Generation Interconnection

Feasibility Study Report

for

Queue Project AF1-203

PATTON RD-SUMMER SHADE 69 KV

12 MW Capacity / 20 MW Energy

January, 2020

Table of Contents

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 an uprate (Storage generating facility) to an existing Solar generating facility (AE2-071) located in Metcalfe County, KY. This projects requests an increase to the install capability of 20 uprate MW with 12 of uprate MW of this output being recognized by PJM as Capacity. The installed facilities will have a total capability of 55 MW with 33 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 12/31/2022. This study does not imply a TO commitment to this in-service date.

Queue Number	**AF1-203**
Project Name	PATTON RD-SUMMER SHADE 69 KV
State	Kentucky
County	Metcalfe
Transmission Owner	EKPC
MFO	55
MWE	20
MWC	12
Fuel	Solar
Basecase Study Year	2023

2.1 Point of Interconnection

AF1-203 will interconnect with the EKPC transmission system tapping the Patton Rd Jct. to Summer Shade Jct. 69 kV line.

2.2 Cost Summary

The AF1-203 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrade	$0
Non Direct Connection Network Upgrades	$0
Total Costs	$0

In addition, the AF1-203 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	$14,325,000

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.

No additional TO attachment facilities required beyond those identified for AE2-071.

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.

No additional direct connection network upgrades required beyond those identified for AE2-071.

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.

No additional direct connection network upgrades required beyond those identified for AE2-071.

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 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

10.2 EKPC Requirements

[Please enter any TO revenue metering and SCADA Requirements]

11 Network Impacts

The Queue Project AF1-203 was evaluated as a 20.0 MW (Capacity 12.0 MW) injection tapping the Patton Rd Jct. to Summer Shade Jct. 69 kV line in the EKPC area. Project AF1-203 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-203 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

12 Generation Deliverability

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

None

13 Multiple Facility Contingency

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

None

14 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
41615269	341059	2BARRENCO	69.0	EKPC	341651	2HORSECAVE J	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1004	breaker	90.0	203.3	203.97	DC	1.34
41615270	341059	2BARRENCO	69.0	EKPC	341651	2HORSECAVE J	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1044	breaker	90.0	197.73	198.41	DC	1.34
41845978	341059	2BARRENCO	69.0	EKPC	341651	2HORSECAVE J	69.0	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	90.0	206.56	207.27	DC	1.42
41845979	341059	2BARRENCO	69.0	EKPC	341651	2HORSECAVE J	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1004-C	bus	90.0	203.3	203.97	DC	1.34
41845980	341059	2BARRENCO	69.0	EKPC	341651	2HORSECAVE J	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1044-B	bus	90.0	197.73	198.41	DC	1.34
41615728	341158	2BONNIVDIST	69.0	EKPC	341161	2BONNIVEK	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1004	breaker	98.0	116.91	117.53	DC	1.34
41615729	341158	2BONNIVDIST	69.0	EKPC	341161	2BONNIVEK	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1044	breaker	98.0	111.8	112.41	DC	1.34
41846252	341158	2BONNIVDIST	69.0	EKPC	341161	2BONNIVEK	69.0	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	119.8	120.45	DC	1.42
41846253	341158	2BONNIVDIST	69.0	EKPC	341161	2BONNIVEK	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1004-C	bus	98.0	116.91	117.53	DC	1.34
41846254	341158	2BONNIVDIST	69.0	EKPC	341161	2BONNIVEK	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1044-B	bus	98.0	111.8	112.41	DC	1.34
41615866	341431	2EDM-JBGALJ	69.0	EKPC	341728	2KNOB LICK	69.0	EKPC	1	EKPC_P4-2_GREENW45-1014	breaker	46.0	104.71	106.25	DC	1.57
41846342	341431	2EDM-JBGALJ	69.0	EKPC	341728	2KNOB LICK	69.0	EKPC	1	EKPC_P2-3_GREENW45-1014-A	bus	46.0	104.71	106.25	DC	1.57
41846343	341431	2EDM-JBGALJ	69.0	EKPC	341728	2KNOB LICK	69.0	EKPC	1	EKPC_P2-3_GREENW45-1014	bus	46.0	104.49	106.03	DC	1.57

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
41615551	341651	2HORSECAVE J	69.0	EKPC	341914	2MUNFVILKU T	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1004	breaker	98.0	133.03	133.65	DC	1.34
41615552	341651	2HORSECAVE J	69.0	EKPC	341914	2MUNFVILKU T	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1044	breaker	98.0	127.82	128.43	DC	1.34
41846158	341651	2HORSECAVE J	69.0	EKPC	341914	2MUNFVILKU T	69.0	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	135.92	136.57	DC	1.42
41846159	341651	2HORSECAVE J	69.0	EKPC	341914	2MUNFVILKU T	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1004-C	bus	98.0	133.03	133.65	DC	1.34
41846160	341651	2HORSECAVE J	69.0	EKPC	341914	2MUNFVILKU T	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1044-B	bus	98.0	127.82	128.43	DC	1.34
41615698	341908	2MUNFVILEK	69.0	EKPC	341158	2BONNIVDIST	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1004	breaker	98.0	119.36	119.98	DC	1.34
41615699	341908	2MUNFVILEK	69.0	EKPC	341158	2BONNIVDIST	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1044	breaker	98.0	114.14	114.76	DC	1.34
41846237	341908	2MUNFVILEK	69.0	EKPC	341158	2BONNIVDIST	69.0	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	122.24	122.9	DC	1.42
41846238	341908	2MUNFVILEK	69.0	EKPC	341158	2BONNIVDIST	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1004-C	bus	98.0	119.36	119.98	DC	1.34
41846239	341908	2MUNFVILEK	69.0	EKPC	341158	2BONNIVDIST	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1044-B	bus	98.0	114.14	114.76	DC	1.34
41615618	341914	2MUNFVILKU T	69.0	EKPC	341908	2MUNFVILEK	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1004	breaker	98.0	125.99	126.61	DC	1.34
41615619	341914	2MUNFVILKU T	69.0	EKPC	341908	2MUNFVILEK	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1044	breaker	98.0	120.78	121.39	DC	1.34
41846192	341914	2MUNFVILKU T	69.0	EKPC	341908	2MUNFVILEK	69.0	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	128.88	129.53	DC	1.42
41846193	341914	2MUNFVILKU T	69.0	EKPC	341908	2MUNFVILEK	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1004-C	bus	98.0	125.99	126.61	DC	1.34
41846194	341914	2MUNFVILKU T	69.0	EKPC	341908	2MUNFVILEK	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1044-B	bus	98.0	120.78	121.39	DC	1.34
41025675	342286	2SOMERSET	69.0	EKPC	342287	2SOMERSET KU	69.0	EKPC	1	EKPC_P7-1_COOP 161 DBL 2	tower	115.0	123.76	124.33	DC	1.45
41025575	342287	2SOMERSET KU	69.0	EKPC	324531	2FERGUSON SO	69.0	LGEE	1	EKPC_P7-1_COOP 161 DBL 2	tower	105.0	144.49	145.28	DC	1.84
41615558	342319	2SUMMSHAD J	69.0	EKPC	342322	2SUMMSHADE	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1004	breaker	98.0	116.3	131.45	DC	14.85
41846188	342319	2SUMMSHAD J	69.0	EKPC	342322	2SUMMSHADE	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1004-C	bus	98.0	116.3	131.45	DC	14.85
41846189	342319	2SUMMSHAD J	69.0	EKPC	342322	2SUMMSHADE	69.0	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	115.33	130.45	DC	14.82
41615711	342322	2SUMMSHADE	69.0	EKPC	341431	2EDM-JBGAL J	69.0	EKPC	1	EKPC_P4-2_GREENW45-1014	breaker	46.0	117.1	118.64	DC	1.57
41846268	342322	2SUMMSHADE	69.0	EKPC	341431	2EDM-JBGAL J	69.0	EKPC	1	EKPC_P2-3_GREENW45-1014-A	bus	46.0	117.1	118.64	DC	1.57

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
41846269	342322	2SUMMSHADE	69.0	EKPC	341431	2EDM-JBGALJ	69.0	EKPC	1	EKPC_P2-3_GREENW45-1014	bus	46.0	116.88	118.42	DC	1.57
41615418	940830	AE2-071 TAP	69.0	EKPC	342319	2SUMMSHADJ	69.0	EKPC	1	EKPC_P4-2_SSHAD S11-1004	breaker	63.0	123.91	149.7	DC	16.25
41846109	940830	AE2-071 TAP	69.0	EKPC	342319	2SUMMSHADJ	69.0	EKPC	1	EKPC_P2-3_SSHAD S11-1004-C	bus	63.0	123.91	149.7	DC	16.25
41846110	940830	AE2-071 TAP	69.0	EKPC	342319	2SUMMSHADJ	69.0	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	63.0	123.21	148.98	DC	16.23

15 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
41293698	341059	2BARRENCO	69.0	EKPC	341651	2HORSECAVE J	69.0	EKPC	1	EKPC_P1-2_BARR-SUMSH161-C	operation	90.0	195.61	196.24	DC	1.28
41293702	341059	2BARRENCO	69.0	EKPC	341651	2HORSECAVE J	69.0	EKPC	1	Base Case	operation	77.0	103.64	104.29	DC	1.12
41294384	341158	2BONNIVDIST	69.0	EKPC	341161	2BONNIVEK	69.0	EKPC	1	EKPC_P1-2_BARR-SUMSH161-C	operation	98.0	109.84	110.43	DC	1.28
41294168	341651	2HORSECAVE J	69.0	EKPC	341914	2MUNFVILKU T	69.0	EKPC	1	EKPC_P1-2_BARR-SUMSH161-C	operation	98.0	125.96	126.55	DC	1.28
41294344	341908	2MUNFVILEK	69.0	EKPC	341158	2BONNIVDIST	69.0	EKPC	1	EKPC_P1-2_BARR-SUMSH161-C	operation	98.0	112.29	112.88	DC	1.28
41294279	341914	2MUNFVILKU T	69.0	EKPC	341908	2MUNFVILEK	69.0	EKPC	1	EKPC_P1-2_BARR-SUMSH161-C	operation	98.0	118.92	119.51	DC	1.28
41294126	342319	2SUMMSHADJ	69.0	EKPC	342322	2SUMMSHADE	69.0	EKPC	1	EKPC_P1-2_BARR-SUMSH161-C	operation	98.0	114.64	129.78	DC	14.84

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
42523239	342757	5LAUREL DAM	161.0	EKPC	342754	5LAUREL CO	161.0	EKPC	1	EKPC_P1-2_COOP-ELIHU161	operation	200.0	99.87	100.11	DC	1.05
42523204	342775	5MARION IP T	161.0	EKPC	342769	5MARION CO	161.0	EKPC	1	Base Case	operation	84.0	101.89	102.88	DC	1.84
41293945	940830	AE2-071 TAP	69.0	EKPC	342319	2SUMM SHAD J	69.0	EKPC	1	EKPC_P1-2_BARR-SUMSH161-C	operation	63.0	122.46	148.24	DC	16.24

16 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
41025675	7	2SOMERSET 69.0 kV - 2SOMERSET KU 69.0 kV Ckt 1	r0080 (82) : Replace the 500 MCM copper jumpers at the Somerset substation using 750 MCM copper or equivalent Project Type : FAC Cost : $10,000 Time Estimate : 6.0 Months	$10,000
41615866,41846342, 41846343	3	2EDM-JBGAL J 69.0 kV - 2KNOB LICK 69.0 kV Ckt 1	r0049 (51) : Increase the maximum operating temperature of the 266 MCM ACSR conductor in the Edmonton/JB Galloway Jct-Knob Lick 6 9kV line section to 176 degrees F (5.7 miles) Project Type : FAC Cost : $310,000 Time Estimate : 12.0 Months	$310,000
41025575	8	2SOMERSET KU 69.0 kV - 2FERGUSON SO 69.0 kV Ckt 1	r0078 (80) : Replace the 1200A current transformer at Somerset with a 2000A current transformer. Project Type : FAC Cost : $35,000 Time Estimate : 6.0 Months NonPJMArea: The external (i.e. Non-PJM) Transmission Owner, LGEE, will not evaluate this violation until the impact study phase.	$35,000
41845980,41615270, 41845979,41615269, 41845978	1	2BARREN CO 69.0 kV - 2HORSECAVE J 69.0 kV Ckt 1	N6197.1 (1) : 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 N6197.2 (2) : 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 r0022 (24) : Rebuild the Barren County-Horse Cave Junction 69 kV line section using 954 MCM ACSS conductor at 392 degrees F (3.9 miles) Project Type : FAC Cost : $3,900,000 Time Estimate : 15.0 Months r0023 (25) : Replace the 1200A circuit breaker W59-614 at Barren County with a 2000A circuit breaker Project Type : FAC Cost : $125,000 Time Estimate : 9.0 Months r0024 (26) : Replace the 1200A disconnect switches W59-613 and W59-615 at Barren County substation and W611-605 at Horse Cave Junction Project Type : FAC Cost : $300,000 Time Estimate : 12.0 Months	$4,335,000

ID	Index	Facility	Upgrade Description	Cost
41615711,41846269, 41846268	10	2SUMM SHADE 69.0 kV - 2EDM-JBGAL J 69.0 kV Ckt 1	r0004 (5) : Increase the maximum operating temperature of the 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
41615728,41615729, 41846254,41846252, 41846253	2	2BONNIV DIST 69.0 kV - 2BONNIV EK 69.0 kV Ckt 1	r0028 (30) : Replace the 556 MCM ACSR conductor (~50 feet) in the line section using 795 MCM ACSR conductor at 212 degrees F Project Type : FAC Cost : $10,000 Time Estimate : 6.0 Months	$10,000
41846110,41615418, 41846109	11	AE2-071 TAP 69.0 kV - 2SUMM SHAD J 69.0 kV Ckt 1	r0071 (73) : Rebuild the AE2-071-Summer Shade 69 kV line section using 795 MCM ACSR conductor at 212 degrees F (1.7 miles) Project Type : FAC Cost : $2,110,000 Time Estimate : 16.0 Months	$2,110,000
41615558,41846188, 41846189	9	2SUMM SHAD J 69.0 kV - 2SUMM SHADE 69.0 kV Ckt 1	r0065 (67) : Increase the maximum operating temperature of the 556 MCM ACSR conductor in the Summer Shade-Summer Shade Junction 69 kV line section to 302 degrees F (0.2 mile) Project Type : FAC Cost : $10,000 Time Estimate : 6.0 Months r0066 (68) : Change the current transformer setting at Summer Shade associated with circuit breaker S11-634 from 600A to 800A. Project Type : FAC Cost : $10,000 Time Estimate : 6.0 Months r0067 (69) : Replace the 500 MCM copper bus and jumpers at the Summer Shade substation using 750 MCM copper or equivalent Project Type : FAC Cost : $120,000 Time Estimate : 6.0 Months r0068 (70) : Change the Zone 3 relay setting at Summer Shade associated with the line protection to at least 132 MVA LTE rating. Project Type : FAC Cost : $0 Time Estimate : 6.0 Months	$140,000
41846193,41846192, 41615618,41615619, 41846194	6	2MUNFVILKU T 69.0 kV - 2MUNFVIL EK 69.0 kV Ckt 1	r0051 (53) : Increase the maximum operating temperature of the 556 MCM ACSR conductor in the Munfordville KU Tap-Munfordville EK 69 kV line section to 302 degrees F (2.0 miles) Project Type : FAC Cost : $140,000 Time Estimate : 7.0 Months	$140,000

ID	Index	Facility	Upgrade Description	Cost
41615552,41615551, 41846159,41846158, 41846160	4	2HORSECAVE J 69.0 kV - 2MUNFVILKU T 69.0 kV Ckt 1	r0035 (37) : Increase the maximum operating temperature of the 556 MCM ACSR conductor in the KU Horse Cave Junction-Munfordville KU Tap 69 kV line section to 302 degrees F (6.8 miles) Project Type : FAC Cost : $460,000 Time Estimate : 9.0 Months r0055 (57) : Rebuild the Horse Cave Junction-Munfordville KU 69 kV line section using 954 MCM ACSR conductor at 212 degrees F (6.8 miles) Project Type : FAC Cost : $6,160,000 Time Estimate : 20.0 Months	$6,160,000
41846238,41846237, 41615698,41615699, 41846239	5	2MUNFVIL EK 69.0 kV - 2BONNIV DIST 69.0 kV Ckt 1	r0021 (23) : Increase the maximum operating temperature of the 556 MCM ACSR conductor in the Bonnieville Dist.-Munfordville EK 69 kV line section to 302 degrees F (8.2 miles) Project Type : FAC Cost : $550,000 Time Estimate : 9.0 Months	$550,000
			TOTAL COST	**$14,325,000**

17 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.

17.1 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
41845978	341059	2BARRENCO	EKPC	341651	2HORSECAVEJ	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	90.0	206.56	207.27	DC	1.42

Bus #	Bus	MW Impact
940041	AE1-246 C O1	25.1728
940042	AE1-246 E O1	12.2588
940051	AE1-247 C O1	42.7656
940052	AE1-247 E O1	21.1800
940831	AE2-071 C	1.2718
940832	AE2-071 E	0.8479
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**23.6755**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**13.7561**
945381	AF1-203 C	0.3852
945382	AF1-203 E	0.2568
NEWTON	NEWTON	0.0118
CPLE	CPLE	0.1039
G-007A	G-007A	0.0384
VFT	VFT	0.1032
CBM-W2	CBM-W2	1.3186
CBM-W1	CBM-W1	0.0125
TVA	TVA	0.6678
CBM-S2	CBM-S2	1.1733
EDWARDS	EDWARDS	0.0028
CBM-S1	CBM-S1	2.7946
TILTON	TILTON	0.0460
MADISON	MADISON	0.3871
MEC	MEC	0.1192
GIBSON	GIBSON	0.1267
BLUEG	BLUEG	0.5139
TRIMBLE	TRIMBLE	0.1519

17.2 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
41846252	341158	2BONNIV DIST	EKPC	341161	2BONNIV EK	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	119.8	120.45	DC	1.42

Bus #	Bus	MW Impact
940041	AE1-246 C O1	25.1728
940042	AE1-246 E O1	12.2588
940051	AE1-247 C O1	42.7656
940052	AE1-247 E O1	21.1800
940831	AE2-071 C	1.2718
940832	AE2-071 E	0.8479
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**23.6755**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**13.7561**
945381	AF1-203 C	0.3852
945382	AF1-203 E	0.2568
NEWTON	NEWTON	0.0118
CPLE	CPLE	0.1039
G-007A	G-007A	0.0384
VFT	VFT	0.1032
CBM-W2	CBM-W2	1.3186
CBM-W1	CBM-W1	0.0125
TVA	TVA	0.6678
CBM-S2	CBM-S2	1.1733
EDWARDS	EDWARDS	0.0028
CBM-S1	CBM-S1	2.7946
TILTON	TILTON	0.0460
MADISON	MADISON	0.3871
MEC	MEC	0.1192
GIBSON	GIBSON	0.1267
BLUEG	BLUEG	0.5139
TRIMBLE	TRIMBLE	0.1519

17.3 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
41846343	341431	2EDM-JBGAL J	EKPC	341728	2KNOB LICK	EKPC	1	EKPC_P2-3_GREEN W45-1014	bus	46.0	104.49	106.03	DC	1.57

Bus #	Bus	MW Impact
940831	AE2-071 C	1.4027
940832	AE2-071 E	0.9351
945381	AF1-203 C	0.4248
945382	AF1-203 E	0.2832
CPLE	CPLE	0.0688
G-007A	G-007A	0.0216
VFT	VFT	0.0581
WEC	WEC	0.0038
CBM-W2	CBM-W2	1.1138
CBM-W1	CBM-W1	0.1877
TVA	TVA	0.4662
CBM-S2	CBM-S2	0.7861
CBM-S1	CBM-S1	1.9426
TILTON	TILTON	0.0151
MADISON	MADISON	0.3165
MEC	MEC	0.1128
GIBSON	GIBSON	0.0497
BLUEG	BLUEG	0.2951
TRIMBLE	TRIMBLE	0.0907

17.4 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
41846158	341651	2HORSECAVE J	EKPC	341914	2MUNFVILKU T	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	135.92	136.57	DC	1.42

Bus #	Bus	MW Impact
940041	AE1-246 C O1	25.1728
940042	AE1-246 E O1	12.2588
940051	AE1-247 C O1	42.7656
940052	AE1-247 E O1	21.1800
940831	AE2-071 C	1.2718
940832	AE2-071 E	0.8479
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**23.6755**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**13.7561**
945381	AF1-203 C	0.3852
945382	AF1-203 E	0.2568
NEWTON	NEWTON	0.0118
CPLE	CPLE	0.1039
G-007A	G-007A	0.0384
VFT	VFT	0.1032
CBM-W2	CBM-W2	1.3186
CBM-W1	CBM-W1	0.0125
TVA	TVA	0.6678
CBM-S2	CBM-S2	1.1733
EDWARDS	EDWARDS	0.0028
CBM-S1	CBM-S1	2.7946
TILTON	TILTON	0.0460
MADISON	MADISON	0.3871
MEC	MEC	0.1192
GIBSON	GIBSON	0.1267
BLUEG	BLUEG	0.5139
TRIMBLE	TRIMBLE	0.1519

17.5 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
41846237	341908	2MUNFVILEK	EKPC	341158	2BONNIV DIST	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	122.24	122.9	DC	1.42

Bus #	Bus	MW Impact
940041	AE1-246 C O1	25.1728
940042	AE1-246 E O1	12.2588
940051	AE1-247 C O1	42.7656
940052	AE1-247 E O1	21.1800
940831	AE2-071 C	1.2718
940832	AE2-071 E	0.8479
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**23.6755**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**13.7561**
945381	AF1-203 C	0.3852
945382	AF1-203 E	0.2568
NEWTON	NEWTON	0.0118
CPLE	CPLE	0.1039
G-007A	G-007A	0.0384
VFT	VFT	0.1032
CBM-W2	CBM-W2	1.3186
CBM-W1	CBM-W1	0.0125
TVA	TVA	0.6678
CBM-S2	CBM-S2	1.1733
EDWARDS	EDWARDS	0.0028
CBM-S1	CBM-S1	2.7946
TILTON	TILTON	0.0460
MADISON	MADISON	0.3871
MEC	MEC	0.1192
GIBSON	GIBSON	0.1267
BLUEG	BLUEG	0.5139
TRIMBLE	TRIMBLE	0.1519

17.6 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
41846192	341914	2MUNFVILKUT	EKPC	341908	2MUNFVILEK	EKPC	1	EKPC_P2-2_SUMMSHADE 161 #2-B	bus	98.0	128.88	129.53	DC	1.42

Bus #	Bus	MW Impact
940041	AE1-246 C O1	25.1728
940042	AE1-246 E O1	12.2588
940051	AE1-247 C O1	42.7656
940052	AE1-247 E O1	21.1800
940831	AE2-071 C	1.2718
940832	AE2-071 E	0.8479
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**23.6755**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**13.7561**
945381	AF1-203 C	0.3852
945382	AF1-203 E	0.2568
NEWTON	NEWTON	0.0118
CPLE	CPLE	0.1039
G-007A	G-007A	0.0384
VFT	VFT	0.1032
CBM-W2	CBM-W2	1.3186
CBM-W1	CBM-W1	0.0125
TVA	TVA	0.6678
CBM-S2	CBM-S2	1.1733
EDWARDS	EDWARDS	0.0028
CBM-S1	CBM-S1	2.7946
TILTON	TILTON	0.0460
MADISON	MADISON	0.3871
MEC	MEC	0.1192
GIBSON	GIBSON	0.1267
BLUEG	BLUEG	0.5139
TRIMBLE	TRIMBLE	0.1519

17.7 Index 7

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
41025675	342286	2SOMERSET	EKPC	342287	2SOMERSET KU	EKPC	1	EKPC_P7-1_COOP 161 DBL 2	tower	115.0	123.76	124.33	DC	1.45

Bus #	Bus	MW Impact
342900	1COOPER1 G	4.4802
342903	1COOPER2 G	8.6895
939131	AE1-143 C	5.3375
939132	AE1-143 E	2.6438
940041	AE1-246 C O1	4.2392
940042	AE1-246 E O1	2.0644
940051	AE1-247 C O1	7.2019
940052	AE1-247 E O1	3.5668
940831	AE2-071 C	1.2979
940832	AE2-071 E	0.8652
943701	AF1-038 C	6.1942
943702	AF1-038 E	4.1294
943821	AF1-050 C	1.1896
943822	AF1-050 E	0.7931
944151	AF1-083 C O1	1.2604
944152	AF1-083 E O1	0.8403
944511	AF1-116 C	3.1726
944512	AF1-116 E	2.1150
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**2.1292**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**1.2371**
945381	AF1-203 C	0.3931
945382	AF1-203 E	0.2620
LGEE	LGEE	0.0120
CPLE	CPLE	0.0304
WEC	WEC	0.0479
LGE-0012019	LGE-0012019	5.0391
CBM-W2	CBM-W2	3.5463
NY	NY	0.0431
CBM-W1	CBM-W1	1.6763
TVA	TVA	1.0696
O-066	O-066	0.5242
CBM-S2	CBM-S2	0.5953
CBM-S1	CBM-S1	5.3335
G-007	G-007	0.0811
MADISON	MADISON	0.7540
MEC	MEC	0.4481

17.8 Index 8

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
41025575	342287	2SOMERSET KU	EKPC	324531	2FERGUSON SO	LGEE	1	EKPC_P7-1_COOP 161 DBL 2	tower	105.0	144.49	145.28	DC	1.84

Bus #	Bus	MW Impact
342900	1COOPER1 G	4.3847
342903	1COOPER2 G	8.5042
939131	AE1-143 C	6.4726
939132	AE1-143 E	3.2061
940041	AE1-246 C O1	5.3429
940042	AE1-246 E O1	2.6019
940051	AE1-247 C O1	9.0769
940052	AE1-247 E O1	4.4954
940831	AE2-071 C	1.6418
940832	AE2-071 E	1.0946
943701	AF1-038 C	8.4535
943702	AF1-038 E	5.6357
943821	AF1-050 C	1.3743
943822	AF1-050 E	0.9162
944151	AF1-083 C O1	1.3582
944152	AF1-083 E O1	0.9055
944511	AF1-116 C	7.2590
944512	AF1-116 E	4.8394
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**2.6865**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**1.5610**
945381	AF1-203 C	0.4972
945382	AF1-203 E	0.3315
CPLE	CPLE	0.0642
WEC	WEC	0.0617
LGE-0012019	LGE-0012019	5.1436
CBM-W2	CBM-W2	4.6028
NY	NY	0.0442
CBM-W1	CBM-W1	2.1893
TVA	TVA	1.4140
O-066	O-066	0.5174
CBM-S2	CBM-S2	1.0057
CBM-S1	CBM-S1	6.9779
G-007	G-007	0.0801
MADISON	MADISON	0.9919
MEC	MEC	0.5800

17.9 Index 9

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
41846188	342319	2SUMM SHAD J	EKPC	342322	2SUMM SHADE	EKPC	1	EKPC_P2-3_SSHADS11-1004-C	bus	98.0	116.3	131.45	DC	14.85

Bus #	Bus	MW Impact
940041	AE1-246 C O1	19.4261
940042	AE1-246 E O1	9.4603
940051	AE1-247 C O1	33.0027
940052	AE1-247 E O1	16.3449
940831	AE2-071 C	15.5887
940832	AE2-071 E	10.3925
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**18.2706**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**10.6158**
945381	AF1-203 C	8.9078
945382	AF1-203 E	5.9386
CPLE	CPLE	0.0053
WEC	WEC	0.0198
CBM-W2	CBM-W2	1.0893
NY	NY	0.0033
CBM-W1	CBM-W1	0.7131
TVA	TVA	0.1918
O-066	O-066	0.0403
CBM-S2	CBM-S2	0.0867
CHEOAH	CHEOAH	0.0150
CBM-S1	CBM-S1	0.8946
G-007	G-007	0.0062
MADISON	MADISON	0.2258
MEC	MEC	0.1541
CALDERWOOD	CALDERWOOD	0.0159
BLUEG	BLUEG	0.0052
TRIMBLE	TRIMBLE	0.0033

17.10 Index 10

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
41846269	342322	2SUMM SHADE	EKPC	341431	2EDM-JBGAL J	EKPC	1	EKPC_P2-3_GREEN W45-1014	bus	46.0	116.88	118.42	DC	1.57

Bus #	Bus	MW Impact
940831	AE2-071 C	1.4027
940832	AE2-071 E	0.9351
945381	AF1-203 C	0.4248
945382	AF1-203 E	0.2832
CPLE	CPLE	0.0688
G-007A	G-007A	0.0216
VFT	VFT	0.0581
WEC	WEC	0.0038
CBM-W2	CBM-W2	1.1138
CBM-W1	CBM-W1	0.1877
TVA	TVA	0.4662
CBM-S2	CBM-S2	0.7861
CBM-S1	CBM-S1	1.9426
TILTON	TILTON	0.0151
MADISON	MADISON	0.3165
MEC	MEC	0.1128
GIBSON	GIBSON	0.0497
BLUEG	BLUEG	0.2951
TRIMBLE	TRIMBLE	0.0907

17.11 Index 11

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
41846109	940830	AE2-071 TAP	EKPC	342319	2SUMM SHAD J	EKPC	1	EKPC_P2-3_SSHADS11-1004-C	bus	63.0	123.91	149.7	DC	16.25

Bus #	Bus	MW Impact
940041	AE1-246 C O1	10.7928
940042	AE1-246 E O1	5.2560
940051	AE1-247 C O1	18.3358
940052	AE1-247 E O1	9.0809
940831	AE2-071 C	17.0602
940832	AE2-071 E	11.3735
944981	**AF1-163 C O1 (Withdrawn : 12/11/2019)**	**10.1509**
944982	**AF1-163 E O1 (Withdrawn : 12/11/2019)**	**5.8979**
945381	AF1-203 C	9.7487
945382	AF1-203 E	6.4991
CPLE	CPLE	0.0033
WEC	WEC	0.0110
CBM-W2	CBM-W2	0.6061
NY	NY	0.0017
CBM-W1	CBM-W1	0.3878
TVA	TVA	0.1064
O-066	O-066	0.0202
CBM-S2	CBM-S2	0.0462
CHEOAH	CHEOAH	0.0085
CBM-S1	CBM-S1	0.4942
G-007	G-007	0.0031
MADISON	MADISON	0.1250
MEC	MEC	0.0858
CALDERWOOD	CALDERWOOD	0.0089
BLUEG	BLUEG	0.0035
TRIMBLE	TRIMBLE	0.0017

Affected Systems

18 Affected Systems

18.1 LG&E

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

18.2 MISO

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

18.3 TVA

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

18.4 Duke Energy Progress

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

18.5 NYISO

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

19 Contingency Descriptions

Contingency Name	Contingency Definition
EKPC_P4-2_SSHAD S11-1004	CONTINGENCY 'EKPC_P4-2_SSHAD S11-1004' /* SUMMERSHADE OPEN BRANCH FROM BUS 944980 TO BUS 342814 CKT 1 /* 944980 AF1-163 TAP 161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 361788 TO BUS 342814 CKT 1 /* 361788 5SUM SHAD TP161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 943820 TO BUS 342814 CKT 1 /* 943820 AF1-050 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 944150 TO BUS 342817 CKT 1 /* 944150 AF1-083 TAP 161.00 342817 5TAYLOR CO J161.00 END
EKPC_P2-3_GREEN W45-1014-A	CONTINGENCY 'EKPC_P2-3_GREEN W45-1014-A' /* OPEN BUS 342733 /* 5GREEN CO 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 944150 CKT 1 /* 342805 5SALOMA T 161.00 342817 5TAYLOR CO J161.00 END
EKPC_P2-3_GREEN W45-1014	CONTINGENCY 'EKPC_P2-3_GREEN W45-1014' /* OPEN BUS 342733 /* 5GREEN CO 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 944150 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_P1-2_COOP-ELIHU161	CONTINGENCY 'EKPC_P1-2_COOP-ELIHU161' /* COOPER - KU ELIHU OPEN BRANCH FROM BUS 324141 TO BUS 342718 CKT 1 /* 324141 5ELIHU 161.00 342718 5COOPER2 161.00 END

Contingency Name	Contingency Definition
EKPC_P7-1_COOP 161 DBL 2	CONTINGENCY 'EKPC_P7-1_COOP 161 DBL 2' /* COOPER - ELIHU 161 & COOPER - LAUREL DAM 161 OPEN BRANCH FROM BUS 324141 TO BUS 342718 CKT 1 /* 324141 5ELIHU 161.00 342718 5COOPER2 161.00 OPEN BRANCH FROM BUS 342718 TO BUS 342757 CKT 1 /* 342718 5COOPER2 161.00 342757 5LAUREL DAM 161.00 END
Base Case	
EKPC_P2-3_SSHAD S11-1044-B	CONTINGENCY 'EKPC_P2-3_SSHAD S11-1044-B' /* SUMMERSHADE OPEN BRANCH FROM BUS 944980 TO BUS 342814 CKT 1 /* 940050 AE1-247 TAP 161.00 342814 5SUMM SHADE 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
EKPC_P2-3_SSHAD S11-1004-C	CONTINGENCY 'EKPC_P2-3_SSHAD S11-1004-C' /* SUMMERSHADE OPEN BRANCH FROM BUS 944980 TO BUS 342814 CKT 1 /* AF1-163 TAP 161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 361788 TO BUS 342814 CKT 1 /* 361788 5SUM SHAD TP161.00 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 943820 TO BUS 342814 CKT 1 /* 943820 AF1-050 TAP 161.00 342814 5SUMM SHADE 161.00 END
EKPC_P4-2_SSHAD S11-1044	CONTINGENCY 'EKPC_P4-2_SSHAD S11-1044' /* SUMMERSHADE OPEN BRANCH FROM BUS 944980 TO BUS 342814 CKT 1 /* 944980 AF1-163 TAP 161.00 342814 5SUMM SHADE 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
EKPC_P1-2_BARR-SUMSH161-C	CONTINGENCY 'EKPC_P1-2_BARR-SUMSH161-C' /* BARREN CO - SUMMERSHADE OPEN BRANCH FROM BUS 944980 TO BUS 342814 CKT 1 /* 944980 AF1-163 TAP 161.00 342814 5SUMM SHADE 161.00 END
EKPC_P2-2_SUMMSHADE 161 #2-B	CONTINGENCY 'EKPC_P2-2_SUMMSHADE 161 #2-B' /* SUMMERSHADE 161 BUS OPEN BRANCH FROM BUS 943820 TO BUS 342814 CKT 1 /* AF1-050 342814 5SUMM SHADE 161.00 OPEN BRANCH FROM BUS 944980 TO BUS 342814 CKT 1 /* AF1-163 161.00 342814 5SUMM SHADE 161.00 OPEN BUS 361788 /* 361788 5SUM SHAD TP161.00 END

Short Circuit

20 Short Circuit

The following Breakers are overduty

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