Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-071

PATTON RD-SUMMER SHADE 69 KV

21 MW Capacity / 35 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.

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 Metcalfe, Kentucky. The installed facilities will have a total capability of 35 MW with 21 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 12/31/2021. This study does not imply a TO commitment to this in-service date.

Queue Number	AE2-071
Project Name	PATTON RD-SUMMER SHADE 69 KV
State	None
County	Metcalfe
Transmission Owner	EKPC
MFO	35
MWE	35
MWC	21
Fuel	Solar
Basecase Study Year	2022

2.1 Point of Interconnection

AE2-071 will interconnect with the EKPC transmission system tapping the Patton Rd. to Summer Shade 69kV line.

2.2 Cost Summary

The AE2-071 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 AE2-071 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	$785,000

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 69 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 69 kV switching station at 161 kV standards near Eighty Eight, KY including associated transmission 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 Option-1 Network Impacts

The Queue Project AE2-071 was evaluated as a 35.0 MW (Capacity 21.0 MW) injection tapping the Patton Rd. to Summer Shade 69kV line in the EKPC area. Project AE2-071 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-071 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)

None

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
2155211	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P4-2_SSHADS11-1004	breaker	90.0	159.96	161.48	DC	3.03
2155212	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P4-2_SSHADS11-1044	breaker	90.0	154.77	156.29	DC	3.03
2155616	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P1-2_BARR-SUMSH161-B	single	90.0	116.32	118.26	DC	1.75
2155403	342322	2SUMMSHADE	EKPC	341431	2EDM-JBGALJ	EKPC	1	EKPC_P4-2_GREENW45-1014	breaker	46.0	105.87	108.22	DC	2.4
2155431	342718	5COOPER2	EKPC	324141	5ELIHU	LGEE	1	EKPC_P4-5_LAURLS50-1024	breaker	277.0	103.7	105.19	DC	4.12
2155982	342718	5COOPER2	EKPC	324141	5ELIHU	LGEE	1	EKPC_P7-1_LAURL 161 DBL	tower	277.0	103.74	105.22	DC	4.12

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
2155615	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P1-2_BARR-SUMSH161-B	operation	90.0	152.86	154.32	DC	2.92
2155805	342718	5COOPER2	EKPC	324141	5ELIHU	LGEE	1	EKPC_P1-2_LAUR-LDAM161	operation	277.0	103.55	105.04	DC	4.13
2155725	940050	AE1-247 TAP	EKPC	342814	5SUMM SHADE	EKPC	1	Base Case	operation	186.0	115.33	115.81	DC	2.0

15 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
2155403	2	2SUMM SHADE 69.0 kV - 2EDM-JBGAL J 69.0 kV Ckt 1	r0004 (506) : Increase MOT of Summershade-Edm. JB Galloway Jct 69kV line section 266 MCM conductor to 212F (~7.9 miles) Project Type : FAC Cost : $525,000 Time Estimate : 12.0 Months	$525,000
2155616,2155211,2155212	1	2BARREN CO 69.0 kV - 2HORSECAVE J 69.0 kV Ckt 1	r0001 (503) : Uprate CT associated with Barren Co-Horsecave Jct 69kV line section to minimum 166 MVA Summer LTE Project Type : FAC Cost : $0 Time Estimate : 6.0 Months r0002 (504) : Upgrade jumpers associated with Barren Co 69kV bus to 2-500 MCM 37 CU conductor Project Type : FAC Cost : $10,000 Time Estimate : 6.0 Months r0003 (505) : Increase MOT of Barren Co-Horsecave Jct 69kV line section 795 MCM conductor to 302F (~3.88 miles) Project Type : FAC Cost : $250,000 Time Estimate : 6.0 Months	$260,000
2155431,2155982	3	5COOPER2 161.0 kV - 5ELIHU 161.0 kV Ckt 1	r0006 (508) : No Violation. EKPC emergency rating 298 MVA. Project Type : FAC Cost : $0 Time Estimate : N/A Months NonPJMArea (635) : 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
			TOTAL COST	$785,000

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
2155211	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P4-2_SSHADS11-1004	breaker	90.0	159.96	161.48	DC	3.03

Bus #	Bus	MW Impact
940041	AE1-246 C O1	24.92
940042	AE1-246 E O1	12.13
940051	AE1-247 C O1	42.33
940052	AE1-247 E O1	20.96
940831	AE2-071 C O1	1.82
940832	AE2-071 E O1	1.21
BLUEG	BLUEG	0.97
CANNELTON	CANNELTON	0.16
CBM-N	CBM-N	0.01
CBM-S1	CBM-S1	0.9
CBM-S2	CBM-S2	0.28
CBM-W2	CBM-W2	3.07
CPLE	CPLE	0.09
EDWARDS	EDWARDS	0.0
ELMERSMITH	ELMERSMITH	0.31
G-007A	G-007A	0.03
GIBSON	GIBSON	0.04
MEC	MEC	0.29
NEWTON	NEWTON	0.02
NYISO	NYISO	0.03
TILTON	TILTON	0.04
TRIMBLE	TRIMBLE	0.1
VFT	VFT	0.08

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
2155403	342322	2SUMM SHADE	EKPC	341431	2EDM-JBGAL J	EKPC	1	EKPC_P4-2_GREEN W45-1014	breaker	46.0	105.87	108.22	DC	2.4

Bus #	Bus	MW Impact
940831	AE2-071 C O1	1.44
940832	AE2-071 E O1	0.96
BLUEG	BLUEG	0.78
CANNELTON	CANNELTON	0.07
CBM-N	CBM-N	0.0
CBM-S1	CBM-S1	0.71
CBM-S2	CBM-S2	0.22
CBM-W1	CBM-W1	0.08
CBM-W2	CBM-W2	3.14
CPLE	CPLE	0.07
ELMERSMITH	ELMERSMITH	0.1
G-007A	G-007A	0.02
GIBSON	GIBSON	0.02
MEC	MEC	0.33
NYISO	NYISO	0.02
TILTON	TILTON	0.02
TRIMBLE	TRIMBLE	0.08
VFT	VFT	0.05
WEC	WEC	0.01

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
2155982	342718	5COOPER2	EKPC	324141	5ELIHU	LGEE	1	EKPC_P7-1_LAURL 161 DBL	tower	277.0	103.74	105.22	DC	4.12

Bus #	Bus	MW Impact
342900	1COOPER1 G	7.85
342903	1COOPER2 G	15.28
342945	1LAUREL 1G	4.75
939131	AE1-143 C	10.07
939132	AE1-143 E	4.99
940041	AE1-246 C O1	9.04
940042	AE1-246 E O1	4.4
940051	AE1-247 C O1	15.37
940052	AE1-247 E O1	7.61
940831	AE2-071 C O1	2.47
940832	AE2-071 E O1	1.65
CARR	CARR	0.06
CBM-S1	CBM-S1	3.76
CBM-S2	CBM-S2	0.41
CBM-W1	CBM-W1	1.15
CBM-W2	CBM-W2	18.72
CIN	CIN	0.55
CPLE	CPLE	0.08
G-007	G-007	0.17
IPL	IPL	0.22
MEC	MEC	2.26
O-066	O-066	1.09
RENSSELAER	RENSSELAER	0.05
TRIMBLE	TRIMBLE	0.02
WEC	WEC	0.15

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
EKPC_P4-2_SSHAD S11-1004	CONTINGENCY 'EKPC_P4-2_SSHAD S11-1004' /* SUMMERSHADE OPEN BRANCH FROM BUS 940050 TO BUS 342814 CKT 1 /* 940050 AE1-247 TAP 161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 342811 TO BUS 342814 CKT 1 /* 342811 5SUMM SHAD T161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 342733 TO BUS 342814 CKT 1 /* 342733 5GREEN CO 161.00 342814 5SUMM SHADE 161.00 END
EKPC_P1-2_BARR-SUMSH161-B	CONTINGENCY 'EKPC_P1-2_BARR-SUMSH161-B' /* BARREN CO - SUMMERSHADE OPEN BRANCH FROM BUS 940050 TO BUS 342814 CKT 1 /* 940050 AE1-247 TAP 161.00 342814 5SUMM SHADE 161.00 END
EKPC_P4-2_GREEN W45-1014	CONTINGENCY 'EKPC_P4-2_GREEN W45-1014' /* GREEN CO OPEN BUS 342733 /* 5GREEN CO DROPS BUS OPEN BRANCH FROM BUS 342817 TO BUS 342818 CKT 1 /* 342817 5TAYLOR CO J161.00 342818 5TAYLRCO 161.00 OPEN BRANCH FROM BUS 342805 TO BUS 342817 CKT 1 /* 342805 5SALOMA T 161.00 342817 5TAYLOR CO J161.00 OPEN BRANCH FROM BUS 342802 TO BUS 342805 CKT 1 /* 342802 5SALOMA 161.00 342805 5SALOMA T 161.00 OPEN BRANCH FROM BUS 342775 TO BUS 342805 CKT 1 /* 342775 5MARION IP T161.00 342805 5SALOMA T 161.00 OPEN BRANCH FROM BUS 342772 TO BUS 342775 CKT 1 /* 342772 5MARION IP 161.00 342775 5MARION IP T161.00 OPEN BRANCH FROM BUS 342769 TO BUS 342775 CKT 1 /* 342769 5MARION CO 161.00 342775 5MARION IP T161.00 END
Base Case	
EKPC_P7-1_LAURL 161 DBL	CONTINGENCY 'EKPC_P7-1_LAURL 161 DBL' /* LAUREL CO - LAUREL DAM 161 & LAUREL CO - TYNER 161 OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 OPEN BRANCH FROM BUS 342754 TO BUS 342781 CKT 1 /* 342754 5LAUREL CO 161.00 342781 5PITTSBURG 161.00 OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 /* 342781 5PITTSBURG 161.00 342820 5TYNER 161.00 END
EKPC_P4-2_SSHAD S11-1044	CONTINGENCY 'EKPC_P4-2_SSHAD S11-1044' /* SUMMERSHADE OPEN BRANCH FROM BUS 940050 TO BUS 342814 CKT 1 /* 940050 AE1-247 TAP 161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 342700 TO BUS 342811 CKT 1 /* 342700 5BULLITT CO 161.00 342811 5SUMM SHAD T161.00 OPEN BRANCH FROM BUS 342811 TO BUS 360334 CKT 1 /* 342811 5SUMM SHAD T161.00 360334 5SUMMER SHAD161.00 OPEN BRANCH FROM BUS 342811 TO BUS 342814 CKT 1 /* 342811 5SUMM SHAD T161.00 342814 5SUMM SHADE 161.00 END

Contingency Name	Contingency Definition
EKPC_P4-5_LAURL S50-1024	CONTINGENCY 'EKPC_P4-5_LAURL S50-1024' /* LAUREL CO OPEN BUS 342754 /* 5LAUREL CO DROPS BUS OPEN BRANCH FROM BUS 324688 TO BUS 342781 CKT 1 /* 324688 2PITTSKU 69.000 342781 5PITTSBURG 161.00 OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 /* 342781 5PITTSBURG 161.00 342820 5TYNER 161.00 END
EKPC_P1-2_LAUR-L DAM161	CONTINGENCY 'EKPC_P1-2_LAUR-L DAM161' /* LAUREL CO - LAUREL DAM OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 END

Short Circuit

18 Short Circuit

None

Secondary Point of Interconnection:

AE2-071 will interconnect with the EKPC transmission system at the Summer Shade 69kV substation.

Option 2 : Network Impacts

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Summer Peak Load Flow

1 Generation Deliverability

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

None

2 Multiple Facility Contingency

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

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3 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)

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2155212	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P4-2_SSHADS11-1044	breaker	90.0	154.78	155.87	DC	2.18
2155616	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P1-2_BARR-SUMSH161-B	single	90.0	116.31	117.69	DC	1.24
2155403	342322	2SUMMSHADE	EKPC	341431	2EDM-JBGALJ	EKPC	1	EKPC_P4-2_GREENW45-1014	breaker	46.0	105.87	108.65	DC	2.84
2155431	342718	5COOPER2	EKPC	324141	5ELIHU	LGEE	1	EKPC_P4-5_LAURLS50-1024	breaker	277.0	103.73	105.29	DC	4.32
2155982	342718	5COOPER2	EKPC	324141	5ELIHU	LGEE	1	EKPC_P7-1_LAURL 161 DBL	tower	277.0	103.76	105.32	DC	4.32

4 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.

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2155805	342718	5COOPER2	EKPC	324141	5ELIHU	LGEE	1	EKPC_P1-2_LAUR-LDAM161	operation	277.0	103.55	105.11	DC	4.33

5 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.

5.1 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
2155211	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P4-2_SSHADS11-1004	breaker	90.0	159.96	161.05	DC	2.17

Bus #	Bus	MW Impact
940041	AE1-246 C O1	24.92
940042	AE1-246 E O1	12.13
940051	AE1-247 C O1	42.33
940052	AE1-247 E O1	20.96
940831	AE2-071 C O2	1.3
940832	AE2-071 E O2	0.87
BLUEG	BLUEG	0.97
CANNELTON	CANNELTON	0.16
CBM-N	CBM-N	0.01
CBM-S1	CBM-S1	0.9
CBM-S2	CBM-S2	0.28
CBM-W2	CBM-W2	3.07
CPLE	CPLE	0.09
EDWARDS	EDWARDS	0.0
ELMERSMITH	ELMERSMITH	0.31
G-007A	G-007A	0.03
GIBSON	GIBSON	0.04
MEC	MEC	0.29
NEWTON	NEWTON	0.02
NYISO	NYISO	0.03
TILTON	TILTON	0.04
TRIMBLE	TRIMBLE	0.1
VFT	VFT	0.08

5.2 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
2155403	342322	2SUMM SHADE	EKPC	341431	2EDM-JBGAL J	EKPC	1	EKPC_P4-2_GREEN W45-1014	breaker	46.0	105.87	108.65	DC	2.84

Bus #	Bus	MW Impact
940831	AE2-071 C O2	1.7
940832	AE2-071 E O2	1.14
BLUEG	BLUEG	0.78
CANNELTON	CANNELTON	0.07
CBM-N	CBM-N	0.0
CBM-S1	CBM-S1	0.71
CBM-S2	CBM-S2	0.22
CBM-W1	CBM-W1	0.08
CBM-W2	CBM-W2	3.14
CPLE	CPLE	0.07
ELMERSMITH	ELMERSMITH	0.1
G-007A	G-007A	0.02
GIBSON	GIBSON	0.02
MEC	MEC	0.33
NYISO	NYISO	0.02
TILTON	TILTON	0.02
TRIMBLE	TRIMBLE	0.08
VFT	VFT	0.05
WEC	WEC	0.01

5.3 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
2155982	342718	5COOPER2	EKPC	324141	5ELIHU	LGEE	1	EKPC_P7-1_LAURL 161 DBL	tower	277.0	103.76	105.32	DC	4.32

Bus #	Bus	MW Impact
342900	1COOPER1 G	7.85
342903	1COOPER2 G	15.28
342945	1LAUREL 1G	4.75
939131	AE1-143 C	10.07
939132	AE1-143 E	4.99
940041	AE1-246 C O1	9.04
940042	AE1-246 E O1	4.4
940051	AE1-247 C O1	15.37
940052	AE1-247 E O1	7.61
940831	AE2-071 C O2	2.59
940832	AE2-071 E O2	1.73
CARR	CARR	0.06
CBM-S1	CBM-S1	3.76
CBM-S2	CBM-S2	0.41
CBM-W1	CBM-W1	1.15
CBM-W2	CBM-W2	18.7
CIN	CIN	0.55
CPLE	CPLE	0.08
G-007	G-007	0.17
IPL	IPL	0.22
MEC	MEC	2.26
O-066	O-066	1.09
RENSSELAER	RENSSELAER	0.05
TRIMBLE	TRIMBLE	0.02
WEC	WEC	0.15

Affected Systems

6 Affected Systems

6.1 LG&E

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

6.2 MISO

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

6.3 TVA

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

6.4 Duke Energy Progress

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

6.5 NYISO

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

Contingency Name	Contingency Definition
EKPC_P4-2_SSHAD S11-1004	CONTINGENCY 'EKPC_P4-2_SSHAD S11-1004' /* SUMMERSHADE OPEN BRANCH FROM BUS 940050 TO BUS 342814 CKT 1 /* 940050 AE1-247 TAP 161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 342811 TO BUS 342814 CKT 1 /* 342811 5SUMM SHAD T161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 342733 TO BUS 342814 CKT 1 /* 342733 5GREEN CO 161.00 342814 5SUMM SHADE 161.00 END
EKPC_P1-2_BARR-SUMSH161-B	CONTINGENCY 'EKPC_P1-2_BARR-SUMSH161-B' /* BARREN CO - SUMMERSHADE OPEN BRANCH FROM BUS 940050 TO BUS 342814 CKT 1 /* 940050 AE1-247 TAP 161.00 342814 5SUMM SHADE 161.00 END
EKPC_P4-2_GREEN W45-1014	CONTINGENCY 'EKPC_P4-2_GREEN W45-1014' /* GREEN CO OPEN BUS 342733 /* 5GREEN CO DROPS BUS OPEN BRANCH FROM BUS 342817 TO BUS 342818 CKT 1 /* 342817 5TAYLOR CO J161.00 342818 5TAYLRCO 161.00 OPEN BRANCH FROM BUS 342805 TO BUS 342817 CKT 1 /* 342805 5SALOMA T 161.00 342817 5TAYLOR CO J161.00 OPEN BRANCH FROM BUS 342802 TO BUS 342805 CKT 1 /* 342802 5SALOMA 161.00 342805 5SALOMA T 161.00 OPEN BRANCH FROM BUS 342775 TO BUS 342805 CKT 1 /* 342775 5MARION IP T161.00 342805 5SALOMA T 161.00 OPEN BRANCH FROM BUS 342772 TO BUS 342775 CKT 1 /* 342772 5MARION IP 161.00 342775 5MARION IP T161.00 OPEN BRANCH FROM BUS 342769 TO BUS 342775 CKT 1 /* 342769 5MARION CO 161.00 342775 5MARION IP T161.00 END
EKPC_P7-1_LAURL 161 DBL	CONTINGENCY 'EKPC_P7-1_LAURL 161 DBL' /* LAUREL CO - LAUREL DAM 161 & LAUREL CO - TYNER 161 OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 OPEN BRANCH FROM BUS 342754 TO BUS 342781 CKT 1 /* 342754 5LAUREL CO 161.00 342781 5PITTSBURG 161.00 OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 /* 342781 5PITTSBURG 161.00 342820 5TYNER 161.00 END
EKPC_P4-2_SSHAD S11-1044	CONTINGENCY 'EKPC_P4-2_SSHAD S11-1044' /* SUMMERSHADE OPEN BRANCH FROM BUS 940050 TO BUS 342814 CKT 1 /* 940050 AE1-247 TAP 161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 342700 TO BUS 342811 CKT 1 /* 342700 5BULLITT CO 161.00 342811 5SUMM SHAD T161.00 OPEN BRANCH FROM BUS 342811 TO BUS 360334 CKT 1 /* 342811 5SUMM SHAD T161.00 360334 5SUMMER SHAD161.00 OPEN BRANCH FROM BUS 342811 TO BUS 342814 CKT 1 /* 342811 5SUMM SHAD T161.00 342814 5SUMM SHADE 161.00 END

Contingency Name	Contingency Definition
EKPC_P4-5_LAURL S50-1024	CONTINGENCY 'EKPC_P4-5_LAURL S50-1024' /* LAUREL CO OPEN BUS 342754 /* 5LAUREL CO DROPS BUS OPEN BRANCH FROM BUS 324688 TO BUS 342781 CKT 1 /* 324688 2PITTSKU 69.000 342781 5PITTSBURG 161.00 OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 /* 342781 5PITTSBURG 161.00 342820 5TYNER 161.00 END
EKPC_P1-2_LAUR-L DAM161	CONTINGENCY 'EKPC_P1-2_LAUR-L DAM161' /* LAUREL CO - LAUREL DAM OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 END

Short Circuit

7 Short Circuit

None