



Generation Interconnection

Feasibility Study Report

for

Queue Project AF1-089

NEW CASTLE 69 KV

53.6 MW Capacity / 70 MW Energy

January, 2020

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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.

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 Henry County, IN. The installed facilities will have a total capability of 70 MW with 53.6 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 6/1/2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF1-089
Project Name	NEW CASTLE 69 KV
State	Indiana
County	Henry
Transmission Owner	EKPC
MFO	70
MWE	70
MWC	53.6
Fuel	Solar; Storage
Basecase Study Year	2023

2.1 Point of Interconnection

AF1-089 will interconnect with the EKPC transmission system at the New Castle 69 kV substation.

2.2 Cost Summary

The AF1-089 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$400,000
Direct Connection Network Upgrade	\$2,590,000
Non Direct Connection Network Upgrades	\$1,130,000
Total Costs	\$4,120,000

In addition, the AF1-089 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$14,780,676

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.

	Total Cost
Install necessary equipment (a 69 kV isolation switch structure and associated switch, plus interconnection metering, fiber-optic connection and telecommunications equipment, circuit breaker and associated switches, and relay panel) at the new New Castle switching station, to accept the IC generator lead line/bus (Estimated time to implement is 24 months)	\$400,000
Total Attachment Facility Costs	\$400,000

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
Construct a new 69 kV switching station near the EKPC New Castle distribution substation to facilitate connection of the IC solar generation project (Estimated time to implement is 24 months)	\$2,590,000
Total Direct Connection Facility Costs	\$2,590,000

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
Construct facilities to loop the existing Owen County-New Castle-Defoe Tap 69 kV line into the new New Castle switching station (Estimated time to implement is 24 months)	\$130,000
Modify relays and/or settings at the Owen County substation for the existing line to the new New Castle switching station (Estimated time to implement is 9 months)	\$45,000

Description	Total Cost
Modify relays and/or settings at Clay Village substation for the existing line to the new New Castle switching station (Estimated time to implement is 9 months)	\$45,000
Install a new microwave tower and associated infrastructure at the new New Castle switching station to address telecommunications needs (Estimated time to implement is 18 months)	\$910,000
Total Non-Direct Connection Facility Costs	\$1,130,000

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

The Queue Project AF1-089 was evaluated as a 70.0 MW (Capacity 53.6 MW) injection at the New Castle 69 kV substation in the EKPC area. Project AF1-089 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-089 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	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41173948	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P1-2_BULL-BLUE L161	single	25.0	11.24	115.44	DC	26.05
41173949	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	Base Case	single	23.0	1.26	114.69	DC	26.09
41173887	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	Base Case	single	23.0	12.57	125.99	DC	26.09
41173888	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P1-2_BULL-BLUE L161	single	25.0	21.64	125.84	DC	26.05

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	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
40974155	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P7-1_BULL 161 DBL	tower	25.0	16.94	152.72	DC	33.94
41512499	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P4-2_BULL W84-1024	breaker	25.0	14.29	149.52	DC	33.81
41512500	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P4-5_BULL W84-1008	breaker	25.0	14.69	149.92	DC	33.81
41512501	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P4-2_BULL W84-1014	breaker	25.0	14.29	149.52	DC	33.81
41784103	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P2-3_BULL W84-1024	bus	25.0	14.29	149.52	DC	33.81
41784104	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P2-2_BULLITT CO 161	bus	25.0	14.69	149.92	DC	33.81
41784105	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P2-3_BULL W84-1014	bus	25.0	14.29	149.52	DC	33.81
40974139	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P7-1_BULL 161 DBL	tower	25.0	26.94	162.72	DC	33.94
41512462	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P4-5_BULL W84-1008	breaker	25.0	24.69	159.92	DC	33.81
41512463	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P4-2_BULL W84-1014	breaker	25.0	24.69	159.92	DC	33.81
41512464	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P4-2_BULL W84-1024	breaker	25.0	24.69	159.92	DC	33.81
41784079	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P2-2_BULLITT CO 161	bus	25.0	24.69	159.92	DC	33.81
41784080	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P2-3_BULL W84-1024	bus	25.0	24.69	159.92	DC	33.81

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41784081	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P2-3_BULL W84-1014	bus	25.0	24.69	159.92	DC	33.81

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	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
40974279	250054	08LONGBR	138.0	DEO&K	250077	08MTZION	138.0	DEO&K	1	DAY_P73454134553	tower	284.0	102.46	103.16	DC	4.39
40974255	342559	4BOONECO	138.0	EKPC	250054	08LONGBR	138.0	DEO&K	1	DAY_P73454134553	tower	284.0	109.78	110.48	DC	4.39

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	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41174166	324010	7TRIMBL REAC	345.0	LGEE	248000	06CLIFTY	345.0	OVEC	1	AEP_P1-2_#363	operation	1451.0	120.76	121.77	DC	14.72
41174167	324010	7TRIMBL REAC	345.0	LGEE	248000	06CLIFTY	345.0	OVEC	1	Base Case	operation	1134.0	117.25	118.55	DC	14.77
41173943	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	Base Case	operation	23.0	1.26	149.39	DC	34.07
41173944	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P1-2_BULL-BLUE L161	operation	25.0	11.24	147.32	DC	34.02
41173882	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	Base Case	operation	23.0	12.57	160.7	DC	34.07
41173883	341950	2NEW CASTLE	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P1-2_BULL-BLUE L161	operation	25.0	21.64	157.72	DC	34.02

15 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
41512464,41512463, 41512462,40974139, 41784079,41173888, 41784081,41784080, 41173887	2	2NEW CASTLE 69.0 kV - 2DEFOE TAP 69.0 kV Ckt 1	r0037 (484) : Rebuild the Defoe Tap-New Castle 69 kV line section using 556 MCM ACSR conductor at 212 degrees F (5.6 miles) Project Type : FAC Cost : \$4,600,000 Time Estimate : 19.0 Months	\$4,600,000
40974279	3	08LONGBR 138.0 kV - 08MTZION 138.0 kV Ckt 1	n30581: Rebuild the line and Substation Bus Conductor on the Longbranch terminal at Mt. Zion Project Type : FAC Cost : \$2,660,676 Time Estimate : 30.0 Months	\$2,660,676
41512500,41512501, 40974155,41784105, 41784104,41784103, 41173949,41173948, 41512499	1	2DEFOE TAP 69.0 kV - 2CLAY VILLAG 69.0 kV Ckt 1	r0027 (474) : Rebuild the Clay Village-Defoe Tap 69 kV line section using 556 MCM ACSR conductor at 212 degrees F (8.7 miles) Project Type : FAC Cost : \$7,150,000 Time Estimate : 20.0 Months	\$7,150,000
40974255	4	4BOONE CO 138.0 kV - 08LONGBR 138.0 kV Ckt 1	r0009 (455) : Increase MOT of Boone-Longbranch 138kV line section 954 MCM conductor to 275F (~2.25 miles) Project Type : FAC Cost : \$200,000 Time Estimate : 6.0 Months r0010 (456) : Upgrade bus and jumpers associated with Boone 138 kV bus using 2-500 MCM 37 CU conductor or equivalent Project Type : FAC Cost : \$170,000 Time Estimate : 6.0 Months	\$370,000
			TOTAL COST	\$14,780,676

16 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each index, 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
40974155	341390	2DEFOE TAP	EKPC	341317	2CLAY VILLAG	EKPC	1	EKPC_P7-1_BULL 161 DBL	tower	25.0	16.94	152.72	DC	33.94

Bus #	Bus	MW Impact
944211	AF1-089 C O1	25.9917
944212	AF1-089 E O1	7.9527
DUCKCREEK	DUCKCREEK	0.0392
NEWTON	NEWTON	0.0569
FARMERCITY	FARMERCITY	0.0024
G-007A	G-007A	0.0072
VFT	VFT	0.0193
PRAIRIE	PRAIRIE	0.1369
COFFEEN	COFFEEN	0.0248
EDWARDS	EDWARDS	0.0112
CHEOAH	CHEOAH	0.0155
TILTON	TILTON	0.0265
GIBSON	GIBSON	0.0579
CALDERWOOD	CALDERWOOD	0.0154
BLUEG	BLUEG	0.4965
TRIMBLE	TRIMBLE	0.1191
CATAWBA	CATAWBA	0.0056

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
40974139	341950	2NEW CASTLE	EKPC	341390	2DEFOE TAP	EKPC	1	EKPC_P7-1_BULL 161 DBL	tower	25.0	26.94	162.72	DC	33.94

Bus #	Bus	MW Impact
944211	AF1-089 C O1	25.9917
944212	AF1-089 E O1	7.9527
DUCKCREEK	DUCKCREEK	0.0392
NEWTON	NEWTON	0.0569
FARMERCITY	FARMERCITY	0.0024
G-007A	G-007A	0.0072
VFT	VFT	0.0193
PRAIRIE	PRAIRIE	0.1369
COFFEEN	COFFEEN	0.0248
EDWARDS	EDWARDS	0.0112
CHEOAH	CHEOAH	0.0155
TILTON	TILTON	0.0265
GIBSON	GIBSON	0.0579
CALDERWOOD	CALDERWOOD	0.0154
BLUEG	BLUEG	0.4965
TRIMBLE	TRIMBLE	0.1191
CATAWBA	CATAWBA	0.0056

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
40974279	250054	08LONGBR	DEO&K	250077	08MTZION	DEO&K	1	DAY_P734541 34553	tower	284.0	102.46	103.16	DC	4.39

Bus #	Bus	MW Impact
342957	1SPURLK1G	5.1535
342960	1SPURLK2G	8.0926
342963	1SPURLK3G	4.2526
342966	1SPURLK4G	4.2526
925981	AC1-074 C O1	9.2562
925982	AC1-074 E O1	3.9670
932551	AC2-075 C	2.1984
932552	AC2-075 E	1.1074
936381	AD2-048 C	6.0729
936382	AD2-048 E	3.0299
936571	AD2-072 C O1	2.9465
936572	AD2-072 E O1	1.4447
939141	AE1-144 C O1	8.7899
939142	AE1-144 E O1	4.3621
940531	AE2-038 C O1	5.8636
940532	AE2-038 E O1	2.9044
941411	AE2-138 C	14.2325
941412	AE2-138 E	5.2641
941981	AE2-210 C O1	4.9041
941982	AE2-210 E O1	1.8447
942411	AE2-254 C O1	1.4096
942412	AE2-254 E O1	0.9398
942591	AE2-275 C O1	4.0264
942592	AE2-275 E O1	1.5145
942891	AE2-308 C O1	6.9274
942892	AE2-308 E O1	2.5191
943111	AE2-339 C	2.0999
943112	AE2-339 E	1.0343
944211	AF1-089 C O1	1.5157
944212	AF1-089 E O1	0.4638
944621	AF1-127 C O1	2.1479
944622	AF1-127 E O1	1.0579
945541	AF1-219 C O1	0.6926
945542	AF1-219 E O1	0.2248
945681	AF1-233 C O1	16.4726
945682	AF1-233 E O1	8.1379
945861	AF1-251 C	5.2663
945862	AF1-251 E	3.5109
945911	AF1-256 C	5.3174
945912	AF1-256 E	3.5450
946021	AF1-267 C O1	1.1808
946022	AF1-267 E O1	0.5425

Bus #	Bus	MW Impact
LGEE	LGEE	1.7069
CPL	CPL	0.2792
WEC	WEC	0.0350
CBM-W2	CBM-W2	6.2080
NY	NY	0.0735
CBM-W1	CBM-W1	0.6755
TVA	TVA	1.6156
O-066	O-066	0.7325
CBM-S2	CBM-S2	3.3062
CBM-S1	CBM-S1	12.7459
G-007	G-007	0.1123
MADISON	MADISON	3.7740
MEC	MEC	0.5673

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
40974255	342559	4BOONE CO	EKPC	250054	08LONGBR	DEO&K	1	DAY_P734541 34553	tower	284.0	109.78	110.48	DC	4.39

Bus #	Bus	MW Impact
342957	1SPURLK1G	5.1535
342960	1SPURLK2G	8.0926
342963	1SPURLK3G	4.2526
342966	1SPURLK4G	4.2526
925981	AC1-074 C O1	9.2562
925982	AC1-074 E O1	3.9670
932551	AC2-075 C	2.1984
932552	AC2-075 E	1.1074
936381	AD2-048 C	6.0729
936382	AD2-048 E	3.0299
936571	AD2-072 C O1	2.9465
936572	AD2-072 E O1	1.4447
939141	AE1-144 C O1	8.7899
939142	AE1-144 E O1	4.3621
940531	AE2-038 C O1	5.8636
940532	AE2-038 E O1	2.9044
941411	AE2-138 C	14.2325
941412	AE2-138 E	5.2641
941981	AE2-210 C O1	4.9041
941982	AE2-210 E O1	1.8447
942411	AE2-254 C O1	1.4096
942412	AE2-254 E O1	0.9398
942591	AE2-275 C O1	4.0264
942592	AE2-275 E O1	1.5145
942891	AE2-308 C O1	6.9274
942892	AE2-308 E O1	2.5191
943111	AE2-339 C	2.0999
943112	AE2-339 E	1.0343
944211	AF1-089 C O1	1.5157
944212	AF1-089 E O1	0.4638
944621	AF1-127 C O1	2.1479
944622	AF1-127 E O1	1.0579
945541	AF1-219 C O1	0.6926
945542	AF1-219 E O1	0.2248
945681	AF1-233 C O1	16.4726
945682	AF1-233 E O1	8.1379
945861	AF1-251 C	5.2663
945862	AF1-251 E	3.5109
945911	AF1-256 C	5.3174
945912	AF1-256 E	3.5450
946021	AF1-267 C O1	1.1808
946022	AF1-267 E O1	0.5425

Bus #	Bus	MW Impact
LGEE	LGEE	1.7069
CPL	CPL	0.2792
WEC	WEC	0.0350
CBM-W2	CBM-W2	6.2080
NY	NY	0.0735
CBM-W1	CBM-W1	0.6755
TVA	TVA	1.6156
O-066	O-066	0.7325
CBM-S2	CBM-S2	3.3062
CBM-S1	CBM-S1	12.7459
G-007	G-007	0.1123
MADISON	MADISON	3.7740
MEC	MEC	0.5673

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).

18 Contingency Descriptions

Contingency Name	Contingency Definition
EKPC_P4-2_BULL W84-1014	CONTINGENCY 'EKPC_P4-2_BULL W84-1014' /* OPEN BUS 342700 /* 5BULLITT CO DROPS BUS OPEN BRANCH FROM BUS 342706 TO BUS 342709 CKT 1 /* 342706 5CEDAR G IP 161.00 342709 5CEDAR G IP1161.00 OPEN BRANCH FROM BUS 324134 TO BUS 342706 CKT 1 /* 324134 5BLUE LK 161.00 342706 5CEDAR G IP 161.00 END
EKPC_P2-2_BULLITT CO 161	CONTINGENCY 'EKPC_P2-2_BULLITT CO 161' /* BULLITT CO 161 BUS OPEN BUS 342700 /* 5BULLITT CO END
EKPC_P2-3_BULL W84-1014	CONTINGENCY 'EKPC_P2-3_BULL W84-1014' /* BULLITT CO OPEN BUS 342700 /* 5BULLITT CO OPEN BRANCH FROM BUS 342706 TO BUS 342709 CKT 1 /* 342706 5CEDAR G IP 161.00 342709 5CEDAR G IP1161.00 OPEN BRANCH FROM BUS 324134 TO BUS 342706 CKT 1 /* 324134 5BLUE LK 161.00 342706 5CEDAR G IP 161.00 END
EKPC_P4-2_BULL W84-1024	CONTINGENCY 'EKPC_P4-2_BULL W84-1024' /* OPEN BUS 342700 /* 5BULLITT CO DROPS BUS OPEN BRANCH FROM BUS 361788 TO BUS 360334 CKT 1 /* 361788 5SUM SHAD TP161.00 360334 5SUMMER SHAD161.00 OPEN BRANCH FROM BUS 361788 TO BUS 342814 CKT 1 /* 361788 5SUM SHAD TP161.00 342814 5SUMM SHADE 161.00 END
EKPC_P1-2_BULL-BLUE L161	CONTINGENCY 'EKPC_P1-2_BULL-BLUE L161' /* BULLITT CO - KU BLUE LICK OPEN BRANCH FROM BUS 342700 TO BUS 342706 CKT 1 /* 342700 5BULLITT CO 161.00 342706 5CEDAR G IP 161.00 OPEN BRANCH FROM BUS 342706 TO BUS 342709 CKT 1 /* 342706 5CEDAR G IP 161.00 342709 5CEDAR G IP1161.00 OPEN BRANCH FROM BUS 324134 TO BUS 342706 CKT 1 /* 324134 5BLUE LK 161.00 342706 5CEDAR G IP 161.00 END
EKPC_P2-3_BULL W84-1024	CONTINGENCY 'EKPC_P2-3_BULL W84-1024' /* BULLITT CO OPEN BUS 342700 /* 5BULLITT CO DROPS BUS OPEN BRANCH FROM BUS 361788 TO BUS 360334 CKT 1 /* 361788 5SUM SHAD TP161.00 360334 5SUMMER SHAD161.00 OPEN BRANCH FROM BUS 361788 TO BUS 342814 CKT 1 /* 361788 5SUM SHAD TP161.00 342814 5SUMM SHADE 161.00 END

Contingency Name	Contingency Definition
DAY_P734541 34553	CONTINGENCY 'DAY_P734541 34553' OPEN BRANCH FROM BUS 249581 TO BUS 342838 CKT 1 /* 249581 08MELDAL 345.00 342838 7SPURLOCK 345.00 OPEN BRANCH FROM BUS 253077 TO BUS 342838 CKT 1 /* 253077 09STUART 345.00 342838 7SPURLOCK 345.00 END
EKPC_P4-5_BULL W84-1008	CONTINGENCY 'EKPC_P4-5_BULL W84-1008' /* BULLITT CO OPEN BUS 342700 /* 5BULLITT CO DROPS BUS 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
EKPC_P7-1_BULL 161 DBL	CONTINGENCY 'EKPC_P7-1_BULL 161 DBL' /* BULLITT - BLUE LICK 161 & BULLITT - SUMMERSHADE 161 OPEN BRANCH FROM BUS 342700 TO BUS 342706 CKT 1 /* 342700 5BULLITT CO 161.00 342706 5CEDAR G IP 161.00 OPEN BRANCH FROM BUS 342706 TO BUS 342709 CKT 1 /* 342706 5CEDAR G IP 161.00 342709 5CEDAR G IP1161.00 OPEN BRANCH FROM BUS 324134 TO BUS 342706 CKT 1 /* 324134 5BLUE LK 161.00 342706 5CEDAR G IP 161.00 OPEN BRANCH FROM BUS 342700 TO BUS 361788 CKT 1 /* 342700 5BULLITT CO 161.00 361788 5SUM SHAD TP161.00 OPEN BRANCH FROM BUS 361788 TO BUS 360334 CKT 1 /* 361788 5SUM SHAD TP161.00 360334 5SUMMER SHAD161.00 OPEN BRANCH FROM BUS 361788 TO BUS 342814 CKT 1 /* 361788 5SUM SHAD TP161.00 342814 5SUMM SHADE 161.00 END
Base Case	

Short Circuit

19 Short Circuit

The following Breakers are overduty

Bus Number	Bus Name	BREAKER	Type	Capacity (Amps)	Duty Percentage Post Queue	Duty Percentage Pre Queue

Secondary Point of Interconnection

20 Network Impacts – Secondary POI

The Queue Project AF1-089 was evaluated as a 70.0 MW (Capacity 53.6 MW) injection tapping the New Castle to Clay Village 69 kV line in the EKPC area. Project AF1-089 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-089 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)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41173948	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P1-2_BULL-BLUE L161	single	25.0	11.24	115.96	DC	26.18
41173949	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	Base Case	single	23.0	1.26	115.26	DC	26.22
59365916	944210	AF1-089 TAP	69.0	EKPC	341950	2NEW CASTLE	69.0	EKPC	1	EKPC_P1-2_CLYV-SHL-FRK69	single	25.0	-48.0	166.4	DC	53.6
59365918	944210	AF1-089 TAP	69.0	EKPC	341950	2NEW CASTLE	69.0	EKPC	1	EKPC_P1-3_OWEN CO 138/69	single	25.0	75.55	159.58	DC	21.01
59365922	944210	AF1-089 TAP	69.0	EKPC	341950	2NEW CASTLE	69.0	EKPC	1	Base Case	single	23.0	0.41	119.46	DC	27.38
59366032	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	Base Case	single	23.0	12.57	126.57	DC	26.22
59366033	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P1-2_BULL-BLUE L161	single	25.0	21.64	126.36	DC	26.18

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	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
40974155	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P7-1_BULL 161 DBL	tower	25.0	16.94	153.4	DC	34.12
41512499	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P4-2_BULL W84-1024	breaker	25.0	14.29	150.21	DC	33.98
41512500	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P4-5_BULL W84-1008	breaker	25.0	14.69	150.61	DC	33.98
41512501	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P4-2_BULL W84-1014	breaker	25.0	14.29	150.21	DC	33.98
41784103	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P2-3_BULL W84-1024	bus	25.0	14.29	150.21	DC	33.98
41784104	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P2-2_BULLITT CO 161	bus	25.0	14.69	150.61	DC	33.98
41784105	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P2-3_BULL W84-1014	bus	25.0	14.29	150.21	DC	33.98
59365139	944210	AF1-089 TAP	69.0	EKPC	341950	2NEW CASTLE	69.0	EKPC	1	EKPC_P2-2_KU CLAY VIL 69	bus	25.0	-10.4	269.6	DC	70.0

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
59365181	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P2-3_BULL W84-1024	bus	25.0	24.69	160.61	DC	33.98
59365182	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P2-2_BULLITT CO 161	bus	25.0	24.69	160.61	DC	33.98
59365183	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P2-3_BULL W84-1014	bus	25.0	24.69	160.61	DC	33.98
59365478	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P4-5_BULL W84-1008	breaker	25.0	24.69	160.61	DC	33.98
59365479	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P4-2_BULL W84-1024	breaker	25.0	24.69	160.61	DC	33.98
59365480	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P4-2_BULL W84-1014	breaker	25.0	24.69	160.61	DC	33.98
59366470	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P7-1_BULL 161 DBL	tower	25.0	26.94	163.4	DC	34.12

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	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
40974279	250054	08LONGBR	138.0	DEO&K	250077	08MTZION	138.0	DEO&K	1	DAY_P73454134553	tower	284.0	102.46	103.16	DC	4.38
40974255	342559	4BOONECO	138.0	EKPC	250054	08LONGBR	138.0	DEO&K	1	DAY_P73454134553	tower	284.0	109.78	110.48	DC	4.38

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	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41174166	324010	7TRIMBL REAC	345.0	LGEE	248000	06CLIFTY	345.0	OVEC	1	AEP_P1-2_#363	operation	1451.0	120.75	121.77	DC	14.74

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
41174167	324010	7TRIMBL REAC	345.0	LGEE	248000	06CLIFTY	345.0	OV E C	1	Base Case	operatio n	1134.0	117.25	118.55	DC	14.79
41173943	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	Base Case	operatio n	23.0	1.26	150.14	DC	34.24
41173944	341390	2DEFOE TAP	69.0	EKPC	341317	2CLAY VILLAG	69.0	EKPC	1	EKPC_P1-2_BULL-BLUE L161	operatio n	25.0	11.24	148.0	DC	34.19
59365913	944210	AF1-089 TAP	69.0	EKPC	341950	2NEW CASTLE	69.0	EKPC	1	EKPC_P1-2_CLYV-SHL-FRK69	operatio n	25.0	-48.0	232.0	DC	70.0
59365920	944210	AF1-089 TAP	69.0	EKPC	341950	2NEW CASTLE	69.0	EKPC	1	Base Case	operatio n	23.0	0.51	155.98	DC	35.76
59366027	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	Base Case	operatio n	23.0	12.57	161.45	DC	34.24
59366028	944210	AF1-089 TAP	69.0	EKPC	341390	2DEFOE TAP	69.0	EKPC	1	EKPC_P1-2_BULL-BLUE L161	operatio n	25.0	21.64	158.4	DC	34.19

25 Flow Gate Details

The following indices contain additional information about each flowgate presented in the body of the report. For each index, 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
40974155	341390	2DEFOE TAP	EKPC	341317	2CLAY VILLAG	EKPC	1	EKPC_P7-1_BULL 161 DBL	tower	25.0	16.94	153.4	DC	34.12

Bus #	Bus	MW Impact
944211	AF1-089 C O2	26.1230
944212	AF1-089 E O2	7.9929
DUCKCREEK	DUCKCREEK	0.0392
NEWTON	NEWTON	0.0569
FARMERCITY	FARMERCITY	0.0024
G-007A	G-007A	0.0072
VFT	VFT	0.0193
PRAIRIE	PRAIRIE	0.1369
COFFEEN	COFFEEN	0.0248
EDWARDS	EDWARDS	0.0112
CHEOAH	CHEOAH	0.0155
TILTON	TILTON	0.0265
GIBSON	GIBSON	0.0579
CALDERWOOD	CALDERWOOD	0.0154
BLUEG	BLUEG	0.4965
TRIMBLE	TRIMBLE	0.1191
CATAWBA	CATAWBA	0.0056

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
59365139	944210	AF1-089 TAP	EKPC	341950	2NEW CASTLE	EKPC	1	EKPC_P2-2_KU CLAY VIL 69	bus	25.0	-10.4	269.6	DC	70.0

Bus #	Bus	MW Impact
944211	AF1-089 C O2	53.6000
944212	AF1-089 E O2	16.4000

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
59366470	944210	AF1-089 TAP	EKPC	341390	2DEFOE TAP	EKPC	1	EKPC_P7-1_BULL 161 DBL	tower	25.0	26.94	163.4	DC	34.12

Bus #	Bus	MW Impact
944211	AF1-089 C O2	26.1230
944212	AF1-089 E O2	7.9929
DUCKCREEK	DUCKCREEK	0.0392
NEWTON	NEWTON	0.0569
FARMERCITY	FARMERCITY	0.0024
G-007A	G-007A	0.0072
VFT	VFT	0.0193
PRAIRIE	PRAIRIE	0.1369
COFFEEN	COFFEEN	0.0248
EDWARDS	EDWARDS	0.0112
CHEOAH	CHEOAH	0.0155
TILTON	TILTON	0.0265
GIBSON	GIBSON	0.0579
CALDERWOOD	CALDERWOOD	0.0154
BLUEG	BLUEG	0.4965
TRIMBLE	TRIMBLE	0.1191
CATAWBA	CATAWBA	0.0056

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
40974279	250054	08LONGBR	DEO&K	250077	08MTZION	DEO&K	1	DAY_P734541 34553	tower	284.0	102.46	103.16	DC	4.38

Bus #	Bus	MW Impact
342957	1SPURLK1G	5.1535
342960	1SPURLK2G	8.0926
342963	1SPURLK3G	4.2526
342966	1SPURLK4G	4.2526
925981	AC1-074 C O1	9.2562
925982	AC1-074 E O1	3.9670
932551	AC2-075 C	2.1984
932552	AC2-075 E	1.1074
936381	AD2-048 C	6.0729
936382	AD2-048 E	3.0299
936571	AD2-072 C O1	2.9465
936572	AD2-072 E O1	1.4447
939141	AE1-144 C O1	8.7899
939142	AE1-144 E O1	4.3621
940531	AE2-038 C O1	5.8636
940532	AE2-038 E O1	2.9044
941411	AE2-138 C	14.2325
941412	AE2-138 E	5.2641
941981	AE2-210 C O1	4.9041
941982	AE2-210 E O1	1.8447
942411	AE2-254 C O1	1.4096
942412	AE2-254 E O1	0.9398
942591	AE2-275 C O1	4.0264
942592	AE2-275 E O1	1.5145
942891	AE2-308 C O1	6.9274
942892	AE2-308 E O1	2.5191
943111	AE2-339 C	2.0999
943112	AE2-339 E	1.0343
944211	AF1-089 C O2	1.5123
944212	AF1-089 E O2	0.4627
944621	AF1-127 C O2	2.2259
944622	AF1-127 E O2	1.0963
945541	AF1-219 C O2	0.7318
945542	AF1-219 E O2	0.2375
945681	AF1-233 C O2	16.5976
945682	AF1-233 E O2	8.1996
945861	AF1-251 C	5.2663
945862	AF1-251 E	3.5109
945911	AF1-256 C	5.3174
945912	AF1-256 E	3.5450
946021	AF1-267 C O2	1.1750
946022	AF1-267 E O2	0.5398

Bus #	Bus	MW Impact
LGEE	LGEE	1.7069
CPL	CPL	0.2792
WEC	WEC	0.0350
CBM-W2	CBM-W2	6.2080
NY	NY	0.0735
CBM-W1	CBM-W1	0.6755
TVA	TVA	1.6156
O-066	O-066	0.7325
CBM-S2	CBM-S2	3.3062
CBM-S1	CBM-S1	12.7459
G-007	G-007	0.1123
MADISON	MADISON	3.7740
MEC	MEC	0.5673

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
40974255	342559	4BOONE CO	EKPC	250054	08LONGBR	DEO&K	1	DAY_P734541 34553	tower	284.0	109.78	110.48	DC	4.38

Bus #	Bus	MW Impact
342957	1SPURLK1G	5.1535
342960	1SPURLK2G	8.0926
342963	1SPURLK3G	4.2526
342966	1SPURLK4G	4.2526
925981	AC1-074 C O1	9.2562
925982	AC1-074 E O1	3.9670
932551	AC2-075 C	2.1984
932552	AC2-075 E	1.1074
936381	AD2-048 C	6.0729
936382	AD2-048 E	3.0299
936571	AD2-072 C O1	2.9465
936572	AD2-072 E O1	1.4447
939141	AE1-144 C O1	8.7899
939142	AE1-144 E O1	4.3621
940531	AE2-038 C O1	5.8636
940532	AE2-038 E O1	2.9044
941411	AE2-138 C	14.2325
941412	AE2-138 E	5.2641
941981	AE2-210 C O1	4.9041
941982	AE2-210 E O1	1.8447
942411	AE2-254 C O1	1.4096
942412	AE2-254 E O1	0.9398
942591	AE2-275 C O1	4.0264
942592	AE2-275 E O1	1.5145
942891	AE2-308 C O1	6.9274
942892	AE2-308 E O1	2.5191
943111	AE2-339 C	2.0999
943112	AE2-339 E	1.0343
944211	AF1-089 C O2	1.5123
944212	AF1-089 E O2	0.4627
944621	AF1-127 C O2	2.2259
944622	AF1-127 E O2	1.0963
945541	AF1-219 C O2	0.7318
945542	AF1-219 E O2	0.2375
945681	AF1-233 C O2	16.5976
945682	AF1-233 E O2	8.1996
945861	AF1-251 C	5.2663
945862	AF1-251 E	3.5109
945911	AF1-256 C	5.3174
945912	AF1-256 E	3.5450
946021	AF1-267 C O2	1.1750
946022	AF1-267 E O2	0.5398

Bus #	Bus	MW Impact
LGEE	LGEE	1.7069
CPL	CPL	0.2792
WEC	WEC	0.0350
CBM-W2	CBM-W2	6.2080
NY	NY	0.0735
CBM-W1	CBM-W1	0.6755
TVA	TVA	1.6156
O-066	O-066	0.7325
CBM-S2	CBM-S2	3.3062
CBM-S1	CBM-S1	12.7459
G-007	G-007	0.1123
MADISON	MADISON	3.7740
MEC	MEC	0.5673

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).

27 Contingency Descriptions

Contingency Name	Contingency Definition
EKPC_P4-2_BULL W84-1014	CONTINGENCY 'EKPC_P4-2_BULL W84-1014' /* OPEN BUS 342700 /* 5BULLITT CO DROPS BUS OPEN BRANCH FROM BUS 342706 TO BUS 342709 CKT 1 /* 342706 SCEDAR G IP 161.00 342709 SCEDAR G IP1161.00 OPEN BRANCH FROM BUS 324134 TO BUS 342706 CKT 1 /* 324134 5BLUE LK 161.00 342706 SCEDAR G IP 161.00 END
EKPC_P2-2_BULLITT CO 161	CONTINGENCY 'EKPC_P2-2_BULLITT CO 161' /* BULLITT CO 161 BUS OPEN BUS 342700 /* 5BULLITT CO END
EKPC_P2-3_BULL W84-1014	CONTINGENCY 'EKPC_P2-3_BULL W84-1014' /* BULLITT CO OPEN BUS 342700 /* 5BULLITT CO OPEN BRANCH FROM BUS 342706 TO BUS 342709 CKT 1 /* 342706 SCEDAR G IP 161.00 342709 SCEDAR G IP1161.00 OPEN BRANCH FROM BUS 324134 TO BUS 342706 CKT 1 /* 324134 5BLUE LK 161.00 342706 SCEDAR G IP 161.00 END
EKPC_P4-2_BULL W84-1024	CONTINGENCY 'EKPC_P4-2_BULL W84-1024' /* OPEN BUS 342700 /* 5BULLITT CO DROPS BUS OPEN BRANCH FROM BUS 361788 TO BUS 360334 CKT 1 /* 361788 5SUM SHAD TP161.00 360334 5SUMMER SHAD161.00 OPEN BRANCH FROM BUS 361788 TO BUS 342814 CKT 1 /* 361788 5SUM SHAD TP161.00 342814 5SUMM SHADE 161.00 END
EKPC_P1-2_CLYV-SHL-FRK69	CONTINGENCY 'EKPC_P1-2_CLYV-SHL-FRK69' /* CLAY VILLAGE - KU SHELBYVILLE - KU FRANKFORT OPEN BRANCH FROM BUS 324474 TO BUS 341317 CKT 1 /* 324474 2CLAY V 69.000 341317 2CLAY VILLAG69.000 OPEN BRANCH FROM BUS 324474 TO BUS 324725 CKT 1 /* 324474 2CLAY V 69.000 324725 2SHLB E 69.000 OPEN BRANCH FROM BUS 324725 TO BUS 324727 CKT 1 /* 324725 2SHLB E 69.000 324727 2SHLBV 69.000 OPEN BRANCH FROM BUS 324474 TO BUS 324765 CKT 1 /* 324474 2CLAY V 69.000 324765 2W FRNK 69.000 END
EKPC_P1-2_BULL-BLUE L161	CONTINGENCY 'EKPC_P1-2_BULL-BLUE L161' /* BULLITT CO - KU BLUE LICK OPEN BRANCH FROM BUS 342700 TO BUS 342706 CKT 1 /* 342700 5BULLITT CO 161.00 342706 SCEDAR G IP 161.00 OPEN BRANCH FROM BUS 342706 TO BUS 342709 CKT 1 /* 342706 SCEDAR G IP 161.00 342709 SCEDAR G IP1161.00 OPEN BRANCH FROM BUS 324134 TO BUS 342706 CKT 1 /* 324134 5BLUE LK 161.00 342706 SCEDAR G IP 161.00 END

Contingency Name	Contingency Definition
EKPC_P2-3_BULL W84-1024	CONTINGENCY 'EKPC_P2-3_BULL W84-1024' /* BULLITT CO OPEN BUS 342700 /* 5BULLITT CO DROPS BUS OPEN BRANCH FROM BUS 361788 TO BUS 360334 CKT 1 /* 361788 5SUM SHAD TP161.00 360334 5SUMMER SHAD161.00 OPEN BRANCH FROM BUS 361788 TO BUS 342814 CKT 1 /* 361788 5SUM SHAD TP161.00 342814 5SUMM SHADE 161.00 END
EKPC_P1-3_OWEN CO 138/69	CONTINGENCY 'EKPC_P1-3_OWEN CO 138/69' /* OPEN BRANCH FROM BUS 324293 TO BUS 342007 CKT 1 /* 324293 4OWEN C 138.00 342007 2OWEN CO 69.000 END
EKPC_P2-2_KU CLAY VIL 69	CONTINGENCY 'EKPC_P2-2_KU CLAY VIL 69' /* KU CLAY VILLAGE 69 TIE OPEN BUS 341317 /* 2CLAY VILLAG END
DAY_P734541 34553	CONTINGENCY 'DAY_P734541 34553' OPEN BRANCH FROM BUS 249581 TO BUS 342838 CKT 1 /* 249581 08MELDAL 345.00 342838 7SPURLOCK 345.00 OPEN BRANCH FROM BUS 253077 TO BUS 342838 CKT 1 /* 253077 09STUART 345.00 342838 7SPURLOCK 345.00 END
EKPC_P4-5_BULL W84-1008	CONTINGENCY 'EKPC_P4-5_BULL W84-1008' /* BULLITT CO OPEN BUS 342700 /* 5BULLITT CO DROPS BUS 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
EKPC_P7-1_BULL 161 DBL	CONTINGENCY 'EKPC_P7-1_BULL 161 DBL' /* BULLITT - BLUE LICK 161 & BULLITT - SUMMERSHADE 161 OPEN BRANCH FROM BUS 342700 TO BUS 342706 CKT 1 /* 342700 5BULLITT CO 161.00 342706 5CEDAR G IP 161.00 OPEN BRANCH FROM BUS 342706 TO BUS 342709 CKT 1 /* 342706 5CEDAR G IP 161.00 342709 5CEDAR G IP1161.00 OPEN BRANCH FROM BUS 324134 TO BUS 342706 CKT 1 /* 324134 5BLUE LK 161.00 342706 5CEDAR G IP 161.00 OPEN BRANCH FROM BUS 342700 TO BUS 361788 CKT 1 /* 342700 5BULLITT CO 161.00 361788 5SUM SHAD TP161.00 OPEN BRANCH FROM BUS 361788 TO BUS 360334 CKT 1 /* 361788 5SUM SHAD TP161.00 360334 5SUMMER SHAD161.00 OPEN BRANCH FROM BUS 361788 TO BUS 342814 CKT 1 /* 361788 5SUM SHAD TP161.00 342814 5SUMM SHADE 161.00 END
Base Case	

Short Circuit

28 Short Circuit

The following Breakers are overduty

Bus Number	Bus Name	BREAKER	Type	Capacity (Amps)	Duty Percentage Post Queue	Duty Percentage Pre Queue