Generation Interconnection

System Impact Study Report

for

Queue Project AF1-203

PATTON RD-SUMMER SHADE 69 KV

12 MW Capacity / 20 MW Energy

August, 2020

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1 Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 205, as well as the System Impact Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is EKPC.

2 Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. 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 System Impact Study is performed.

The System Impact 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.

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.

3 General

The Interconnection Customer (IC) has proposed an uprate to an existing Solar; Storage generating facility located in Metcalfe, Kentucky. This project is an increase to the Interconnection Customer's AE2-071 project, which will share the same point of interconnection. The AF1-203 queue position is a 20 MW uprate (12 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 55 MW with 33 MW of this output being recognized by PJM as Capacity.

The proposed in-service date for this uprate project is December 31, 2022. This study does not imply a TO commitment to this in-service date.

The objective of this System Impact Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the ITO transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required for maintaining the reliability of the ITO transmission system.

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; Storage
Basecase Study Year	2023

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Point of Interconnection

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

5 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
Allocation for New System Upgrades*	$0
Contribution to Previously Identified Upgrades*	$350,000
Total Costs	**$350,000**

*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

Note 2: For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

6 Transmission Owner Scope of Work

6.1 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
	$0
Total Attachment Facility Costs	**$0**

6.2 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
	$0
Total Attachment Facility Costs	**$0**

6.3 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
	$0
Total Attachment Facility Costs	**$0**

7 Incremental Capacity Transfer Rights (ICTRs)

None

8 Interconnection Customer Requirements

It is understood that the Interconnection Customer is responsible for all costs associated with this interconnection. The costs above are reimbursable to the Interconnected Transmission Owner. The cost of the Interconnection Customer's generating plant and the costs for the line connecting the generating plant to the Interconnected Transmission Owner's Transmission circuit are not included in this report; these are assumed to be the Interconnection Customer's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for the Interconnected Transmission Owner to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Requirement from the PJM Open Access Transmission Tariff:

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 Section 8 of Attachment O.

9.2 Meteorological Data Reporting Requirements

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Back Panel temperature (Fahrenheit)
- Irradiance (Watts/meter^2)
- Ambient air temperature (Fahrenheit) – (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

9.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

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

10 Summer Peak Analysis

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 (specifically at the AE2-071 Tap interconnection substation) 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 100.0 %. Potential network impacts were as follows:

10.1 Generation Deliverability

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

None

10.2 Multiple Facility Contingency

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

None

10.3 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)

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
4161586	341431	2EDM-JBGALJ	69.0	EKPC	341728	2KNOBLICK	69.0	EKPC	1	EKPC_P4-2_GREEN W45-1014	breaker	46.0	109.53	112.44	AC	1.57
4184634	341431	2EDM-JBGALJ	69.0	EKPC	341728	2KNOBLICK	69.0	EKPC	1	EKPC_P2-3_GREEN W45-1014-A	bus	46.0	109.53	112.44	AC	1.57
4184634	341431	2EDM-JBGALJ	69.0	EKPC	341728	2KNOBLICK	69.0	EKPC	1	EKPC_P2-3_GREEN W45-1014	bus	46.0	109.1	112.0	AC	1.57
4102567	342286	2SOMERSET	69.0	EKPC	342287	2SOMERSET KU	69.0	EKPC	1	EKPC_P7-1_COOP 161 DBL 2	tower	115.0	119.06	120.16	AC	1.45
4102557	342287	2SOMERSET KU	69.0	EKPC	324531	2FERGUSON SO	69.0	LGEE	1	EKPC_P7-1_COOP 161 DBL 2	tower	105.0	133.49	135.01	AC	1.84

10.4 Steady-State Voltage Requirements

None

10.5 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.

None

10.6 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF1-203	Upgrade Number
41025675	3	**2SOMERSET 69.0 kV - 2SOMERSET KU 69.0 kV Ckt 1**	Upgrade the existing 500 MCM CU bus jumpers to 750 MCM CU. 6 month time estimate. New expected SE rating after the upgrade will be 152 MVA. This line overload is presently driven by a prior queue cycle.	$250 K	$0	N6232
41615866,41846342,41846343	2	**2EDM-JBGAL J 69.0 kV - 2KNOB LICK 69.0 kV Ckt 1**	(N6494) Increase the maximum operating temperature of the 266 MCM ACSR conductor in the Edmonton/JB Galloway JctKnob Lick 6 9kV line section to 176 degrees F (5.7 miles). Time Estimate : 12 Months N6494 is driven by a prior queue cycle (N6494.1) Increase the maximum operating temperature of the 266 MCM ACSR conductor in the Edmonton/JB Galloway JctKnob Lick 6 9kV line section to 212 degrees F (5.7 miles). Time Estimate : 12 Months	$310 K + $350 K	$0 + $350 K	N6494 N6494.1
41025575	4	**2SOMERSET KU 69.0 kV - 2FERGUSON SO 69.0 kV Ckt 1**	EKPC: SE rating is 152 MVA. No EKPC upgrade required. LG&E: SE rating is 83 MVA. A LG&E affected system study will be required to determine if LG&E upgrades are required on this line. Preliminary upgrade, if determined to be required, is to replace terminal equipment at a cost estimate of $897.613 K.	$0	$0	N/A
			Total Cost	**$910,000**	**$350,000**	

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

10.7 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

10.7.1 Index 1

None

10.7.2 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
41846343	341431	2EDM-JBGAL J	EKPC	341728	2KNOB LICK	EKPC	1	EKPC_P2-3_GREEN W45-1014	bus	46.0	109.1	112.0	AC	1.57

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
940831	AE2-071 C	1.4027	Adder	1.65
940832	AE2-071 E	0.9351	Adder	1.1
945381	AF1-203 C	0.8015	Adder	0.94
945382	AF1-203 E	0.5343	Adder	0.63
WEC	WEC	0.0038	Confirmed LTF	0.0038
CPLE	CPLE	0.0688	Confirmed LTF	0.0688
G-007A	G-007A	0.0240	Confirmed LTF	0.0240
VFT	VFT	0.0645	Confirmed LTF	0.0645
CBM-W2	CBM-W2	1.1220	Confirmed LTF	1.1220
TVA	TVA	0.4662	Confirmed LTF	0.4662
CBM-S2	CBM-S2	0.7861	Confirmed LTF	0.7861
CBM-S1	CBM-S1	1.9426	Confirmed LTF	1.9426
TILTON	TILTON	0.0151	Confirmed LTF	0.0151
MADISON	MADISON	0.3185	Confirmed LTF	0.3185
MEC	MEC	0.1128	Confirmed LTF	0.1128
GIBSON	GIBSON	0.0497	Confirmed LTF	0.0497
BLUEG	BLUEG	0.2951	Confirmed LTF	0.2951
TRIMBLE	TRIMBLE	0.0907	Confirmed LTF	0.0907
CBM-W1	CBM-W1	0.1877	Confirmed LTF	0.1877

10.7.3 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
41025675	342286	2SOMERSET	EKPC	342287	2SOMERSET KU	EKPC	1	EKPC_P7-1_COOP 161 DBL 2	tower	115.0	119.06	120.16	AC	1.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	5.6852	50/50	5.6852
342903	1COOPER2 G	11.0266	50/50	11.0266
939131	AE1-143 C	5.3386	Adder	6.28
939132	AE1-143 E	2.6443	Adder	3.11
940041	AE1-246 C O1	4.2405	Adder	4.99
940042	AE1-246 E O1	2.0651	Adder	2.43
940831	AE2-071 C	1.2982	Adder	1.53
940832	AE2-071 E	0.8655	Adder	1.02
943701	AF1-038 C	6.1949	50/50	6.1949
943702	AF1-038 E	4.1299	50/50	4.1299
943821	AF1-050 C	2.2451	Adder	2.64
943822	AF1-050 E	1.4967	Adder	1.76
944151	AF1-083 C O1	2.3786	Adder	2.8
944152	AF1-083 E O1	1.5858	Adder	1.87
944511	AF1-116 C	5.9872	Adder	7.04
944512	AF1-116 E	3.9915	Adder	4.7
945381	AF1-203 C	0.7418	Adder	0.87
945382	AF1-203 E	0.4946	Adder	0.58
WEC	WEC	0.0482	Confirmed LTF	0.0482
LGEE	LGEE	0.0131	Confirmed LTF	0.0131
CPLE	CPLE	0.0318	Confirmed LTF	0.0318
LGE-0012019	LGE-0012019	5.0391	LTF	5.0391
CBM-W2	CBM-W2	3.5872	Confirmed LTF	3.5872
NY	NY	0.0426	Confirmed LTF	0.0426
TVA	TVA	1.0724	Confirmed LTF	1.0724
O-066	O-066	0.5040	Confirmed LTF	0.5040
CBM-S2	CBM-S2	0.6069	Confirmed LTF	0.6069
CBM-S1	CBM-S1	5.3506	Confirmed LTF	5.3506
G-007	G-007	0.0780	Confirmed LTF	0.0780
MADISON	MADISON	0.7560	Confirmed LTF	0.7560
MEC	MEC	0.4513	Confirmed LTF	0.4513
CBM-W1	CBM-W1	1.7014	Confirmed LTF	1.7014

10.7.4 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
41025575	342287	2SOMERSET KU	EKPC	324531	2FERGUSON SO	LGEE	1	EKPC_P7-1_COOP 161 DBL 2	tower	105.0	133.49	135.01	AC	1.84

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	5.5640	50/50	5.5640
342903	1COOPER2 G	10.7915	50/50	10.7915
939131	AE1-143 C	6.4733	50/50	6.4733
939132	AE1-143 E	3.2064	50/50	3.2064
940041	AE1-246 C O1	5.3436	Adder	6.29
940042	AE1-246 E O1	2.6022	Adder	3.06
940831	AE2-071 C	1.6422	Adder	1.93
940832	AE2-071 E	1.0948	Adder	1.29
943701	AF1-038 C	8.4539	50/50	8.4539
943702	AF1-038 E	5.6359	50/50	5.6359
943821	AF1-050 C	2.5937	Adder	3.05
943822	AF1-050 E	1.7291	Adder	2.03
944151	AF1-083 C O1	2.5632	Adder	3.02
944152	AF1-083 E O1	1.7088	Adder	2.01
944511	AF1-116 C	7.2598	50/50	7.2598
944512	AF1-116 E	4.8398	50/50	4.8398
945381	AF1-203 C	0.9384	Adder	1.1
945382	AF1-203 E	0.6256	Adder	0.74
WEC	WEC	0.0621	Confirmed LTF	0.0621
CPLE	CPLE	0.0648	Confirmed LTF	0.0648
LGE-0012019	LGE-0012019	5.1436	LTF	5.1436
CBM-W2	CBM-W2	4.6437	Confirmed LTF	4.6437
NY	NY	0.0431	Confirmed LTF	0.0431
TVA	TVA	1.4154	Confirmed LTF	1.4154
O-066	O-066	0.5107	Confirmed LTF	0.5107
CBM-S2	CBM-S2	1.0115	Confirmed LTF	1.0115
CBM-S1	CBM-S1	6.9864	Confirmed LTF	6.9864
G-007	G-007	0.0790	Confirmed LTF	0.0790
MADISON	MADISON	0.9959	Confirmed LTF	0.9959
MEC	MEC	0.5816	Confirmed LTF	0.5816
CBM-W1	CBM-W1	2.2143	Confirmed LTF	2.2143

10.8 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

Queue Number	Project Name	Status
AE1-143	Marion County 161 kV	Active
AE1-246	Barren County-Summer Shade 161 kV	Active
AE2-071	Patton Rd-Summer Shade 69 kV	Active
AF1-038	Sewellton Jct-Webbs Crossroads 69 kV	Active
AF1-050	Summer Shade - Green County 161 kV	Active
AF1-083	Green County-Saloma 161 kV	Active
AF1-116	Marion County 161 kV	Active
AF1-203	Patton Rd-Summer Shade 69 kV	Active

10.9 Contingency Descriptions

Contingency Name	Contingency Definition
EKPC_P4-2_GREEN W45-1004	CONTINGENCY 'EKPC_P4-2_GREEN W45-1004' /* GREEN CO OPEN BUS 342733 /* 5GREEN CO DROPS BUS 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_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

Contingency Name	Contingency Definition
EKPC_P2-2_GREEN CO 161	CONTINGENCY 'EKPC_P2-2_GREEN CO 161' /* GREEN 161 BUS OPEN BUS 342733 /* 5GREEN CO END

11 Light Load Analysis

The Queue Project AF1-203 was evaluated as a 20.0 MW injection/withdrawal (battery) tapping the Patton Rd Jct. to Summer Shade Jct. 69 kV line (specifically at the AE2-071 Tap interconnection substation) 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 100.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

(Single or N-1 contingencies)

None

11.2 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies)

None

11.3 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)

None

11.4 Steady-State Voltage Requirements

None

11.5 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.

None

11.6 System Reinforcements

None

12 Short Circuit Analysis

The following Breakers are overdutied

None

13 Stability and Reactive Power Requirements for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be evaluated during the Facilities Study Phase

14 Affected Systems

14.1 TVA

A TVA Affected System Study is required. The customer will be required to sign onto a TVA Affected System Study Agreement.

14.2 Duke Energy Progress

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

14.3 MISO

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

14.4 LG&E

An LG&E Affected System Study will be required. PJM has identified several EKPC-LG&E tie line overloads with limiting equipment on the LG&E side. LG&E will need to determine if LG&E upgrades are required.

15 Attachment 1: One-Line Diagram