Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-308

THREE FORKS-DALE 138 KV

110 MW Capacity / 150 MW Energy

July, 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 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; Storage generating facility located in Madison County, Kentucky. The installed facilities will have a total capability of 150 MW with 110 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 5/31/2021. This study does not imply a TO commitment to this in-service date.

Queue Number	**AE2-308**
Project Name	THREE FORKS-DALE 138 KV
State	Kentucky
County	Madison
Transmission Owner	EKPC
MFO	150
MWE	150
MWC	110
Fuel	Solar; Storage
Basecase Study Year	2022

2.1 Point of Interconnection

AE2-308 will interconnect with the EKPC transmission system tapping the Three Forks to Dale 138kV line.

2.2 Cost Summary

The AE2-308 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$250,000
Direct Connection Network Upgrade	$5,650,000
Non Direct Connection Network Upgrades	$100,000
Total Costs	$6,000,000

In addition, the AE2-308 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	$19,210,000

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
Install a 138 kV switch structure at the point of demarcation.	$250,000
Total Attachment Facility Costs	$250,000

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
Build 138kV switching station along the Dale – Three Forks 138kV line, includes line work. **Estimated Time to Construct: 24 months**	$5,650,000
Total Direct Connection Facility Costs	$5,650,000

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
Relaying upgrades at the remote end substations	$100,000
Total Non-Direct Connection Facility Costs	$100,000

7 Incremental Capacity Transfer Rights (ICTRs)

Will be determined at a later study phase

8 Interconnection Customer Requirements

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.

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 Sections 24.1 and 24.2.

9.2 EKPC Requirements

The Interconnection Customer will be required to comply with all EKPC Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "EKPC Facility Connection Requirements" document located at the following link:

http://www.pjm.com/planning/design-engineering/to-tech-standards/ekpc.aspx

10 Network Impacts Option-1

The Queue Project AE2-308 was evaluated as a 151.0 MW (Capacity 111.0 MW) injection tapping the Three Forks to Dale 138kV line in the EKPC area. Project AE2-308 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-308 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
8971658	342574	4DALE	EKPC	342565	4BOONESBORT	EKPC	1	EKPC_P1-2_JKS-NCLA345	single	296.0	92.42	105.39	DC	38.38

12 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
7407802	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P4_#2085_05BEATTY 345_304C	breaker	1372.0	99.64	100.14	DC	15.22
7407803	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P4_#2866_05BEATTY 345_304W	breaker	1372.0	99.81	100.3	DC	15.07

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
7408997	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	tower	1372.0	112.84	113.38	DC	16.28
7408998	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-B	tower	1372.0	110.75	111.28	DC	16.28
8971300	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	Base Case	single	1134.0	151.31	152.54	DC	13.99
8971950	342559	4BOONE CO	EKPC	250054	08LONG BR	DEO&K	1	DEO&K-DAY-EKPC.C5 4541MELDAHLSPRLCKSTUARTSPURLOC KDPLEK	tower	284.0	103.59	105.4	DC	11.3
8971638	342607	4JK SMITH	EKPC	342574	4DALE	EKPC	1	EKPC_P1-2_JKS-NCLA345	single	284.0	103.89	108.79	DC	13.91
8970928	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.138.DEO&K.C2 816_SILVERGROVE	breaker	1421.0	121.47	122.63	DC	36.58
8970929	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.345.DEO&K.C2 1493_RED BANK	breaker	1421.0	121.35	122.51	DC	36.53
8971488	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.345.DEO&K.B2 RED BANK-SG-ZIMMER 4545	single	1421.0	116.18	118.07	DC	26.79
8971491	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	Base Case	single	1240.0	112.9	114.93	DC	25.16

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
7408712	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P1-2_#762	operation	1372.0	99.6	100.09	DC	15.06
8971294	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	AEP_P1-2_#363	operation	1451.0	158.92	160.2	DC	18.81
8971295	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	Base Case	operation	1134.0	156.95	158.59	DC	19.08
8971657	342574	4DALE	EKPC	342565	4BOONESBORT	EKPC	1	EKPC_P1-2_JKS-NCLA345	operation	296.0	89.81	107.49	DC	52.33
8971639	342607	4JK SMITH	EKPC	342574	4DALE	EKPC	1	EKPC_P1-2_JKS-NCLA345	operation	284.0	100.65	105.56	DC	13.91
8971487	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.345.DEO&K.B2 RED BANK-SG-ZIMMER 4545	operation	1421.0	121.29	122.45	DC	36.53
8971489	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	Base Case	operation	1240.0	116.17	117.42	DC	34.32

15 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
8971950	4	4BOONE CO 138.0 kV - 08LONGBR 138.0 kV Ckt 1	8971950 Facility is 100% Owned by EKPC. No DL reinforcements needed. r0009 (646) : Increase MOT of Boone-Longbranch 138kV line section 954 MCM conductor to 275F (~2.25 miles) Project Type : FAC Cost : $200,000 Time Estimate : 6 Months r0010 (647) : upgrade jumpers associated with Boone 138kV bus using 2-500 MCM 37 CU conductor or equivalent Project Type : FAC Cost : $20,000 Time Estimate : 6 Months	$220,000
8971300	3	7TRIMBLE CO 345.0 kV - 06CLIFTY 345.0 kV Ckt 1	8971300 This facility is owned by LGEE. NonPJMArea (778) : The external (i.e. Non-PJM) Transmission Owner, LGEE, will not evaluate this violation until the impact study phase. Project Type : FAC Cost : $0 Time Estimate : N/A Months	$0
8971638	5	4JK SMITH 138.0 kV - 4DALE 138.0 kV Ckt 1	r0011 (648) : No violation. Rating Correction: [Rate A: 229, Rate B: 296, Rate C: 358] Project Type : FAC Cost : $0 Time Estimate : N/A Months r0012a (649) : rebuild Dale 138kV bus using 2-500 MCM conductor or equivalent (Dale-JK Smith 138kV) Project Type : FAC Cost : $1,000,000 Time Estimate : 12 Months	$1,000,000

ID	Index	Facility	Upgrade Description	Cost
7408998,7408997,7407803,7407802	2	09KILLEN 345.0 kV - 05MARQUI 345.0 kV Ckt 1	**AEP** **AEPO0007a (116) : Perform sag study on Don Marquis-Killen 345kV circuit, 32.1 miles of 2-983.1 ACAR 30/7 Rail5 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 : FAC** **Cost : $190,000** **Time Estimate : 6-12 Months** **DAY** **r190008 (359) : Reconductor line with 795 ACCR high temperature conductor in a twin bundle** **Project Type : FAC** **Cost : $6,500,000** **Time Estimate : 18.0 Months** **r190009 (360) : Replace 2000A wave trap with 3000A** **Project Type : FAC** **Cost : $100,000** **Time Estimate : 12.0 Months** **r190010 (361) : Replace substation riser conductor with 2-1024.5 ACAR 30x7** **Project Type : FAC** **Cost : $100,000** **Time Estimate : 12.0 Months**	$6,890,000
8970928,8970929,8971488,8971491	6	7SPURLOCK 345.0 kV - 09STUART 345.0 kV Ckt 1	**DAY** **r190002 (353) : Replace substation riser conductor with 2500AAC (parallel)** **Project Type : FAC** **Cost : $100,000** **Time Estimate : 12.0 Months** **r190004 (355) : Reconductor line with 795 ACCR high temperature conductor in a twin bundle** **Project Type : FAC** **Cost : $10,000,000** **Time Estimate : 18.0 Months** **EKPC** **r0005 (640) : No Violation. EKPC emergency rating 1792 MVA.** **Project Type : FAC** **Cost : $0** **Time Estimate : N/A Months**	$10,100,000
8971658	1	4DALE 138.0 kV - 4BOONESBOR T 138.0 kV Ckt 1	**r0012b (651) : rebuild Dale 138kV bus using 2-500 MCM conductor or equivalent (Dale-Boonesboro North 138kV)** **Project Type : FAC** **Cost : $1,000,000** **Time Estimate : 12 Months**	$1,000,000
			TOTAL COST	**$19,210,000**

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
8971658	342574	4DALE	EKPC	342565	4BOONESBORT	EKPC	1	EKPC_P1-2_JKS-NCLA345	single	296.0	92.42	105.39	DC	38.38

Bus #	Bus	MW Impact
342900	1COOPER1 G	0.77
342903	1COOPER2 G	1.49
342918	1JKCT 1G	2.5
342921	1JKCT 2G	2.5
342924	1JKCT 3G	2.5
342927	1JKCT 4G	1.66
342930	1JKCT 5G	1.65
342933	1JKCT 6G	1.66
342936	1JKCT 7G	1.66
342939	1JKCT 9G	1.34
342942	1JKCT 10G	1.34
342945	1LAUREL 1G	0.58
935011	AD1-134	12.57
936571	AD2-072 C O1	4.55
936821	AD2-105 C O1	2.24
942411	AE2-254 C O1	2.81
942591	AE2-275 C O1	12.47
942891	AE2-308 C O1	38.38
CARR	CARR	0.03
CBM-S1	CBM-S1	4.43
CBM-S2	CBM-S2	1.26
CBM-W1	CBM-W1	0.54
CBM-W2	CBM-W2	19.29
CIN	CIN	0.92
CPLE	CPLE	0.39
IPL	IPL	0.35
LGEE	LGEE	0.86
MEC	MEC	1.91
RENSSELAER	RENSSELAER	0.02
WEC	WEC	0.09

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
7408997	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	tower	1372.0	112.84	113.38	DC	16.28

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

16.3 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
8971300	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	Base Case	single	1134.0	151.31	152.54	DC	13.99

Bus #	Bus	MW Impact
342900	1COOPER1 G	2.08
342903	1COOPER2 G	4.04
342918	1JKCT 1G	1.67
342921	1JKCT 2G	1.67
342924	1JKCT 3G	1.67
342927	1JKCT 4G	1.11
342930	1JKCT 5G	1.1
342933	1JKCT 6G	1.11
342936	1JKCT 7G	1.11
342939	1JKCT 9G	1.14
342942	1JKCT 10G	1.14
342945	1LAUREL 1G	1.18
925981	AC1-074 C O1	5.08
932551	AC2-075 C	1.21
935011	AD1-134	8.84
936281	AD2-036 C	3.63
936381	AD2-048 C	4.44
936571	AD2-072 C O1	12.34
936821	AD2-105 C O1	3.65
936831	AD2-106 C O1	2.21
936841	AD2-107 C O1	1.48
939131	AE1-143 C	11.58
940041	AE1-246 C O1	14.33
940051	AE1-247 C O1	24.33
940831	AE2-071 C O1	3.63
941411	AE2-138 C	18.77
941961	AE2-208	1.61
941981	AE2-210 C O1	6.59
942231	AE2-235 C O1	2.35
942411	AE2-254 C O1	4.9
942591	AE2-275 C O1	8.41
942891	AE2-308 C O1	13.99
943111	AE2-339 C	4.01
952471	J708	47.79
952811	J759	11.5
952821	J762	36.21
952861	J783 C	10.89
953611	J800	14.73
953831	J842 C	3.43
953841	J843 C	3.69
953931	J856	10.79
CARR	CARR	0.1

Bus #	Bus	MW Impact
CBM-S1	CBM-S1	44.7
CBM-S2	CBM-S2	4.84
CBM-W1	CBM-W1	5.83
CBM-W2	CBM-W2	163.55
CIN	CIN	24.9
CPLE	CPLE	1.42
IPL	IPL	12.59
LGEE	LGEE	27.85
MEC	MEC	14.95
RENSSELAER	RENSSELAER	0.08
WEC	WEC	0.91

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
8971950	342559	4BOONE CO	EKPC	250054	08LONGBR	DEO&K	1	DEO&K-DAY-EKPC.C5 4541MELDAHLSPRLCKSTUARTSPURLOCK DPLEK	tower	284.0	103.59	105.4	DC	11.3

Bus #	Bus	MW Impact
342957	1SPURLK1G	4.49
342960	1SPURLK2G	7.03
342963	1SPURLK3G	3.69
342966	1SPURLK4G	3.69
925981	AC1-074 C O1	9.17
925982	AC1-074 E O1	3.93
932551	AC2-075 C	2.18
932552	AC2-075 E	1.1
935011	AD1-134	5.06
936281	AD2-036 C	6.55
936282	AD2-036 E	3.27
936381	AD2-048 C	5.97
936382	AD2-048 E	2.98
936571	AD2-072 C O1	3.35
936572	AD2-072 E O1	1.64
939141	AE1-144 C O1	8.69
939142	AE1-144 E O1	4.31
940531	AE2-038 C O1	5.79
940532	AE2-038 E O1	2.87
941411	AE2-138 C	16.37
941412	AE2-138 E	6.05
941981	AE2-210 C O1	5.66
941982	AE2-210 E O1	2.13
942231	AE2-235 C O1	4.52
942232	AE2-235 E O1	1.95
942411	AE2-254 C O1	1.61
942412	AE2-254 E O1	1.07
942591	AE2-275 C O1	4.63
942592	AE2-275 E O1	1.74
942891	AE2-308 C O1	8.29
942892	AE2-308 E O1	3.01
943111	AE2-339 C	3.03
943112	AE2-339 E	1.49
CARR	CARR	0.05
CBM-S1	CBM-S1	4.34
CBM-S2	CBM-S2	0.84
CBM-W1	CBM-W1	0.14
CBM-W2	CBM-W2	15.68
CIN	CIN	1.16
CPLE	CPLE	0.25

Bus #	Bus	MW Impact
G-007	G-007	0.12
IPL	IPL	0.49
LGEE	LGEE	1.78
MEC	MEC	1.39
O-066	O-066	0.78
RENSSELAER	RENSSELAER	0.04
WEC	WEC	0.04

16.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
8971638	342607	4JK SMITH	EKPC	342574	4DALE	EKPC	1	EKPC_P1-2_JKS-NCLA345	single	284.0	103.89	108.79	DC	13.91

Bus #	Bus	MW Impact
342918	1JKCT 1G	2.72
342921	1JKCT 2G	2.72
342924	1JKCT 3G	2.72
342927	1JKCT 4G	1.81
342930	1JKCT 5G	1.8
342933	1JKCT 6G	1.81
342936	1JKCT 7G	1.81
342939	1JKCT 9G	1.41
342942	1JKCT 10G	1.41
935011	AD1-134	11.75
942591	AE2-275 C O1	5.17
942893	AE2-308 BAT	13.91
CARR	CARR	0.03
CBM-S1	CBM-S1	2.16
CBM-S2	CBM-S2	0.65
CBM-W1	CBM-W1	0.07
CBM-W2	CBM-W2	9.69
CIN	CIN	0.44
CPLE	CPLE	0.2
IPL	IPL	0.15
LGEE	LGEE	0.31
MEC	MEC	0.86
RENSSELAER	RENSSELAER	0.02
WEC	WEC	0.02

16.6 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
8970929	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.345.DEO&K.C2 1493_RED BANK	breaker	1421.0	121.35	122.51	DC	36.53

Bus #	Bus	MW Impact
251968	08ZIMRHP	33.39
251969	08ZIMRLP	18.29
251970	08MELDL1	1.69
251971	08MELDL2	1.69
251972	08MELDL3	1.7
342957	1SPURLK1G	17.48
342960	1SPURLK2G	33.1
342963	1SPURLK3G	17.39
342966	1SPURLK4G	17.39
925981	AC1-074 C O1	15.31
925982	AC1-074 E O1	6.56
926951	AC1-182	0.8
932551	AC2-075 C	3.64
932552	AC2-075 E	1.83
935011	AD1-134	17.48
936281	AD2-036 C	10.93
936282	AD2-036 E	5.47
936381	AD2-048 C	11.97
936382	AD2-048 E	5.97
936571	AD2-072 C O1	9.64
936572	AD2-072 E O1	4.73
936821	AD2-105 C O1	4.08
936822	AD2-105 E O1	5.98
936831	AD2-106 C O1	2.82
936832	AD2-106 E O1	3.9
936841	AD2-107 C O1	2.23
936842	AD2-107 E O1	3.08
939131	AE1-143 C	7.15
939132	AE1-143 E	3.54
939141	AE1-144 C O1	32.16
939142	AE1-144 E O1	15.96
940531	AE2-038 C O1	21.45
940532	AE2-038 E O1	10.63
941411	AE2-138 C	62.82
941412	AE2-138 E	23.23
941961	AE2-208	2.43
941981	AE2-210 C O1	21.29
941982	AE2-210 E O1	8.01
942231	AE2-235 C O1	14.72
942232	AE2-235 E O1	6.36
942411	AE2-254 C O1	4.87

Bus #	Bus	MW Impact
942412	AE2-254 E O1	3.25
942591	AE2-275 C O1	15.67
942592	AE2-275 E O1	5.89
942891	AE2-308 C O1	26.79
942892	AE2-308 E O1	9.74
943111	AE2-339 C	9.06
943112	AE2-339 E	4.46
CARR	CARR	0.51
CBM-S1	CBM-S1	13.72
CBM-S2	CBM-S2	1.86
CBM-W1	CBM-W1	3.85
CBM-W2	CBM-W2	65.29
CIN	CIN	7.07
CPLE	CPLE	0.39
G-007	G-007	1.38
IPL	IPL	4.27
LGEE	LGEE	5.18
MEC	MEC	7.85
O-066	O-066	8.9
RENSSELAER	RENSSELAER	0.4
WEC	WEC	0.68

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
DEO&K-DAY-EKPC.C5 4541MELDAHLSPRLCKSTUARTSPURLOCKDPLEK	CONTINGENCY 'DEO&K-DAY-EKPC.C5 4541MELDAHLSPRLCKSTUARTSPURLOCKDPLEK' OPEN BRANCH FROM BUS 342838 TO BUS 249581 CKT 1 OPEN BRANCH FROM BUS 253077 TO BUS 342838 CKT 1 END
EKPC_P1-2_JKS-NCLA345	CONTINGENCY 'EKPC_P1-2_JKS-NCLA345' /* JK SMITH - N CLARK OPEN BRANCH FROM BUS 342832 TO BUS 342835 CKT 1 /* 342832 7JK SMITH 345.00 342835 7N CLARK 345.00 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
.345.DEO&K.C2 1493_RED BANK	CONTINGENCY '.345.DEO&K.C2 1493_RED BANK' OPEN BRANCH FROM BUS 249571 TO BUS 249573 CKT 1 OPEN BRANCH FROM BUS 249573 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 249573 TO BUS 249577 CKT 1 OPEN BRANCH FROM BUS 249571 TO BUS 250092 CKT 1 END
.345.DEO&K.B2 RED BANK-SG-ZIMMER 4545	CONTINGENCY '.345.DEO&K.B2 RED BANK-SG-ZIMMER 4545' OPEN BRANCH FROM BUS 249573 TO BUS 249577 CKT 1 OPEN BRANCH FROM BUS 249573 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 249571 TO BUS 249573 CKT 1 END
.138.DEO&K.C2 816_SILVERGROVE	CONTINGENCY '.138.DEO&K.C2 816_SILVERGROVE' OPEN BRANCH FROM BUS 249573 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 249988 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 250042 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 250052 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 250053 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 249571 TO BUS 249573 CKT 1 OPEN BRANCH FROM BUS 249573 TO BUS 249577 CKT 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_#363	CONTINGENCY 'AEP_P1-2_#363' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 END

Contingency Name	Contingency Definition
Base Case	
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

Short Circuit

18 Short Circuit

The following Breakers are overduty

None.

19 Point of Interconnection Option-2

AE2-308 will interconnect with the EKPC transmission system tapping the Fawkes to JK Smith 138kV line.

20 Network Impacts Option-2

The Queue Project AE2-308 was evaluated as a 151.0 MW (Capacity 111.0 MW) injection tapping the Fawkes to JK Smith 138kV line in the EKPC area. Project AE2-308 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-308 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

21 Generation Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

22 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
7407803	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P4_#2866_05BEATTY 345_304W	breaker	1372.0	99.98	100.46	DC	14.53
14744611	942890	AE2-308 TAP	EKPC	342577	4FAWKES EK	EKPC	1	EKPC_P4-6_JKSM E63-91T	breaker	284.0	90.54	121.98	DC	89.29
14744612	942890	AE2-308 TAP	EKPC	342577	4FAWKES EK	EKPC	1	EKPC_P4-6_JKSM E63-92T	breaker	284.0	70.72	103.09	DC	91.93

23 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
7407802	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P4_#2085_05BEATTY 345_304C	breaker	1372.0	100.53	101.01	DC	14.69
7408997	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	tower	1372.0	113.27	113.79	DC	15.74
7408998	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-B	tower	1372.0	111.15	111.67	DC	15.74
8971300	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	Base Case	single	1134.0	151.12	152.38	DC	14.32
8971950	342559	4BOONE CO	EKPC	250054	08LONG BR	DEO&K	1	DEO&K-DAY-EKPC.C5 4541MELDAHLSPRLCKSTUARTSPURLOCKDPLEK	tower	284.0	103.71	105.39	DC	10.52
8970928	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.138.DEO&K.C2 816_SILVERGROVE	breaker	1421.0	121.53	122.65	DC	35.16
8970929	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.345.DEO&K.C2 1493_RED BANK	breaker	1421.0	121.42	122.53	DC	35.12
8971488	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.345.DEO&K.B2 RED BANK-SG-ZIMMER 4545	single	1421.0	116.32	117.14	DC	25.76
8971491	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	Base Case	single	1240.0	113.12	115.07	DC	24.21

24 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
7408712	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	AEP_P1-2_#762	operation	1372.0	99.77	100.25	DC	14.52
8971294	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	AEP_P1-2_#363	operation	1451.0	158.83	160.14	DC	19.26
8971295	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	Base Case	operation	1134.0	156.83	158.5	DC	19.52
8971487	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.345.DEO&K.B2 RED BANK-SG-ZIMMER 4545	operation	1421.0	121.35	122.47	DC	35.12
8971489	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	Base Case	operation	1240.0	116.48	117.68	DC	33.01

25 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.

25.1 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
7408997	253038	09KILLEN	DAY	242938	05MARQUI	AEP	1	DAY_P7_BEATTY-S. CHARLESTON 34542_1-A	tower	1372.0	113.27	113.79	DC	15.74

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

25.2 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
14744611	942890	AE2-308 TAP	EKPC	342577	4FAWKES EK	EKPC	1	EKPC_P4-6_JKSM E63-91T	breaker	284.0	90.54	121.98	DC	89.29

Bus #	Bus	MW Impact
342918	1JKCT 1G	2.26
342921	1JKCT 2G	2.26
342924	1JKCT 3G	2.26
342927	1JKCT 4G	1.5
342933	1JKCT 6G	1.5
342936	1JKCT 7G	1.5
935011	AD1-134	8.66
942891	AE2-308 C O1	65.48
942892	AE2-308 E O1	23.81
BLUEG	BLUEG	1.24
CALDERWOOD	CALDERWOOD	0.16
CANNELTON	CANNELTON	0.09
CARR	CARR	0.02
CATAWBA	CATAWBA	0.07
CHEOAH	CHEOAH	0.14
CHILHOWEE	CHILHOWEE	0.05
COFFEEN	COFFEEN	0.08
COTTONWOOD	COTTONWOOD	0.54
DUCKCREEK	DUCKCREEK	0.15
EDWARDS	EDWARDS	0.06
ELMERSMITH	ELMERSMITH	0.16
FARMERCITY	FARMERCITY	0.06
G-007	G-007	0.07
GIBSON	GIBSON	0.04
HAMLET	HAMLET	0.1
NEWTON	NEWTON	0.23
O-066	O-066	0.45
PRAIRIE	PRAIRIE	0.51
RENSSELAER	RENSSELAER	0.02
SANTEETLA	SANTEETLA	0.04
SMITHLAND	SMITHLAND	0.06
TATANKA	TATANKA	0.1
TILTON	TILTON	0.08
TRIMBLE	TRIMBLE	0.13
TVA	TVA	0.54
UNIONPOWER	UNIONPOWER	0.19

25.3 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
8971300	324114	7TRIMBLE CO	LGEE	248000	06CLIFTY	OVEC	1	Base Case	single	1134.0	151.12	152.38	DC	14.32

Bus #	Bus	MW Impact
342900	1COOPER1 G	2.08
342903	1COOPER2 G	4.04
342918	1JKCT 1G	1.67
342921	1JKCT 2G	1.67
342924	1JKCT 3G	1.67
342927	1JKCT 4G	1.11
342930	1JKCT 5G	1.1
342933	1JKCT 6G	1.11
342936	1JKCT 7G	1.11
342939	1JKCT 9G	1.14
342942	1JKCT 10G	1.14
342945	1LAUREL 1G	1.18
925981	AC1-074 C O1	5.08
932551	AC2-075 C	1.21
935011	AD1-134	8.84
936281	AD2-036 C	3.63
936381	AD2-048 C	4.44
936571	AD2-072 C O1	12.34
936821	AD2-105 C O1	3.65
936831	AD2-106 C O1	2.21
936841	AD2-107 C O1	1.48
939131	AE1-143 C	11.58
940041	AE1-246 C O1	14.33
940051	AE1-247 C O1	24.34
940831	AE2-071 C O2	3.63
941411	AE2-138 C O2	19.13
941961	AE2-208	1.61
941981	AE2-210 C O2	6.47
942411	AE2-254 C O2	4.91
942591	AE2-275 C O2	8.31
942891	AE2-308 C O1	14.32
943111	AE2-339 C	4.01
952471	J708	47.79
952811	J759	11.5
952821	J762	36.21
952861	J783 C	10.89
953611	J800	14.73
953831	J842 C	3.43
953841	J843 C	3.69
953931	J856	10.79
CARR	CARR	0.1
CBM-S1	CBM-S1	44.7

Bus #	Bus	MW Impact
CBM-S2	CBM-S2	4.84
CBM-W1	CBM-W1	5.83
CBM-W2	CBM-W2	163.55
CIN	CIN	24.9
CPLE	CPLE	1.42
IPL	IPL	12.59
LGEE	LGEE	27.85
MEC	MEC	14.95
RENSSELAER	RENSSELAER	0.08
WEC	WEC	0.91

25.4 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
8971950	342559	4BOONE CO	EKPC	250054	08LONGBR	DEO&K	1	DEO&K-DAY-EKPC.C5 4541MELDAHLSPRLCKSTUARTSPURLOCK DPLEK	tower	284.0	103.71	105.39	DC	10.52

Bus #	Bus	MW Impact
342957	1SPURLK1G	4.49
342960	1SPURLK2G	7.03
342963	1SPURLK3G	3.69
342966	1SPURLK4G	3.69
925981	AC1-074 C O1	9.16
925982	AC1-074 E O1	3.93
932551	AC2-075 C	2.18
932552	AC2-075 E	1.1
935011	AD1-134	5.06
936281	AD2-036 C	6.55
936282	AD2-036 E	3.27
936381	AD2-048 C	5.97
936382	AD2-048 E	2.98
936571	AD2-072 C O1	3.35
936572	AD2-072 E O1	1.64
939141	AE1-144 C O1	8.69
939142	AE1-144 E O1	4.31
940531	AE2-038 C O2	5.46
940532	AE2-038 E O2	2.72
941411	AE2-138 C O2	16.44
941412	AE2-138 E O2	6.08
941981	AE2-210 C O2	5.64
941982	AE2-210 E O2	2.12
942231	AE2-235 C O2	5.02
942232	AE2-235 E O2	2.17
942411	AE2-254 C O2	1.62
942412	AE2-254 E O2	1.08
942591	AE2-275 C O2	4.58
942592	AE2-275 E O2	1.72
942891	AE2-308 C O1	7.72
942892	AE2-308 E O1	2.81
943111	AE2-339 C	3.03
943112	AE2-339 E	1.49
CARR	CARR	0.05
CBM-S1	CBM-S1	4.34
CBM-S2	CBM-S2	0.84
CBM-W1	CBM-W1	0.14
CBM-W2	CBM-W2	15.68
CIN	CIN	1.16
CPLE	CPLE	0.25

Bus #	Bus	MW Impact
G-007	G-007	0.12
IPL	IPL	0.49
LGEE	LGEE	1.78
MEC	MEC	1.39
O-066	O-066	0.78
RENSSELAER	RENSSELAER	0.04
WEC	WEC	0.04

25.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
8970929	342838	7SPURLOCK	EKPC	253077	09STUART	DAY	1	.345.DEO&K.C2 1493_RED BANK	breaker	1421.0	121.42	122.53	DC	35.12

Bus #	Bus	MW Impact
251968	08ZIMRHP	33.39
251969	08ZIMRLP	18.29
251970	08MELDL1	1.69
251971	08MELDL2	1.69
251972	08MELDL3	1.7
342957	1SPURLK1G	17.48
342960	1SPURLK2G	33.1
342963	1SPURLK3G	17.39
342966	1SPURLK4G	17.39
925981	AC1-074 C O1	15.31
925982	AC1-074 E O1	6.56
926951	AC1-182	0.8
932551	AC2-075 C	3.64
932552	AC2-075 E	1.83
935011	AD1-134	17.48
936281	AD2-036 C	10.93
936282	AD2-036 E	5.47
936381	AD2-048 C	11.97
936382	AD2-048 E	5.97
936571	AD2-072 C O1	9.64
936572	AD2-072 E O1	4.73
936821	AD2-105 C O1	4.08
936822	AD2-105 E O1	5.98
936841	AD2-107 C O1	2.23
936842	AD2-107 E O1	3.08
939131	AE1-143 C	7.15
939132	AE1-143 E	3.54
939141	AE1-144 C O1	32.16
939142	AE1-144 E O1	15.96
940531	AE2-038 C O2	20.11
940532	AE2-038 E O2	10.02
941411	AE2-138 C O2	61.77
941412	AE2-138 E O2	22.85
941961	AE2-208	2.43
941981	AE2-210 C O2	21.64
941982	AE2-210 E O2	8.14
942231	AE2-235 C O2	19.29
942232	AE2-235 E O2	8.33
942411	AE2-254 C O2	4.88
942412	AE2-254 E O2	3.25
942591	AE2-275 C O2	15.55

Bus #	Bus	MW Impact
942592	AE2-275 E O2	5.85
942891	AE2-308 C O1	25.76
942892	AE2-308 E O1	9.37
943111	AE2-339 C	9.06
943112	AE2-339 E	4.46
CARR	CARR	0.51
CBM-S1	CBM-S1	13.73
CBM-S2	CBM-S2	1.86
CBM-W1	CBM-W1	3.87
CBM-W2	CBM-W2	65.34
CIN	CIN	7.07
CPLE	CPLE	0.39
G-007	G-007	1.38
IPL	IPL	4.27
LGEE	LGEE	5.19
MEC	MEC	7.86
O-066	O-066	8.9
RENSSELAER	RENSSELAER	0.4
WEC	WEC	0.68

Affected Systems

26 Affected Systems

26.1 LG&E

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

26.2 MISO

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

26.3 TVA

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

26.4 Duke Energy Progress

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

26.5 NYISO

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

Contingency Name	Contingency Definition
DEO&K-DAY-EKPC.C5 4541MELDAHLSPRLCKSTUARTSPURLOCKDPLEK	CONTINGENCY 'DEO&K-DAY-EKPC.C5 4541MELDAHLSPRLCKSTUARTSPURLOCKDPLEK' OPEN BRANCH FROM BUS 342838 TO BUS 249581 CKT 1 OPEN BRANCH FROM BUS 253077 TO BUS 342838 CKT 1 END
EKPC_P4-6_JKSM E63-92T	CONTINGENCY 'EKPC_P4-6_JKSM E63-92T' /* JK SMITH OPEN BRANCH FROM BUS 342607 TO BUS 942590 CKT 1 /* 342607 4JK SMITH 138.00 942590 AE2-275 TAP T138.00 OPEN BRANCH FROM BUS 342607 TO BUS 935010 CKT 1 /* 342607 4JK SMITH 138.00 935010 AD1-134 TAP 138.00 /* CONTINGENCY LINE ADDED FOR AE1 BUILD END
.138.DEO&K.C2 816_SILVERGROVE	CONTINGENCY '.138.DEO&K.C2 816_SILVERGROVE' OPEN BRANCH FROM BUS 249573 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 249988 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 250042 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 250052 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 250053 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 249571 TO BUS 249573 CKT 1 OPEN BRANCH FROM BUS 249573 TO BUS 249577 CKT 1 END
EKPC_P4-6_JKSM E63-91T	CONTINGENCY 'EKPC_P4-6_JKSM E63-91T' /* JK SMITH OPEN BRANCH FROM BUS 342574 TO BUS 342607 CKT 1 /* 342574 4DALE 138.00 342607 4JK SMITH 138.00 OPEN BRANCH FROM BUS 942590 TO BUS 342607 CKT 1 /* 942590 AE2-275 TAP 138.00 342607 4JK SMITH 138.00 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
.345.DEO&K.C2 1493_RED BANK	CONTINGENCY '.345.DEO&K.C2 1493_RED BANK' OPEN BRANCH FROM BUS 249571 TO BUS 249573 CKT 1 OPEN BRANCH FROM BUS 249573 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 249573 TO BUS 249577 CKT 1 OPEN BRANCH FROM BUS 249571 TO BUS 250092 CKT 1 END
.345.DEO&K.B2 RED BANK-SG-ZIMMER 4545	CONTINGENCY '.345.DEO&K.B2 RED BANK-SG-ZIMMER 4545' OPEN BRANCH FROM BUS 249573 TO BUS 249577 CKT 1 OPEN BRANCH FROM BUS 249573 TO BUS 250097 CKT 1 OPEN BRANCH FROM BUS 249571 TO BUS 249573 CKT 1 END

Contingency Name	Contingency Definition
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_#363	CONTINGENCY 'AEP_P1-2_#363' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 END
Base Case	
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

Short Circuit

27 Short Circuit

The following Breakers are overduty

None