Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-320

ATLANTA 69 KV II

66.9 MW Capacity / 100 MW Energy

July, 2019

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

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

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

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

2 General

The Interconnection Customer (IC) has proposed a Solar generating facility located in Pickaway County, Ohio. The installed facilities will have a total capability of 100 MW with 66.9 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 1, 2022. **This study does not imply a TO commitment to this in-service date.**

Queue Number	**AE2-320**
Project Name	ATLANTA 69 KV II
State	Ohio
County	Pickaway
Transmission Owner	Dayton
MFO	100
MWE	100
MWC	66.9
Fuel	Solar
Basecase Study Year	2022

2.1 Point of Interconnection

AE2-320 will interconnect with the Dayton Power and Light Company transmission system at the Atlanta Substation 69kV bus. Presently Atlanta Substation consists of two 345 kV line feeds, a 345/69 kV transformer, and a single 69 kV line. Proposed interconnection projects AC1-068, AC1-069, AC1-165, AC1-166, and AE2-319 will expand the 69kV portion of the Atlanta Substation to a breaker and a half scheme. The AE2-320 project will require the installation of a fourth 69kV breaker-and-a-half bay. The last takeoff structure leaving the Atlanta Substation will be designated as the Point of Interconnection (POI). Dayton will own the takeoff structure and all attachment hardware. Customer will own the conductor terminating onto the structure.

Under the AE2-320 project, the IC will construct a single 69kV line up to the POI in the Atlanta 69 kV yard.

2.2 Cost Summary

The AE2-320 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrade	$0
Non Direct Connection Network Upgrades	$1,600,000
Total Costs	**$1,600,000**

In addition, the AE2-320 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	**$71,030,000**

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

3 Attachment Facilities

There are no Attachment Facilities required to support this interconnection.

This report assumes that the Interconnection Customer will construct and own the attachment line from its generating facility into the proposed Point of Interconnection as depicted on the one line diagram in Attachment 1. The IC will also be responsible for the fiber/OPGW that Dayton requires on the generator line for the communication assisted trip scheme.

The metering may be classified as an Attachment Facility in future study reports.

4 Direct Connection Cost Estimate

There are no Direct Connection facilities required to support this interconnection.

5 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 fourth 69kV breaker and a half bay and associated work.	$1,525,000
Protection System upgrades at Atlanta Substation	$75,000
Total Non-Direct Connection Facility Costs	**$1,600,000**

The substation non-direct work for the AE2-320 project is approximately $1,600,000. The scope of work at Dayton's Atlanta Substation involves installing a fourth breaker and a half bay, revenue class 69 kV metering, fiber line relaying, updated protection, and an RTU to interconnect the AE2-320 generation.

6 Schedule

Based on the extent of the Dayton Non-Direct Connection and Attachment upgrades required to support the AE2-320 project, it is expected to take a minimum of **24 months** from the date of a fully executed Interconnection Construction Service Agreement to complete the installation subject to market conditions and vendor lead times. This includes the requirement for the Interconnection Customer to make a preliminary payment to Dayton which funds the construction of the Non-Direct Connection facilities and the first three months of construction work in earnest for the Attachment Facility upgrades. It assumes that there will be no environmental or permitting issues to implement the Non-Direct Connection upgrades for this project and that all system outages will be allowed when requested.

7 Transmission Owner Analysis

Dayton identified the following violation on their lower voltage system:

Id	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	kV	CONT DESCRIPTION
L1	253100	09ATLNTA	DAY	253099	09ATLNTA	DAY	1	345.0/69.0	Loss of the Atlanta-Robinson 69kV line

8 Interconnection Customer Requirements

The Dayton Power and Light Company (DP&L) has prepared this Facilities Connection Requirements document to ensure compliance with North American Electric Reliability Council (NERC) Reliability Standards and applicable Regional Reliability Organization, sub regional, Power Pool, and individual Transmission Owner planning criteria and facility connection requirements in compliance to NERC Standard FAC-001-2. These connection requirements apply to all generation facilities, transmission facilities, and end-users connecting to the DP&L transmission system. Detailed information outlining DP&L interconnection requirements can be reviewed utilizing the following link:

https://www.pjm.com/~/media/planning/plan-standards/private-dayton/dayton-facilities-connection-requirements.ashx

9 Revenue Metering and SCADA Requirements

9.1 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.

9.2 Dayton Requirements

The Interconnection Customer will be required to comply with all Dayton Revenue Metering Requirements for Generation Interconnection Customers as outlined in the link below. The Revenue Metering Requirements may be found within the Dayton Power & Light Co. "Requirements for the Connection of Facilities to the Dayton Power & Light Co. Transmission System" document located at the following link:

http://www.pjm.com/~/media/planning/plan-standards/private-dayton/dayton-facilities-connection-requirements.ashx
http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx

10 Network Impacts

The Queue Project AE2-320 was evaluated as a 100.0 MW (Capacity 66.9 MW) injection at the Atlanta 69kV substation in the Dayton area. Project AE2-320 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-320 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

11 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
8985270	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	AEP_P1-2_#764	single	1195.0	97.71	100.84	DC	37.36

12 Multiple Facility Contingency

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

None

13 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
7430033	243453	05BEATTY	AEP	244022	05COLE	AEP	1	AEP_P4_#8094_05BIXBY 345_C	breaker	1203.0	114.81	117.25	DC	29.29
7430034	243453	05BEATTY	AEP	244022	05COLE	AEP	1	AEP_P4_#3195_05BEATTY 345_304E	breaker	1203.0	114.65	117.23	DC	30.97
7430126	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	1203.0	110.1	112.87	DC	33.32
7430127	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P4_#10715_05COLE 345_C	breaker	1203.0	108.03	110.67	DC	31.69
7430221	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P4_#2085_05BEATTY 345_304C	breaker	1372.0	101.38	102.1	DC	21.88
7430222	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P4_#2866_05BEATTY 345_304W	breaker	1372.0	101.52	102.24	DC	21.67
7431416	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	tower	1372.0	114.71	115.48	DC	23.3
7431417	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-B	tower	1372.0	112.62	113.38	DC	23.3
8984216	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	DAY_P2_GREENE_345	bus	1195.0	106.78	111.3	DC	53.9
8984650	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	AEP_P4_#6774_05MARQUI 345_D	breaker	1195.0	106.25	110.89	DC	55.43
8984651	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	AEP_P4_#2900_05MARQUI 345_D2	breaker	1195.0	102.71	107.38	DC	55.86
8985502	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	DAY_P7_34522 34598-A	tower	1195.0	106.64	111.23	DC	54.79
8985503	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	.345.DEO&K-DAY.C5 4511HILLCRESTSTUARTCLINTONSTUARTDPL-A	tower	1195.0	105.83	110.46	DC	55.14
7429323	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	DAY_P2_GREENE_345	bus	1372.0	116.84	120.77	DC	53.64
7430016	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	AEP_P4_#6774_05MARQUI 345_D	breaker	1372.0	118.55	122.59	DC	55.16
7430931	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	DAY_P1_34509-A-A	single	1372.0	112.96	115.61	DC	36.2
7430932	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	Base Case	single	1233.0	112.28	115.23	DC	36.2

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
7430933	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	DAY_P1_34522	single	1372.0	112.61	115.28	DC	36.57
7431390	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	.345.DEO&K-DAY.C5 4511HILLCRESTSTUA RTCLINTONSTUARTD PL-A	tower	1372.0	117.88	121.89	DC	54.88
7431391	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	DAY_P7_34522 34598-A	tower	1372.0	116.69	120.68	DC	54.53

14 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
7431056	243453	05BEATTY	AEP	244022	05COLE	AEP	1	AEP_P1-2_#713	operation	1203.0	106.9	109.34	DC	29.28
7431137	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P1-2_#10137	operation	1203.0	101.07	103.71	DC	31.69
7430917	253030	09GRNFLD	DAY	243598	05BCKSKI	AEP	1	DAY_P1_160_B3	operation	72.0	115.51	153.39	DC	27.28
7431131	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P1-2_#762	operation	1372.0	101.31	102.02	DC	21.66
8985266	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	DAY_P1_34509-A-A	operation	1195.0	102.66	107.21	DC	54.38
7430928	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	Base Case	operation	1233.0	113.48	117.88	DC	54.12
7430929	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	DAY_P1_34509-A-A	operation	1372.0	113.43	117.39	DC	54.12

15 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
7430222, 431417, 7430221, 7431416	1	09KILLEN 345.0 kV - 05MARQUI 345.0 kV Ckt 1	**AEPO0007a (116)** : Perform sag study on Don Marquis-Killen 345kV circuit, 32.1 miles of 2-983.1 ACAR 30/7 Rail 5 conductor. Since Killen will be retired, the conductor between Don Marquis and Stuart will become a complete circuit and the whole circuit will need to be sag studied. Perform sag study on Killen-Stuart 345kV circuit, 15.2 miles of 2-983.1 ACAR 30/7 Rail5 conductor. **Project Type** : FACILITY **Cost** : $190,000 **Time Estimate** : 6-12 Months **r190008 (359**) : Reconductor line with 795 ACCR high temperature conductor in a twin bundle **Project Type** : FACILITY **Cost :** $6,500,000 **Time Estimate** : 18.0 Months **r190009 (360**) : Replace 2000A wave trap with 3000A **Project Type** : FACILITY **Cost** : $100,000 **Time Estimate** : 12.0 Months **r190010 (361)** : Replace substation riser conductor with 2-1024.5 ACAR 30x7 **Project Type** : FACILITY **Cost** : $100,000 **Time Estimate** : 12.0 Months	$6,890,000
7430034, 7430033	3	05BEATTY 345.0 kV - 05COLE 345.0 kV Ckt 1	**AEPO0001a (102)** : Upgrade/Replace 3-345kV 1600A switches at Beatty station **Project Type** : FACILITY **Cost :** $1,500,000 **Time Estimate** : 12-18 Months **AEPO0001b (103**) : perform sag study on 9.7 miles of 2-954 ACSR 45/7 Rail on Beatty-Cole 345kV circuit **Project Type** : FACILITY Cost : $40,000 **Time Estimate :** 6-12 Months	$1,540,000

ID	Index	Facility	Upgrade Description	Cost
7430126, 7430127	4	05BEATTY 345.0 kV - 05BIXBY 345.0 kV Ckt 1	**AEPO0003a (108)** : Upgrade/Replace Three 345kV 1600A switches at Beatty station **Project Type** : FACILITY **Cost** : $1,500,000 **Time Estimate** : 12-18 Months	$1,500,000
8985270, 8984216, 8985502, 8985503, 8984651, 8984650	2	09ATLNTA 345.0 kV - 09ADKINS 345.0 kV Ckt 1	**r190011 (362)** : Replace metering equipment to increase thermal line rating **Project Type** : FACILITY **Cost** : $100,000 **Time Estimate** : 12.0 Months	$100,000
7430016, 7430933, 7430932, 7430931, 7429323, 7431390, 7431391	5	09ADKINS 345.0 kV - 05BEATTY 345.0 kV Ckt 1	**AEPO0004a (109)** : Rebuild 13.0 miles of 2-983.1 ACAR 30/7 Rail 5 conductor on Beatty-Adkins circuit (3.7 miles of double circuit construction). Bare minimum conductor is 2-1024.5 ACAR 30/7 Rail1 which provide no additional margin. Upgrade other elements previously rated by DP&L. Ratings validation of this equipment is currently underway. This will require relay upgrades at Beatty and Adkins. **Project Type** : FACILITY **Cost** : $55,000,000 **Time Estimat**e : 24-36 Months **AEPO0004b (110)** : Replace equipment at Adkins station formerly owned by DP&L that is now owned by AEP. Further investigation is required to see exactly what equipment is to be replaced and whether it can be simply re-rated according to AEP's standards. **Project Type** : FACILITY **Cost :** $1,000,000 **Time Estimate** : 36-48 Months	$56,000,000
L1	See TO Analysis	09ATLNTA 345.0 kV - 09ADKINS 69.0 kV Ckt 1	**r190012** : Add a second 250 MVA 345/69kV transformer **Project Type** : FACILITY **Cost** : $5,000,000 **Time Estimate** : 24 Months	$5,000,000
			TOTAL COST	**$71,030,000**

16 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.

16.1 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
7431416	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	tower	1372.0	114.71	115.48	DC	23.3

Bus #	Bus	MW Impact
253038	09KILLEN	298.51
253077	09STUART	478.92
902531	W2-040 C	0.7
902532	W2-040 E	1.13
904722	V4-073 E	0.15
913222	Y1-054 E	1.77
914372	Y2-111 E	1.12
915582	Y3-080 E	0.75
915662	Y3-099 E	0.16
915672	Y3-100 E	0.16
916182	Z1-065 E	0.54
916272	Z1-080 E	0.47
918802	AA1-099 E	0.31
925242	AB2-178 E	1.56
925921	AC1-068 C	7.92
925922	AC1-068 E	3.71
925931	AC1-069 C	7.92
925932	AC1-069 E	3.71
925981	AC1-074 C O1	7.04
925982	AC1-074 E O1	3.02
926061	AC1-085 C O1	34.6
926062	AC1-085 E O1	56.44
926101	AC1-089 C O1	4.35
926102	AC1-089 E O1	7.1
926791	AC1-165 C	7.83
926792	AC1-165 E	3.8
926801	AC1-166 C	7.83
926802	AC1-166 E	3.8
930062	AB1-014 E	13.64
931181	AB1-169	301.62
932462	AC2-066 E	0.44
932481	AC2-068 C	2.36
932482	AC2-068 E	3.86
932551	AC2-075 C	1.67
932552	AC2-075 E	0.84
932661	AC2-088 C O1	7.58
932662	AC2-088 E O1	6.24
935011	AD1-134	7.68
935031	AD1-136 C	1.07
935032	AD1-136 E	0.91
935041	AD1-140 C O1	7.32

Bus #	Bus	MW Impact
935042	AD1-140 E O1	6.06
936251	AD2-031 C O1	2.3
936252	AD2-031 E O1	3.76
936281	AD2-036 C	5.03
936282	AD2-036 E	2.51
936381	AD2-048 C	5.59
936382	AD2-048 E	2.79
936571	AD2-072 C O1	4.96
936572	AD2-072 E O1	2.43
937111	AD2-147 C O1	4.65
937112	AD2-147 E O1	6.41
937151	AD2-151 C O1	7.55
937152	AD2-151 E O1	10.43
938051	AE1-007 C	0.68
938052	AE1-007 E	1.1
938271	AE1-040 C O1	2.56
938272	AE1-040 E O1	1.29
938921	AE1-120	7.75
939141	AE1-144 C O1	13.3
939142	AE1-144 E O1	6.6
940531	AE2-038 C O1	8.87
940532	AE2-038 E O1	4.39
941411	AE2-138 C	26.57
941412	AE2-138 E	9.83
941511	AE2-148 C	43.93
941512	AE2-148 E	19.87
941981	AE2-210 C O1	9.04
941982	AE2-210 E O1	3.4
942061	AE2-218 C	8.21
942062	AE2-218 E	5.58
942091	AE2-221 C	32.57
942092	AE2-221 E	21.71
942231	AE2-235 C O1	6.33
942232	AE2-235 E O1	2.73
942411	AE2-254 C O1	2.36
942412	AE2-254 E O1	1.57
942521	AE2-267 C O1	2.99
942522	AE2-267 E O1	1.85
942591	AE2-275 C O1	6.97
942592	AE2-275 E O1	2.62
942781	AE2-296 O1	9.52
942891	AE2-308 C O1	11.94
942892	AE2-308 E O1	4.34
942951	AE2-315	2.31
942981	AE2-320 C O1	15.59
942982	AE2-320 E O1	7.71
943111	AE2-339 C	4.02
943112	AE2-339 E	1.98
943191	AE2-318 C	10.18
943192	AE2-318 E	4.97
943201	AE2-319 C O1	15.59
943202	AE2-319 E O1	7.71

Bus #	Bus	MW Impact
CARR	CARR	0.47
CATAWBA	CATAWBA	0.07
CBM-S1	CBM-S1	8.51
CBM-W1	CBM-W1	10.07
CBM-W2	CBM-W2	56.95
CIN	CIN	9.04
G-007	G-007	1.37
HAMLET	HAMLET	0.22
IPL	IPL	6.18
LGEE	LGEE	3.95
MEC	MEC	9.91
MECS	MECS	3.8
O-066	O-066	8.76
RENSSELAER	RENSSELAER	0.37
WEC	WEC	1.35

16.2 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
8985502	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	DAY_P7_34522 34598-A	tower	1195.0	106.64	111.23	DC	54.79

Bus #	Bus	MW Impact
253038	09KILLEN	67.5
253077	09STUART	259.27
342960	1SPURLK2G	7.12
342963	1SPURLK3G	3.74
342966	1SPURLK4G	3.74
925921	AC1-068 C	18.63
925922	AC1-068 E	8.71
925931	AC1-069 C	18.63
925932	AC1-069 E	8.71
925981	AC1-074 C O1	3.92
925982	AC1-074 E O1	1.68
926061	AC1-085 C O1	22.56
926062	AC1-085 E O1	36.81
926791	AC1-165 C	18.41
926792	AC1-165 E	8.93
926801	AC1-166 C	18.41
926802	AC1-166 E	8.93
930062	AB1-014 E	6.98
931181	AB1-169	163.28
932381	AC2-055 C	1.82
932382	AC2-055 E	2.97
932421	AC2-060 C	6.46
932422	AC2-060 E	3.63
932462	AC2-066 E	0.23
932551	AC2-075 C	0.93
932552	AC2-075 E	0.47
932651	AC2-087 C O1	4.79
932652	AC2-087 E O1	3.8
932661	AC2-088 C O1	4.0
932662	AC2-088 E O1	3.29
934491	AD1-073 C	1.33
934492	AD1-073 E	0.69
935031	AD1-136 C	0.56
935032	AD1-136 E	0.48
936251	AD2-031 C O1	1.75
936252	AD2-031 E O1	2.85
936281	AD2-036 C	2.8
936282	AD2-036 E	1.4
936381	AD2-048 C	3.14
936382	AD2-048 E	1.57
937151	AD2-151 C O1	3.84
937152	AD2-151 E O1	5.31

Bus #	Bus	MW Impact
938271	AE1-040 C O1	4.12
938272	AE1-040 E O1	2.07
938921	AE1-120	3.96
939141	AE1-144 C O1	7.37
939142	AE1-144 E O1	3.66
940531	AE2-038 C O1	4.91
940532	AE2-038 E O1	2.43
941411	AE2-138 C	14.76
941412	AE2-138 E	5.46
941981	AE2-210 C O1	5.02
941982	AE2-210 E O1	1.89
942091	AE2-221 C	26.72
942092	AE2-221 E	17.81
942231	AE2-235 C O1	3.53
942232	AE2-235 E O1	1.52
942981	AE2-320 C O1	36.66
942982	AE2-320 E O1	18.14
943111	AE2-339 C	2.26
943112	AE2-339 E	1.11
943191	AE2-318 C	5.14
943192	AE2-318 E	2.51
943201	AE2-319 C O1	36.66
943202	AE2-319 E O1	18.14
CARR	CARR	0.25
CBM-S1	CBM-S1	6.38
CBM-S2	CBM-S2	1.3
CBM-W1	CBM-W1	3.42
CBM-W2	CBM-W2	37.52
CIN	CIN	4.89
CPLE	CPLE	0.37
G-007	G-007	0.63
IPL	IPL	3.27
LGEE	LGEE	2.34
MEC	MEC	5.26
O-066	O-066	4.08
RENSSELAER	RENSSELAER	0.19
WEC	WEC	0.57

16.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7430034	243453	05BEATTY	AEP	244022	05COLE	AEP	1	AEP_P4_#3195_05BEATTY 345_304E	breaker	1203.0	114.65	117.23	DC	30.97

Bus #	Bus	MW Impact
247965	Y1-063 E	0.3
253038	09KILLEN	56.4
253077	09STUART	208.35
253110	09ADKINS	22.23
253261	09MON D	0.18
902531	W2-040 C	0.86
902532	W2-040 E	1.41
904722	V4-073 E	0.19
913222	Y1-054 E	1.51
914372	Y2-111 E	1.42
915582	Y3-080 E	0.95
915662	Y3-099 E	0.15
915672	Y3-100 E	0.15
916182	Z1-065 E	0.46
916272	Z1-080 E	0.48
918802	AA1-099 E	0.32
925242	AB2-178 E	1.44
925921	AC1-068 C	10.53
925922	AC1-068 E	4.92
925931	AC1-069 C	10.53
925932	AC1-069 E	4.92
925981	AC1-074 C O1	4.06
925982	AC1-074 E O1	1.74
926011	AC1-078 C O1	5.87
926012	AC1-078 E O1	9.79
926061	AC1-085 C O1	19.55
926062	AC1-085 E O1	31.89
926101	AC1-089 C O1	4.28
926102	AC1-089 E O1	6.99
926791	AC1-165 C	10.41
926792	AC1-165 E	5.05
926801	AC1-166 C	10.41
926802	AC1-166 E	5.05
930062	AB1-014 E	8.06
931181	AB1-169	131.22
932381	AC2-055 C	2.09
932382	AC2-055 E	3.41
932421	AC2-060 C	7.4
932422	AC2-060 E	4.17
932431	AC2-061 C	4.39
932432	AC2-061 E	4.45
932462	AC2-066 E	0.26

Bus #	Bus	MW Impact
932481	AC2-068 C	2.9
932482	AC2-068 E	4.75
932551	AC2-075 C	0.96
932552	AC2-075 E	0.49
932651	AC2-087 C O1	5.48
932652	AC2-087 E O1	4.35
932661	AC2-088 C O1	4.08
932662	AC2-088 E O1	3.36
934491	AD1-073 C	1.53
934492	AD1-073 E	0.79
934561	AD1-081 C	1.17
934562	AD1-081 E	0.61
935031	AD1-136 C	0.57
935032	AD1-136 E	0.49
935041	AD1-140 C O1	9.97
935042	AD1-140 E O1	8.24
936251	AD2-031 C O1	2.41
936252	AD2-031 E O1	3.93
936281	AD2-036 C	2.9
936282	AD2-036 E	1.45
936381	AD2-048 C	3.31
936382	AD2-048 E	1.65
937111	AD2-147 C O1	12.54
937112	AD2-147 E O1	17.32
937151	AD2-151 C O1	4.43
937152	AD2-151 E O1	6.12
938051	AE1-007 C	0.83
938052	AE1-007 E	1.36
938271	AE1-040 C O1	4.38
938272	AE1-040 E O1	2.2
938921	AE1-120	4.58
939141	AE1-144 C O1	6.94
939142	AE1-144 E O1	3.45
940531	AE2-038 C O1	4.63
940532	AE2-038 E O1	2.29
941411	AE2-138 C	14.23
941412	AE2-138 E	5.26
941511	AE2-148 C	156.01
941512	AE2-148 E	70.56
941771	AE2-180 C	5.29
941772	AE2-180 E	3.53
941981	AE2-210 C O1	4.86
941982	AE2-210 E O1	1.83
942061	AE2-218 C	9.45
942062	AE2-218 E	6.42
942091	AE2-221 C	24.82
942092	AE2-221 E	16.55
942231	AE2-235 C O1	3.46
942232	AE2-235 E O1	1.49
942521	AE2-267 C O1	2.68
942522	AE2-267 E O1	1.66
942781	AE2-296 O1	11.82

Bus #	Bus	MW Impact
942951	AE2-315	2.89
942981	AE2-320 C O1	20.72
942982	AE2-320 E O1	10.25
943111	AE2-339 C	2.28
943112	AE2-339 E	1.12
943191	AE2-318 C	6.6
943192	AE2-318 E	3.22
943201	AE2-319 C O1	20.72
943202	AE2-319 E O1	10.25
CARR	CARR	0.47
CBM-S1	CBM-S1	8.14
CBM-S2	CBM-S2	1.21
CBM-W1	CBM-W1	5.36
CBM-W2	CBM-W2	51.73
CIN	CIN	7.66
CPLE	CPLE	0.27
G-007	G-007	1.26
IPL	IPL	5.3
LGEE	LGEE	3.24
MEC	MEC	7.47
O-066	O-066	8.14
RENSSELAER	RENSSELAER	0.37
WEC	WEC	0.85

16.4 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
7430126	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	1203.0	110.1	112.87	DC	33.32

Bus #	Bus	MW Impact
253038	09KILLEN	52.29
253077	09STUART	214.43
253110	09ADKINS	24.08
253261	09MON D	0.21
902531	W2-040 C	0.97
902532	W2-040 E	1.58
904722	V4-073 E	0.21
913222	Y1-054 E	1.61
914372	Y2-111 E	1.61
915582	Y3-080 E	1.07
915662	Y3-099 E	0.15
915672	Y3-100 E	0.15
916182	Z1-065 E	0.5
916272	Z1-080 E	0.49
918802	AA1-099 E	0.32
925242	AB2-178 E	1.5
925921	AC1-068 C	11.33
925922	AC1-068 E	5.3
925931	AC1-069 C	11.33
925932	AC1-069 E	5.3
925981	AC1-074 C O1	4.21
925982	AC1-074 E O1	1.8
926011	AC1-078 C O1	8.49
926012	AC1-078 E O1	14.15
926061	AC1-085 C O1	20.6
926062	AC1-085 E O1	33.61
926101	AC1-089 C O1	4.17
926102	AC1-089 E O1	6.8
926791	AC1-165 C	11.2
926792	AC1-165 E	5.43
926801	AC1-166 C	11.2
926802	AC1-166 E	5.43
927182	AC1-212 E	1.27
930062	AB1-014 E	8.46
931181	AB1-169	135.05
932381	AC2-055 C	1.77
932382	AC2-055 E	2.89
932421	AC2-060 C	6.29
932422	AC2-060 E	3.54
932431	AC2-061 C	4.26
932432	AC2-061 E	4.32
932462	AC2-066 E	0.27

Bus #	Bus	MW Impact
932481	AC2-068 C	3.29
932482	AC2-068 E	5.39
932551	AC2-075 C	1.0
932552	AC2-075 E	0.5
932651	AC2-087 C O1	4.66
932652	AC2-087 E O1	3.7
932661	AC2-088 C O1	4.24
932662	AC2-088 E O1	3.49
932841	AC2-111 C O1	2.16
932842	AC2-111 E O1	3.52
934491	AD1-073 C	1.3
934492	AD1-073 E	0.67
934561	AD1-081 C	1.7
934562	AD1-081 E	0.87
935031	AD1-136 C	0.6
935032	AD1-136 E	0.51
935041	AD1-140 C O1	12.37
935042	AD1-140 E O1	10.23
936251	AD2-031 C O1	2.51
936252	AD2-031 E O1	4.09
936281	AD2-036 C	3.01
936282	AD2-036 E	1.5
936381	AD2-048 C	3.42
936382	AD2-048 E	1.71
937111	AD2-147 C O1	13.71
937112	AD2-147 E O1	18.93
937151	AD2-151 C O1	4.66
937152	AD2-151 E O1	6.43
938051	AE1-007 C	0.94
938052	AE1-007 E	1.54
938061	AE1-008 C	0.54
938062	AE1-008 E	0.88
938271	AE1-040 C O1	4.04
938272	AE1-040 E O1	2.03
938921	AE1-120	4.8
939141	AE1-144 C O1	7.14
939142	AE1-144 E O1	3.54
940531	AE2-038 C O1	4.76
940532	AE2-038 E O1	2.36
941411	AE2-138 C	14.74
941412	AE2-138 E	5.45
941511	AE2-148 C	169.93
941512	AE2-148 E	76.86
941771	AE2-180 C	7.08
941772	AE2-180 E	4.72
941941	AE2-206 C O1	2.91
941942	AE2-206 E O1	4.02
941981	AE2-210 C O1	5.04
941982	AE2-210 E O1	1.89
942051	AE2-217 C	10.75
942052	AE2-217 E	7.17
942061	AE2-218 C	11.36

Bus #	Bus	MW Impact
942062	AE2-218 E	7.72
942091	AE2-221 C	26.7
942092	AE2-221 E	17.8
942231	AE2-235 C O1	3.55
942232	AE2-235 E O1	1.54
942521	AE2-267 C O1	2.88
942522	AE2-267 E O1	1.78
942621	AE2-278 C	7.48
942622	AE2-278 E	4.99
942781	AE2-296 O1	13.29
942951	AE2-315	3.23
942981	AE2-320 C O1	22.29
942982	AE2-320 E O1	11.03
943111	AE2-339 C	2.36
943112	AE2-339 E	1.16
943191	AE2-318 C	6.94
943192	AE2-318 E	3.39
943201	AE2-319 C O1	22.29
943202	AE2-319 E O1	11.03
CARR	CARR	0.55
CBM-S1	CBM-S1	8.63
CBM-S2	CBM-S2	0.95
CBM-W1	CBM-W1	9.32
CBM-W2	CBM-W2	59.99
CIN	CIN	8.94
CPLE	CPLE	0.14
G-007	G-007	1.49
IPL	IPL	6.15
LGEE	LGEE	3.45
MEC	MEC	10.24
MECS	MECS	1.52
O-066	O-066	9.56
RENSSELAER	RENSSELAER	0.43
WEC	WEC	1.36

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7430016	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	AEP_P4_#6774_05MARQUI 345_D	breaker	1372.0	118.55	122.59	DC	55.16

Bus #	Bus	MW Impact
253038	09KILLEN	102.99
253077	09STUART	285.55
253110	09ADKINS	43.35
925921	AC1-068 C	18.75
925922	AC1-068 E	8.77
925931	AC1-069 C	18.75
925932	AC1-069 E	8.77
925981	AC1-074 C O1	4.26
925982	AC1-074 E O1	1.83
926061	AC1-085 C O1	19.32
926062	AC1-085 E O1	31.52
926791	AC1-165 C	18.53
926792	AC1-165 E	8.99
926801	AC1-166 C	18.53
926802	AC1-166 E	8.99
930062	AB1-014 E	7.76
931181	AB1-169	179.84
932381	AC2-055 C	1.61
932382	AC2-055 E	2.63
932421	AC2-060 C	5.71
932422	AC2-060 E	3.21
932462	AC2-066 E	0.25
932551	AC2-075 C	1.01
932552	AC2-075 E	0.51
932651	AC2-087 C O1	4.23
932652	AC2-087 E O1	3.35
932661	AC2-088 C O1	4.42
932662	AC2-088 E O1	3.64
934491	AD1-073 C	1.18
934492	AD1-073 E	0.61
935031	AD1-136 C	0.62
935032	AD1-136 E	0.53
936251	AD2-031 C O1	1.43
936252	AD2-031 E O1	2.34
936281	AD2-036 C	3.05
936282	AD2-036 E	1.52
936381	AD2-048 C	3.41
936382	AD2-048 E	1.7
937151	AD2-151 C O1	4.28
937152	AD2-151 E O1	5.91
938271	AE1-040 C O1	3.82
938272	AE1-040 E O1	1.92

Bus #	Bus	MW Impact
938921	AE1-120	4.4
939141	AE1-144 C O1	8.04
939142	AE1-144 E O1	3.99
940531	AE2-038 C O1	5.36
940532	AE2-038 E O1	2.66
941411	AE2-138 C	16.07
941412	AE2-138 E	5.94
941981	AE2-210 C O1	5.47
941982	AE2-210 E O1	2.06
942091	AE2-221 C	16.31
942092	AE2-221 E	10.88
942231	AE2-235 C O1	3.84
942232	AE2-235 E O1	1.66
942981	AE2-320 C O1	36.9
942982	AE2-320 E O1	18.26
943111	AE2-339 C	2.45
943112	AE2-339 E	1.2
943191	AE2-318 C	5.73
943192	AE2-318 E	2.8
943201	AE2-319 C O1	36.9
943202	AE2-319 E O1	18.26
CARR	CARR	0.39
CBM-S1	CBM-S1	6.15
CBM-S2	CBM-S2	0.73
CBM-W1	CBM-W1	3.31
CBM-W2	CBM-W2	36.43
CIN	CIN	5.15
CPLE	CPLE	0.12
G-007	G-007	1.05
IPL	IPL	3.48
LGEE	LGEE	2.48
MEC	MEC	5.14
O-066	O-066	6.75
RENSSELAER	RENSSELAER	0.31
WEC	WEC	0.57

Affected Systems

17 Affected Systems

17.1 LG&E

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

17.2 MISO

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

17.3 TVA

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

17.4 Duke Energy Progress

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

17.5 NYISO

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

Contingency Name	Contingency Definition
.345.DEO&K-DAY.C5 4511HILLCRESTSTUARTCLINTONSTUARTDPL-A	CONTINGENCY '.345.DEO&K-DAY.C5 4511HILLCRESTSTUARTCLINTONSTUARTDPL-A' OPEN BRANCH FROM BUS 253077 TO BUS 249578 CKT 1 OPEN BRANCH FROM BUS 926060 TO BUS 253077 CKT 1 END
AEP_P4_#8094_05BIXBY 345_C	CONTINGENCY 'AEP_P4_#8094_05BIXBY 345_C' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 941520 TO BUS 243454 CKT 1 / 941520 AE2-149 TAP 345 243454 05BIXBY 345 1 /* CONTINGENCY LINE ADDED FOR AE2 BUILD END
DAY_P2_GREENE_345	CONTINGENCY 'DAY_P2_GREENE_345' OPEN BRANCH FROM BUS 253027 TO BUS 253248 CKT 1 / 253027 09GREENE 345 253027 09SCHARL 345 1 OPEN BRANCH FROM BUS 253006 TO BUS 253027 CKT 1 / 253006 09BATH 345 253027 09GREENE 345 1 OPEN BRANCH FROM BUS 253014 TO BUS 253027 CKT 1 / 253014 09CLINTO 345 253027 09GREENE 345 1 OPEN BRANCH FROM BUS 253027 TO BUS 253079 CKT 1 / 253027 09GREENE 345 253079 09SUGRCK 345 1 OPEN BRANCH FROM BUS 253027 TO BUS 253026 CKT 1 / 253027 09GREENE 345 253026 09GREENE 138 1 OPEN BRANCH FROM BUS 253027 TO BUS 253026 CKT 2 / 253027 09GREENE 345 253026 09GREENE 138 2 END
AEP_P4_#2866_05BEATTY 345_304W	CONTINGENCY 'AEP_P4_#2866_05BEATTY 345_304W' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 243469 CKT 3 / 243453 05BEATTY 345 243469 05BEATTY 138 3 END
DAY_P1_34509-A-A	CONTINGENCY 'DAY_P1_34509-A-A' OPEN BRANCH FROM BUS 253014 TO BUS 942090 CKT 1 / 253014 09CLINTO 345 942090 AE2-221 TAP 345 1 END
AEP_P4_#2900_05MARQUI 345_D2	CONTINGENCY 'AEP_P4_#2900_05MARQUI 345_D2' OPEN BRANCH FROM BUS 242938 TO BUS 248003 CKT 1 / 242938 05MARQUI 345 248003 06DOE530 345 1 OPEN BRANCH FROM BUS 242938 TO BUS 253038 CKT 1 / 242938 05MARQUI 345 253038 09KILLEN 345 1 OPEN BRANCH FROM BUS 242938 TO BUS 243034 CKT 3 / 242938 05MARQUI 345 243034 05MARQUI 138 3 END

Contingency Name	Contingency Definition
DAY_P1_34522	CONTINGENCY 'DAY_P1_34522' OPEN BRANCH FROM BUS 253014 TO BUS 253027 CKT 1 / 253014 09CLINTO 345 253027 09GREENE 345 1 OPEN BRANCH FROM BUS 253014 TO BUS 253013 CKT 1 / 253014 09CLINTO 345 253013 09CLINTO 69 1 OPEN BRANCH FROM BUS 253014 TO BUS 253013 CKT 2 / 253014 09CLINTO 345 253013 09CLINTO 69 2 END
AEP_P1-2_#10137	CONTINGENCY 'AEP_P1-2_#10137' OPEN BRANCH FROM BUS 243453 TO BUS 244022 CKT 1 / 243453 05BEATTY 345 244022 05COLE 345 1 END
Base Case	
DAY_P7_34522 34598-A	CONTINGENCY 'DAY_P7_34522 34598-A' OPEN BRANCH FROM BUS 249566 TO BUS 253006 CKT 1 / 249566 08FOSTER 345 253006 09BATH 345 1 OPEN BRANCH FROM BUS 253014 TO BUS 253027 CKT 1 / 253014 09CLINTO 345 253027 09GREENE 345 1 OPEN BRANCH FROM BUS 253014 TO BUS 253013 CKT 1 / 253014 09CLINTO 345 253013 09CLINTO 69 1 OPEN BRANCH FROM BUS 253014 TO BUS 942090 CKT 1 / 253014 09CLINTO 345 942090 AE2-221 TAP 345 1 END
AEP_P4_#2085_05BEATTY 345_304C	CONTINGENCY 'AEP_P4_#2085_05BEATTY 345_304C' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END
DAY_P1_160_B3	CONTINGENCY 'DAY_P1_160_B3' OPEN BRANCH FROM BUS 253110 TO BUS 253100 CKT 1 / 253110 09ADKINS 345 253100 09ATLNTA 345 1 OPEN BRANCH FROM BUS 253100 TO BUS 253099 CKT 1 / 253100 09ATLNTA 345 253099 09ATLNTA 69.0 1 END
AEP_P1-2_#713	CONTINGENCY 'AEP_P1-2_#713' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 END
AEP_P4_#10715_05COLE 345_C	CONTINGENCY 'AEP_P4_#10715_05COLE 345_C' OPEN BRANCH FROM BUS 244022 TO BUS 243457 CKT 1 / 244022 05COLE 345 243457 05HAYDEN 345 1 OPEN BRANCH FROM BUS 244022 TO BUS 244023 CKT 1 / 244022 05COLE 345 244023 05COLE 138 1 END

Contingency Name	Contingency Definition
DAY_P7_BEATTY-S. CHARLESTON 34542_1-B	CONTINGENCY 'DAY_P7_BEATTY-S. CHARLESTON 34542_1-B' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 OPEN BRANCH FROM BUS 941510 TO BUS 253248 CKT 1 / 941510 AE2-148 TAP 345 253248 09SCHARL 345 1 END
DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	CONTINGENCY 'DAY_P7_BEATTY-S. CHARLESTON 34542_1-A' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 941510 CKT 1 / 243453 05BEATTY 345 941510 AE2-148 TAP 345 1 END
AEP_P1-2_#762	CONTINGENCY 'AEP_P1-2_#762' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END
AEP_P4_#6774_05MARQUI 345_D	CONTINGENCY 'AEP_P4_#6774_05MARQUI 345_D' OPEN BRANCH FROM BUS 246888 TO BUS 242938 CKT 1 / 246888 05BIERSR 345 242938 05MARQUI 345 1 OPEN BRANCH FROM BUS 242938 TO BUS 253038 CKT 1 / 242938 05MARQUI 345 253038 09KILLEN 345 1 END
AEP_P1-2_#764	CONTINGENCY 'AEP_P1-2_#764' OPEN BRANCH FROM BUS 242938 TO BUS 253038 CKT 1 / 242938 05MARQUI 345 253038 09KILLEN 345 1 END
AEP_P4_#3196_05BEATTY 345_302E	CONTINGENCY 'AEP_P4_#3196_05BEATTY 345_302E' OPEN BRANCH FROM BUS 243453 TO BUS 244022 CKT 1 / 243453 05BEATTY 345 244022 05COLE 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 243468 CKT 4 / 243453 05BEATTY 345 243468 05BEATTX 138 4 END
AEP_P4_#3195_05BEATTY 345_304E	CONTINGENCY 'AEP_P4_#3195_05BEATTY 345_304E' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 243468 CKT 4 / 243453 05BEATTY 345 243468 05BEATTX 138 4 END

Short Circuit

18 Short Circuit

The following Breakers are over duty

None.

OPTION 2 Network Impacts

The Queue Project AE2-320 was evaluated as a 100.0 MW (Capacity 66.9 MW) injection at the Atlanta 345 kV substation in the Dayton area. Project AE2-320 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-320 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

19 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
7431132	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P1-2_#762	single	1372.0	99.36	100.56	DC	16.38
8985270	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	AEP_P1-2_#764	single	1195.0	98.15	101.82	DC	43.85

20 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
7431132	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P1-2_#762	single	1372.0	99.36	100.56	DC	16.38
8985270	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	AEP_P1-2_#764	single	1195.0	98.15	101.82	DC	43.85

21 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
7430033	243453	05BEATTY	AEP	244022	05COLE	AEP	1	AEP_P4_#8094_05BIXBY 345_C	breaker	1203.0	116.67	119.33	DC	32.01
7430034	243453	05BEATTY	AEP	244022	05COLE	AEP	1	AEP_P4_#3195_05BEATTY 345_304E	breaker	1203.0	116.77	119.6	DC	33.95
7430126	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	1203.0	111.5	114.56	DC	36.69
7430127	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P4_#10715_05COLE 345_C	breaker	1203.0	110.77	113.67	DC	34.88
7430221	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P4_#2085_05BEATTY 345_304C	breaker	1372.0	103.33	105.13	DC	24.67
7430222	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P4_#2866_05BEATTY 345_304W	breaker	1372.0	101.78	102.58	DC	24.49
7431416	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	tower	1372.0	116.26	118.15	DC	25.94
7431417	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-B	tower	1372.0	114.14	116.03	DC	25.94
8984216	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	DAY_P2_GREENE_345	bus	1195.0	107.72	113.01	DC	63.16
8984650	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	AEP_P4_#6774_05MARQUI 345_D	breaker	1195.0	106.64	112.09	DC	65.13
8984651	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	AEP_P4_#2900_05MARQUI 345_D2	breaker	1195.0	103.08	108.56	DC	65.56
8985502	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	DAY_P7_34522 34598-A	tower	1195.0	107.2	112.59	DC	64.34

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
8985503	253100	09ATLN TA	DAY	253110	09ADKINS	DAY	1	.345.DEO&K-DAY.C5 4511HILLCRESTSTUARTC LINTONSTUARTDPL-A	tower	1195.0	105.82	111.29	DC	65.32
7429323	253110	09ADKI NS	DAY	243453	05BEATTY	AEP	1	DAY_P2_GREENE_345	bus	1372.0	116.91	121.51	DC	62.9
7430016	253110	09ADKI NS	DAY	243453	05BEATTY	AEP	1	AEP_P4_#6774_05MAR QUI 345_D	breaker	1372.0	119.08	123.83	DC	64.86
7430931	253110	09ADKI NS	DAY	243453	05BEATTY	AEP	1	DAY_P1_34509-A-A	single	1372.0	113.4	116.53	DC	42.87
7430932	253110	09ADKI NS	DAY	243453	05BEATTY	AEP	1	Base Case	single	1233.0	112.48	115.94	DC	42.63
7430933	253110	09ADKI NS	DAY	243453	05BEATTY	AEP	1	DAY_P1_34522	single	1372.0	113.01	116.15	DC	42.93
7431390	253110	09ADKI NS	DAY	243453	05BEATTY	AEP	1	.345.DEO&K-DAY.C5 4511HILLCRESTSTUARTC LINTONSTUARTDPL-A	tower	1372.0	118.39	123.15	DC	65.06
7431391	253110	09ADKI NS	DAY	243453	05BEATTY	AEP	1	DAY_P7_34522 34598-A	tower	1372.0	117.46	122.15	DC	64.07

22 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
7431056	243453	05BEATTY	AEP	244022	05COLE	AEP	1	AEP_P1-2_#713	operation	1203.0	108.94	111.61	DC	32.07
7431137	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P1-2_#10137	operation	1203.0	103.79	106.7	DC	34.87
7431131	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P1-2_#762	operation	1372.0	101.56	102.37	DC	24.48
8985266	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	DAY_P1_34509-A-A	operation	1195.0	103.27	108.66	DC	64.34
7430928	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	Base Case	operation	1233.0	113.62	118.79	DC	63.73
7430929	253110	09ADKINS	DAY	243453	05BEATTY	AEP	1	DAY_P1_34509-A-A	operation	1372.0	114.01	118.7	DC	64.07

23 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.

23.1 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
7431416	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	tower	1372.0	116.26	118.15	DC	25.94

Bus #	Bus	MW Impact
253038	09KILLEN	298.8
253077	09STUART	479.97
902531	W2-040 C	0.71
902532	W2-040 E	1.15
904722	V4-073 E	0.15
913222	Y1-054 E	1.79
914372	Y2-111 E	1.14
915582	Y3-080 E	0.76
915662	Y3-099 E	0.16
915672	Y3-100 E	0.16
916182	Z1-065 E	0.54
916272	Z1-080 E	0.47
918802	AA1-099 E	0.32
925242	AB2-178 E	1.57
925921	AC1-068 C	7.95
925922	AC1-068 E	3.72
925931	AC1-069 C	7.95
925932	AC1-069 E	3.72
925981	AC1-074 C O1	7.06
925982	AC1-074 E O1	3.03
926061	AC1-085 C O1	34.71
926062	AC1-085 E O1	56.64
926101	AC1-089 C O1	4.38
926102	AC1-089 E O1	7.15
926791	AC1-165 C	7.85
926792	AC1-165 E	3.81
926801	AC1-166 C	7.85
926802	AC1-166 E	3.81
930062	AB1-014 E	13.7
931181	AB1-169	302.28
932462	AC2-066 E	0.44
932481	AC2-068 C	2.39
932482	AC2-068 E	3.91
932551	AC2-075 C	1.68
932552	AC2-075 E	0.85
932661	AC2-088 C O1	7.6
932662	AC2-088 E O1	6.26
935011	AD1-134	7.71
935031	AD1-136 C	1.07
935032	AD1-136 E	0.91
935041	AD1-140 C O1	7.66

Bus #	Bus	MW Impact
935042	AD1-140 E O1	6.33
936251	AD2-031 C O1	2.32
936252	AD2-031 E O1	3.79
936281	AD2-036 C	5.05
936282	AD2-036 E	2.52
936381	AD2-048 C	5.61
936382	AD2-048 E	2.8
936571	AD2-072 C O1	4.99
936572	AD2-072 E O1	2.44
937111	AD2-147 C O1	4.7
937112	AD2-147 E O1	6.49
937151	AD2-151 C O1	7.58
937152	AD2-151 E O1	10.47
938051	AE1-007 C	0.68
938052	AE1-007 E	1.12
938271	AE1-040 C O1	2.58
938272	AE1-040 E O1	1.3
938921	AE1-120	7.78
939141	AE1-144 C O1	13.34
939142	AE1-144 E O1	6.62
940531	AE2-038 C O2	8.36
940532	AE2-038 E O2	4.17
941411	AE2-138 C O2	26.31
941412	AE2-138 E O2	9.73
941511	AE2-148 C	44.43
941512	AE2-148 E	20.09
941981	AE2-210 C O2	9.19
941982	AE2-210 E O2	3.46
942061	AE2-218 C	8.32
942062	AE2-218 E	5.65
942091	AE2-221 C	32.74
942092	AE2-221 E	21.83
942231	AE2-235 C O2	7.89
942232	AE2-235 E O2	3.41
942411	AE2-254 C O2	2.38
942412	AE2-254 E O2	1.58
942521	AE2-267 C O2	2.92
942522	AE2-267 E O2	1.8
942591	AE2-275 C O2	6.92
942592	AE2-275 E O2	2.6
942781	AE2-296 O2	9.74
942891	AE2-308 C O1	11.55
942892	AE2-308 E O1	4.2
942951	AE2-315	2.34
942981	AE2-320 C O2	17.35
942982	AE2-320 E O2	8.59
943111	AE2-339 C	4.03
943112	AE2-339 E	1.98
943191	AE2-318 C	10.23
943192	AE2-318 E	4.99
943201	AE2-319 C O2	17.35
943202	AE2-319 E O2	8.59

Bus #	Bus	MW Impact
CARR	CARR	0.48
CATAWBA	CATAWBA	0.07
CBM-S1	CBM-S1	8.57
CBM-W1	CBM-W1	10.14
CBM-W2	CBM-W2	57.35
CIN	CIN	9.1
G-007	G-007	1.38
HAMLET	HAMLET	0.22
IPL	IPL	6.22
LGEE	LGEE	3.97
MEC	MEC	9.98
MECS	MECS	3.82
O-066	O-066	8.83
RENSSELAER	RENSSELAER	0.38
WEC	WEC	1.36

23.2 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
8984216	253100	09ATLNTA	DAY	253110	09ADKINS	DAY	1	DAY_P2_GREENE_345	bus	1195.0	107.72	113.01	DC	63.16

Bus #	Bus	MW Impact
253038	09KILLEN	68.08
253077	09STUART	262.13
342957	1SPURLK1G	3.99
342960	1SPURLK2G	7.33
342963	1SPURLK3G	3.85
342966	1SPURLK4G	3.85
920061	AA2-100	0.06
925921	AC1-068 C	18.33
925922	AC1-068 E	8.57
925931	AC1-069 C	18.33
925932	AC1-069 E	8.57
925981	AC1-074 C O1	4.15
925982	AC1-074 E O1	1.78
926061	AC1-085 C O1	22.51
926062	AC1-085 E O1	36.73
926791	AC1-165 C	18.11
926792	AC1-165 E	8.79
926801	AC1-166 C	18.11
926802	AC1-166 E	8.79
930062	AB1-014 E	7.51
931181	AB1-169	165.09
932381	AC2-055 C	1.88
932382	AC2-055 E	3.06
932421	AC2-060 C	6.65
932422	AC2-060 E	3.74
932462	AC2-066 E	0.24
932551	AC2-075 C	0.99
932552	AC2-075 E	0.5
932651	AC2-087 C O1	4.93
932652	AC2-087 E O1	3.91
932661	AC2-088 C O1	4.2
932662	AC2-088 E O1	3.46
934491	AD1-073 C	1.37
934492	AD1-073 E	0.71
935031	AD1-136 C	0.59
935032	AD1-136 E	0.5
936251	AD2-031 C O1	2.25
936252	AD2-031 E O1	3.67
936281	AD2-036 C	2.97
936282	AD2-036 E	1.48

Bus #	Bus	MW Impact
936381	AD2-048 C	3.34
936382	AD2-048 E	1.67
937151	AD2-151 C O1	4.13
937152	AD2-151 E O1	5.71
938271	AE1-040 C O1	4.2
938272	AE1-040 E O1	2.11
938921	AE1-120	4.26
939141	AE1-144 C O1	7.66
939142	AE1-144 E O1	3.8
940531	AE2-038 C O2	4.85
940532	AE2-038 E O2	2.42
941411	AE2-138 C O2	15.24
941412	AE2-138 E O2	5.64
941981	AE2-210 C O2	5.31
941982	AE2-210 E O2	2.0
942091	AE2-221 C	26.3
942092	AE2-221 E	17.53
942231	AE2-235 C O2	4.45
942232	AE2-235 E O2	1.92
942981	AE2-320 C O2	42.25
942982	AE2-320 E O2	20.91
943111	AE2-339 C	2.38
943112	AE2-339 E	1.17
943191	AE2-318 C	5.67
943192	AE2-318 E	2.77
943201	AE2-319 C O2	42.25
943202	AE2-319 E O2	20.91
CARR	CARR	0.3
CBM-S1	CBM-S1	7.16
CBM-S2	CBM-S2	1.35
CBM-W1	CBM-W1	4.69
CBM-W2	CBM-W2	43.69
CIN	CIN	5.88
CPLE	CPLE	0.37
G-007	G-007	0.78
IPL	IPL	3.97
LGEE	LGEE	2.66
MEC	MEC	6.42
O-066	O-066	5.02
RENSSELAER	RENSSELAER	0.24
WEC	WEC	0.74

23.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7430321	243454	05BIXBY	AEP	243459	05KIRK	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	783.0	97.81	99.78	DC	16.02

Bus #	Bus	MW Impact
253038	09KILLEN	42.35
253077	09STUART	126.23
253110	09ADKINS	10.34
902531	W2-040 C	0.49
902532	W2-040 E	0.79
904722	V4-073 E	0.11
914372	Y2-111 E	0.79
915582	Y3-080 E	0.53
916272	Z1-080 E	0.33
918802	AA1-099 E	0.22
924351	AB2-083 C O1	2.74
924352	AB2-083 E O1	1.29
924371	AB2-085 C O1	3.43
924372	AB2-085 E O1	1.62
925341	AC1-001 C O1	5.47
925342	AC1-001 E O1	2.58
925921	AC1-068 C	5.1
925922	AC1-068 E	2.39
925931	AC1-069 C	5.1
925932	AC1-069 E	2.39
926011	AC1-078 C O1	4.67
926012	AC1-078 E O1	7.79
926061	AC1-085 C O1	11.37
926062	AC1-085 E O1	18.54
926101	AC1-089 C O1	3.11
926102	AC1-089 E O1	5.08
926791	AC1-165 C	5.04
926792	AC1-165 E	2.45
926801	AC1-166 C	5.04
926802	AC1-166 E	2.45
930062	AB1-014 E	4.88
931181	AB1-169	79.5
932201	AC2-029 C	2.83
932202	AC2-029 E	4.62
932381	AC2-055 C	1.82
932382	AC2-055 E	2.96
932411	AC2-059 C	7.39
932412	AC2-059 E	7.63
932421	AC2-060 C	6.44
932422	AC2-060 E	3.62
932431	AC2-061 C	3.23
932432	AC2-061 E	3.27

Bus #	Bus	MW Impact
932462	AC2-066 E	0.16
932481	AC2-068 C	1.63
932482	AC2-068 E	2.67
932651	AC2-087 C O1	4.77
932652	AC2-087 E O1	3.78
932661	AC2-088 C O1	2.5
932662	AC2-088 E O1	2.06
934481	AD1-072 C	1.62
934482	AD1-072 E	0.74
934491	AD1-073 C	1.33
934492	AD1-073 E	0.68
934561	AD1-081 C	0.93
934562	AD1-081 E	0.48
935031	AD1-136 C	0.35
935032	AD1-136 E	0.3
935041	AD1-140 C O1	6.05
935042	AD1-140 E O1	5.0
936111	AD2-016 C	7.39
936112	AD2-016 E	7.63
936251	AD2-031 C O1	1.47
936252	AD2-031 E O1	2.4
937111	AD2-147 C O1	5.94
937112	AD2-147 E O1	8.2
937151	AD2-151 C O1	2.67
937152	AD2-151 E O1	3.69
937231	AD2-162 C	8.46
937232	AD2-162 E	4.15
938051	AE1-007 C	0.47
938052	AE1-007 E	0.76
938271	AE1-040 C O1	3.29
938272	AE1-040 E O1	1.66
938921	AE1-120	2.77
939141	AE1-144 C O1	4.39
939142	AE1-144 E O1	2.18
940531	AE2-038 C O2	2.83
940532	AE2-038 E O2	1.41
941511	AE2-148 C	71.66
941512	AE2-148 E	32.41
941521	AE2-149 C	61.53
941522	AE2-149 E	22.93
941771	AE2-180 C	4.04
941772	AE2-180 E	2.69
942051	AE2-217 C	5.5
942052	AE2-217 E	3.67
942061	AE2-218 C	5.33
942062	AE2-218 E	3.62
942091	AE2-221 C	13.91
942092	AE2-221 E	9.27
942231	AE2-235 C O2	2.46
942232	AE2-235 E O2	1.06
942521	AE2-267 C O2	1.56
942522	AE2-267 E O2	0.97

Bus #	Bus	MW Impact
942781	AE2-296 O2	6.74
942951	AE2-315	1.61
942981	AE2-320 C O2	10.71
942982	AE2-320 E O2	5.3
943041	AE2-327 C	3.59
943042	AE2-327 E	2.4
943191	AE2-318 C	4.03
943192	AE2-318 E	1.96
943201	AE2-319 C O2	10.71
943202	AE2-319 E O2	5.3
CARR	CARR	0.35
CBM-S1	CBM-S1	6.22
CBM-S2	CBM-S2	1.31
CBM-W1	CBM-W1	5.23
CBM-W2	CBM-W2	39.9
CIN	CIN	5.48
CPLE	CPLE	0.36
G-007	G-007	0.94
IPL	IPL	3.74
LGEE	LGEE	2.24
MEC	MEC	5.99
MECS	MECS	0.67
O-066	O-066	6.06
RENSSELAER	RENSSELAER	0.28
WEC	WEC	0.7

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7430034	243453	05BEATTY	AEP	244022	05COLE	AEP	1	AEP_P4_#3195_05BEATTY 345_304E	breaker	1203.0	116.77	119.6	DC	33.95

Bus #	Bus	MW Impact
247965	Y1-063 E	0.33
253038	09KILLEN	56.89
253077	09STUART	210.13
253110	09ADKINS	22.26
253261	09MON D	0.18
902531	W2-040 C	0.88
902532	W2-040 E	1.44
904722	V4-073 E	0.19
913222	Y1-054 E	1.54
914372	Y2-111 E	1.46
915582	Y3-080 E	0.97
915662	Y3-099 E	0.15
915672	Y3-100 E	0.15
916182	Z1-065 E	0.47
916272	Z1-080 E	0.49
918802	AA1-099 E	0.32
925242	AB2-178 E	1.46
925921	AC1-068 C	10.56
925922	AC1-068 E	4.94
925931	AC1-069 C	10.56
925932	AC1-069 E	4.94
925981	AC1-074 C O1	4.1
925982	AC1-074 E O1	1.76
926011	AC1-078 C O1	6.28
926012	AC1-078 E O1	10.46
926061	AC1-085 C O1	19.75
926062	AC1-085 E O1	32.23
926101	AC1-089 C O1	4.34
926102	AC1-089 E O1	7.08
926791	AC1-165 C	10.43
926792	AC1-165 E	5.06
926801	AC1-166 C	10.43
926802	AC1-166 E	5.06
930062	AB1-014 E	8.15
931181	AB1-169	132.34
932381	AC2-055 C	2.1
932382	AC2-055 E	3.43
932421	AC2-060 C	7.46
932422	AC2-060 E	4.2
932431	AC2-061 C	4.45

Bus #	Bus	MW Impact
932432	AC2-061 E	4.51
932462	AC2-066 E	0.26
932481	AC2-068 C	2.97
932482	AC2-068 E	4.86
932551	AC2-075 C	0.97
932552	AC2-075 E	0.49
932651	AC2-087 C O1	5.53
932652	AC2-087 E O1	4.38
932661	AC2-088 C O1	4.12
932662	AC2-088 E O1	3.39
934491	AD1-073 C	1.54
934492	AD1-073 E	0.79
934561	AD1-081 C	1.26
934562	AD1-081 E	0.65
935031	AD1-136 C	0.58
935032	AD1-136 E	0.49
935041	AD1-140 C O1	10.77
935042	AD1-140 E O1	8.9
936251	AD2-031 C O1	2.44
936252	AD2-031 E O1	3.98
936281	AD2-036 C	2.93
936282	AD2-036 E	1.47
936381	AD2-048 C	3.35
936382	AD2-048 E	1.67
937111	AD2-147 C O1	12.6
937112	AD2-147 E O1	17.4
937151	AD2-151 C O1	4.48
937152	AD2-151 E O1	6.19
938051	AE1-007 C	0.85
938052	AE1-007 E	1.39
938271	AE1-040 C O1	4.41
938272	AE1-040 E O1	2.22
938921	AE1-120	4.63
939141	AE1-144 C O1	7.01
939142	AE1-144 E O1	3.48
940531	AE2-038 C O2	4.48
940532	AE2-038 E O2	2.23
941411	AE2-138 C O2	14.25
941412	AE2-138 E O2	5.27
941511	AE2-148 C	156.31
941512	AE2-148 E	70.7
941771	AE2-180 C	5.47
941772	AE2-180 E	3.65
941981	AE2-210 C O2	4.95
941982	AE2-210 E O2	1.86
942051	AE2-217 C	7.62
942052	AE2-217 E	5.08
942061	AE2-218 C	9.68
942062	AE2-218 E	6.58
942091	AE2-221 C	25.13
942092	AE2-221 E	16.76
942231	AE2-235 C O2	4.0

Bus #	Bus	MW Impact
942232	AE2-235 E O2	1.73
942521	AE2-267 C O2	2.57
942522	AE2-267 E O2	1.59
942621	AE2-278 C	6.46
942622	AE2-278 E	4.31
942781	AE2-296 O2	12.22
942861	AE2-305 C O2	3.34
942862	AE2-305 E O2	2.23
942951	AE2-315	2.95
942981	AE2-320 C O2	22.71
942982	AE2-320 E O2	11.24
943111	AE2-339 C	2.3
943112	AE2-339 E	1.13
943191	AE2-318 C	6.68
943192	AE2-318 E	3.26
943201	AE2-319 C O2	22.71
943202	AE2-319 E O2	11.24
CARR	CARR	0.48
CBM-S1	CBM-S1	8.25
CBM-S2	CBM-S2	1.23
CBM-W1	CBM-W1	5.48
CBM-W2	CBM-W2	52.51
CIN	CIN	7.77
CPLE	CPLE	0.27
G-007	G-007	1.28
IPL	IPL	5.38
LGEE	LGEE	3.28
MEC	MEC	7.6
O-066	O-066	8.25
RENSSELAER	RENSSELAER	0.38
WEC	WEC	0.87

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7430126	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	1203.0	111.5	114.56	DC	36.69

Bus #	Bus	MW Impact
253038	09KILLEN	52.79
253077	09STUART	216.16
253110	09ADKINS	24.12
253261	09MON D	0.21
902531	W2-040 C	0.99
902532	W2-040 E	1.61
904722	V4-073 E	0.22
913222	Y1-054 E	1.63
914372	Y2-111 E	1.64
915582	Y3-080 E	1.09
915662	Y3-099 E	0.15
915672	Y3-100 E	0.15
916182	Z1-065 E	0.5
916272	Z1-080 E	0.49
918802	AA1-099 E	0.33
925242	AB2-178 E	1.52
925921	AC1-068 C	11.36
925922	AC1-068 E	5.31
925931	AC1-069 C	11.36
925932	AC1-069 E	5.31
925981	AC1-074 C O1	4.25
925982	AC1-074 E O1	1.82
926011	AC1-078 C O1	8.83
926012	AC1-078 E O1	14.71
926061	AC1-085 C O1	20.8
926062	AC1-085 E O1	33.93
926101	AC1-089 C O1	4.23
926102	AC1-089 E O1	6.89
926791	AC1-165 C	11.23
926792	AC1-165 E	5.45
926801	AC1-166 C	11.23
926802	AC1-166 E	5.45
927182	AC1-212 E	1.29
930062	AB1-014 E	8.54
931181	AB1-169	136.14
932381	AC2-055 C	1.79
932382	AC2-055 E	2.92
932421	AC2-060 C	6.35
932422	AC2-060 E	3.57
932431	AC2-061 C	4.32

Bus #	Bus	MW Impact
932432	AC2-061 E	4.38
932462	AC2-066 E	0.28
932481	AC2-068 C	3.35
932482	AC2-068 E	5.49
932551	AC2-075 C	1.01
932552	AC2-075 E	0.51
932651	AC2-087 C O1	4.7
932652	AC2-087 E O1	3.73
932661	AC2-088 C O1	4.28
932662	AC2-088 E O1	3.52
932841	AC2-111 C O1	2.19
932842	AC2-111 E O1	3.57
934491	AD1-073 C	1.31
934492	AD1-073 E	0.67
934561	AD1-081 C	1.77
934562	AD1-081 E	0.91
935031	AD1-136 C	0.6
935032	AD1-136 E	0.51
935041	AD1-140 C O1	13.04
935042	AD1-140 E O1	10.78
936251	AD2-031 C O1	2.53
936252	AD2-031 E O1	4.13
936281	AD2-036 C	3.04
936282	AD2-036 E	1.52
936381	AD2-048 C	3.46
936382	AD2-048 E	1.73
937111	AD2-147 C O1	13.76
937112	AD2-147 E O1	19.01
937151	AD2-151 C O1	4.7
937152	AD2-151 E O1	6.5
938051	AE1-007 C	0.96
938052	AE1-007 E	1.57
938061	AE1-008 C	0.55
938062	AE1-008 E	0.89
938271	AE1-040 C O1	4.08
938272	AE1-040 E O1	2.05
938921	AE1-120	4.85
939141	AE1-144 C O1	7.2
939142	AE1-144 E O1	3.57
940531	AE2-038 C O2	4.59
940532	AE2-038 E O2	2.28
941411	AE2-138 C O2	14.76
941412	AE2-138 E O2	5.46
941511	AE2-148 C	170.27
941512	AE2-148 E	77.01
941771	AE2-180 C	7.24
941772	AE2-180 E	4.83
941981	AE2-210 C O2	5.13
941982	AE2-210 E O2	1.93
942051	AE2-217 C	11.79
942052	AE2-217 E	7.86
942061	AE2-218 C	11.57

Bus #	Bus	MW Impact
942062	AE2-218 E	7.86
942091	AE2-221 C	26.98
942092	AE2-221 E	17.99
942231	AE2-235 C O2	4.12
942232	AE2-235 E O2	1.78
942521	AE2-267 C O2	2.75
942522	AE2-267 E O2	1.7
942621	AE2-278 C	9.46
942622	AE2-278 E	6.31
942781	AE2-296 O2	13.6
942861	AE2-305 C O2	4.9
942862	AE2-305 E O2	3.26
942951	AE2-315	3.29
942981	AE2-320 C O2	24.55
942982	AE2-320 E O2	12.14
943111	AE2-339 C	2.39
943112	AE2-339 E	1.18
943191	AE2-318 C	7.02
943192	AE2-318 E	3.43
943201	AE2-319 C O2	24.55
943202	AE2-319 E O2	12.14
CARR	CARR	0.55
CBM-S1	CBM-S1	8.74
CBM-S2	CBM-S2	0.97
CBM-W1	CBM-W1	9.46
CBM-W2	CBM-W2	60.79
CIN	CIN	9.06
CPLE	CPLE	0.15
G-007	G-007	1.51
IPL	IPL	6.23
LGEE	LGEE	3.49
MEC	MEC	10.38
MECS	MECS	1.56
O-066	O-066	9.68
RENSSELAER	RENSSELAER	0.44
WEC	WEC	1.38

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC| DC	MW IMPACT
7431390	253110	09ADK INS	DAY	243453	05BE ATTY	AEP	1	.345.DEO&K-DAY.C5 4511HILLCRESTSTUA RTCLINTONSTUARTD PL-A	tower	1372.0	118.39	123.15	DC	65.06

Bus #	Bus	MW Impact
253038	09KILLEN	77.96
253077	09STUART	301.86
253110	09ADKINS	43.43
925921	AC1-068 C	18.66
925922	AC1-068 E	8.73
925931	AC1-069 C	18.66
925932	AC1-069 E	8.73
925981	AC1-074 C O1	4.09
925982	AC1-074 E O1	1.75
926791	AC1-165 C	18.44
926792	AC1-165 E	8.95
926801	AC1-166 C	18.44
926802	AC1-166 E	8.95
931181	AB1-169	190.11
932381	AC2-055 C	1.53
932382	AC2-055 E	2.5
932421	AC2-060 C	5.44
932422	AC2-060 E	3.06
932551	AC2-075 C	0.97
932552	AC2-075 E	0.49
932651	AC2-087 C O1	4.03
932652	AC2-087 E O1	3.19
932661	AC2-088 C O1	3.33
932662	AC2-088 E O1	2.74
934491	AD1-073 C	1.12
934492	AD1-073 E	0.58
935031	AD1-136 C	0.47
935032	AD1-136 E	0.4
936281	AD2-036 C	2.92
936282	AD2-036 E	1.46
938271	AE1-040 C O1	3.58
938272	AE1-040 E O1	1.8
939141	AE1-144 C O1	8.06
939142	AE1-144 E O1	4.0
940531	AE2-038 C O2	5.08
940532	AE2-038 E O2	2.53
941411	AE2-138 C O2	15.7
941412	AE2-138 E O2	5.81

Bus #	Bus	MW Impact
941981	AE2-210 C O2	5.49
941982	AE2-210 E O2	2.06
942231	AE2-235 C O2	4.75
942232	AE2-235 E O2	2.05
942981	AE2-320 C O2	43.52
942982	AE2-320 E O2	21.53
943111	AE2-339 C	2.38
943112	AE2-339 E	1.17
943201	AE2-319 C O2	43.52
943202	AE2-319 E O2	21.53
CARR	CARR	0.32
CBM-S1	CBM-S1	5.31
CBM-S2	CBM-S2	0.91
CBM-W1	CBM-W1	1.16
CBM-W2	CBM-W2	28.2
CIN	CIN	3.56
CPLE	CPLE	0.22
G-007	G-007	0.85
IPL	IPL	2.35
LGEE	LGEE	2.01
MEC	MEC	3.38
O-066	O-066	5.49
RENSSELAER	RENSSELAER	0.26
WEC	WEC	0.29

Affected Systems

24 Affected Systems

24.1 LG&E

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

24.2 MISO

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

24.3 TVA

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

24.4 Duke Energy Progress

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

24.5 NYISO

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

Contingency Name	Contingency Definition
.345.DEO&K-DAY.C5 4511HILLCRESTSTUARTCLINTONSTUARTDPL-A	CONTINGENCY '.345.DEO&K-DAY.C5 4511HILLCRESTSTUARTCLINTONSTUARTDPL-A' OPEN BRANCH FROM BUS 253077 TO BUS 249578 CKT 1 OPEN BRANCH FROM BUS 926060 TO BUS 253077 CKT 1 END
AEP_P4_#8094_05BIXBY 345_C	CONTINGENCY 'AEP_P4_#8094_05BIXBY 345_C' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 941520 TO BUS 243454 CKT 1 / 941520 AE2-149 TAP 345 243454 05BIXBY 345 1 /* CONTINGENCY LINE ADDED FOR AE2 BUILD END
DAY_P2_GREENE_345	CONTINGENCY 'DAY_P2_GREENE_345' OPEN BRANCH FROM BUS 253027 TO BUS 253248 CKT 1 / 253027 09GREENE 345 253027 09SCHARL 345 1 OPEN BRANCH FROM BUS 253006 TO BUS 253027 CKT 1 / 253006 09BATH 345 253027 09GREENE 345 1 OPEN BRANCH FROM BUS 253014 TO BUS 253027 CKT 1 / 253014 09CLINTO 345 253027 09GREENE 345 1 OPEN BRANCH FROM BUS 253027 TO BUS 253079 CKT 1 / 253027 09GREENE 345 253079 09SUGRCK 345 1 OPEN BRANCH FROM BUS 253027 TO BUS 253026 CKT 1 / 253027 09GREENE 345 253026 09GREENE 138 1 OPEN BRANCH FROM BUS 253027 TO BUS 253026 CKT 2 / 253027 09GREENE 345 253026 09GREENE 138 2 END
AEP_P4_#2866_05BEATTY 345_304W	CONTINGENCY 'AEP_P4_#2866_05BEATTY 345_304W' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 243469 CKT 3 / 243453 05BEATTY 345 243469 05BEATTY 138 3 END
DAY_P1_34509-A-A	CONTINGENCY 'DAY_P1_34509-A-A' OPEN BRANCH FROM BUS 253014 TO BUS 942090 CKT 1 / 253014 09CLINTO 345 942090 AE2-221 TAP 345 1 END
AEP_P4_#2900_05MARQUI 345_D2	CONTINGENCY 'AEP_P4_#2900_05MARQUI 345_D2' OPEN BRANCH FROM BUS 242938 TO BUS 248003 CKT 1 / 242938 05MARQUI 345 248003 06DOE530 345 1 OPEN BRANCH FROM BUS 242938 TO BUS 253038 CKT 1 / 242938 05MARQUI 345 253038 09KILLEN 345 1 OPEN BRANCH FROM BUS 242938 TO BUS 243034 CKT 3 / 242938 05MARQUI 345 243034 05MARQUI 138 3 END

Contingency Name	Contingency Definition
DAY_P1_34522	CONTINGENCY 'DAY_P1_34522' OPEN BRANCH FROM BUS 253014 TO BUS 253027 CKT 1 / 253014 09CLINTO 345 253027 09GREENE 345 1 OPEN BRANCH FROM BUS 253014 TO BUS 253013 CKT 1 / 253014 09CLINTO 345 253013 09CLINTO 69 1 OPEN BRANCH FROM BUS 253014 TO BUS 253013 CKT 2 / 253014 09CLINTO 345 253013 09CLINTO 69 2 END
AEP_P1-2_#10137	CONTINGENCY 'AEP_P1-2_#10137' OPEN BRANCH FROM BUS 243453 TO BUS 244022 CKT 1 / 243453 05BEATTY 345 244022 05COLE 345 1 END
Base Case	
DAY_P7_34522 34598-A	CONTINGENCY 'DAY_P7_34522 34598-A' OPEN BRANCH FROM BUS 249566 TO BUS 253006 CKT 1 / 249566 08FOSTER 345 253006 09BATH 345 1 OPEN BRANCH FROM BUS 253014 TO BUS 253027 CKT 1 / 253014 09CLINTO 345 253027 09GREENE 345 1 OPEN BRANCH FROM BUS 253014 TO BUS 253013 CKT 1 / 253014 09CLINTO 345 253013 09CLINTO 69 1 OPEN BRANCH FROM BUS 253014 TO BUS 942090 CKT 1 / 253014 09CLINTO 345 942090 AE2-221 TAP 345 1 END
AEP_P4_#2085_05BEATTY 345_304C	CONTINGENCY 'AEP_P4_#2085_05BEATTY 345_304C' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END
AEP_P1-2_#713	CONTINGENCY 'AEP_P1-2_#713' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 END
AEP_P4_#10715_05COLE 345_C	CONTINGENCY 'AEP_P4_#10715_05COLE 345_C' OPEN BRANCH FROM BUS 244022 TO BUS 243457 CKT 1 / 244022 05COLE 345 243457 05HAYDEN 345 1 OPEN BRANCH FROM BUS 244022 TO BUS 244023 CKT 1 / 244022 05COLE 345 244023 05COLE 138 1 END
DAY_P7_BEATTY-S. CHARLESTON 34542_1-B	CONTINGENCY 'DAY_P7_BEATTY-S. CHARLESTON 34542_1-B' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 OPEN BRANCH FROM BUS 941510 TO BUS 253248 CKT 1 / 941510 AE2-148 TAP 345 253248 09SCHARL 345 1 END

Contingency Name	Contingency Definition
DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	CONTINGENCY 'DAY_P7_BEATTY-S. CHARLESTON 34542_1-A' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 941510 CKT 1 / 243453 05BEATTY 345 941510 AE2-148 TAP 345 1 END
AEP_P1-2_#762	CONTINGENCY 'AEP_P1-2_#762' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END
AEP_P4_#6774_05MARQUI 345_D	CONTINGENCY 'AEP_P4_#6774_05MARQUI 345_D' OPEN BRANCH FROM BUS 246888 TO BUS 242938 CKT 1 / 246888 05BIERSR 345 242938 05MARQUI 345 1 OPEN BRANCH FROM BUS 242938 TO BUS 253038 CKT 1 / 242938 05MARQUI 345 253038 09KILLEN 345 1 END
AEP_P1-2_#764	CONTINGENCY 'AEP_P1-2_#764' OPEN BRANCH FROM BUS 242938 TO BUS 253038 CKT 1 / 242938 05MARQUI 345 253038 09KILLEN 345 1 END
AEP_P4_#3196_05BEATTY 345_302E	CONTINGENCY 'AEP_P4_#3196_05BEATTY 345_302E' OPEN BRANCH FROM BUS 243453 TO BUS 244022 CKT 1 / 243453 05BEATTY 345 244022 05COLE 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 243468 CKT 4 / 243453 05BEATTY 345 243468 05BEATTX 138 4 END
AEP_P4_#3195_05BEATTY 345_304E	CONTINGENCY 'AEP_P4_#3195_05BEATTY 345_304E' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 243468 CKT 4 / 243453 05BEATTY 345 243468 05BEATTX 138 4 END

Short Circuit

25 Short Circuit

The following Breakers are over duty

None.