251	J641	10.33
952271	J644	9.55
952321	J734	5.06
952651	J756 C	2.46
952652	J756 E	13.3
952871	J757 C	4.05
952872	J757 E	21.93
953371	J808	9.04
953401	J811	17.74
953431	J853	11.08
953641	J813	43.76
953651	J815	32.07
953671	J817	10.65
953741	J826 C	1.65
953742	J826 E	8.93
953801	J835 C	2.67
953802	J835 E	14.45
953851	J845 C	1.72
953852	J845 E	9.3
953881	J848 C	5.26
953882	J848 E	28.47

Bus #	Bus	MW Impact
953951	J859	9.76
954181	J884	7.65
954411	J912	14.22
954681	J949	38.88
954721	J750 C	2.1
954722	J750 E	11.37
954761	J468 C	7.07
954762	J468 E	28.29
990901	L-005 E	11.16
BLUEG	BLUEG	10.45
CARR	CARR	0.3
CBM-S1	CBM-S1	13.08
CBM-S2	CBM-S2	2.33
CBM-W1	CBM-W1	28.27
CBM-W2	CBM-W2	200.48
CIN	CIN	3.82
CPLE	CPLE	0.55
G-007	G-007	0.81
GIBSON	GIBSON	0.02
MEC	MEC	45.55
O-066	O-066	5.21
RENSSELAER	RENSSELAER	0.24
TRIMBLE	TRIMBLE	1.32
WEC	WEC	4.13
Z1-043	Z1-043	21.94

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_#286	CONTINGENCY 'AEP_P1-2_#286' OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1 / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1 END
AEP_P7-1_#11013	CONTINGENCY 'AEP_P7-1_#11013' OPEN BRANCH FROM BUS 243216 TO BUS 247712 CKT 1 / 243216 05DARWIN 345 247712 05SULLIVAN 345 1 OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 END
AEP_P1-2_#8905	CONTINGENCY 'AEP_P1-2_#8905' OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 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_#3128_05EUGENE 345_A2	CONTINGENCY 'AEP_P4_#3128_05EUGENE 345_A2' OPEN BRANCH FROM BUS 243221 TO BUS 249504 CKT 1 / 243221 05EUGENE 345 249504 08CAYSUB 345 1 OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1 / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 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

Contingency Name	Contingency Definition
AEP_P1-2_#10136	CONTINGENCY 'AEP_P1-2_#10136' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243209 TO BUS 243443 CKT 2 / 243209 05ROCKPT 765 243443 05RKG2 26.0 2 REMOVE UNIT 2H FROM BUS 243443 / 243443 05RKG2 26.0 REMOVE UNIT 2L FROM BUS 243443 / 243443 05RKG2 26.0 END
AEP_P4_#8906_05SULLIVAN 345_C	CONTINGENCY 'AEP_P4_#8906_05SULLIVAN 345_C' OPEN BRANCH FROM BUS 243216 TO BUS 247712 CKT 1 / 243216 05DARWIN 345 247712 05SULLIVAN 345 1 OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 END
AEP_P4_#8910_05DEQUIN 345_C	CONTINGENCY 'AEP_P4_#8910_05DEQUIN 345_C' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 2 / 243217 05DEQUIN 345 243878 05MEADOW 345 2 OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 END
AEP_P1-2_#363	CONTINGENCY 'AEP_P1-2_#363' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 END
AEP_P1-2_#1027	CONTINGENCY 'AEP_P1-2_#1027' OPEN BRANCH FROM BUS 248000 TO BUS 324114 CKT 1 / 248000 06CLIFTY 345 324114 7TRIMBLE CO 345 1 END
Base Case	
AEP_P4_#8648_05JEFRSO 765_B	CONTINGENCY 'AEP_P4_#8648_05JEFRSO 765_B' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243208 TO BUS 242865 CKT 2 / 243208 05JEFRSO 765 242865 05JEFRSO 345 2 OPEN BRANCH FROM BUS 242865 TO BUS 248000 CKT Z1 / 242865 05JEFRSO 345 248000 06CLIFTY 345 Z1 END
AEP_P7-1_#11022	CONTINGENCY 'AEP_P7-1_#11022' OPEN BRANCH FROM BUS 243216 TO BUS 243221 CKT 1 / 243216 05DARWIN 345 243221 05EUGENE 345 1 OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 END

Contingency Name	Contingency Definition
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
AEP_P4_#1760_05JEFRSO 765_A	CONTINGENCY 'AEP_P4_#1760_05JEFRSO 765_A' OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END

Short Circuit

21 Short Circuit

The following Breakers are overduty

None.