



**Generation Interconnection
System Impact Study Report
for**

Queue Project AF1-176

COREY 138 KV

155.684 MW Capacity / 300 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 AEP.

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.

An Interconnection Customer with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

3 General

The Interconnection Customer (IC), has proposed a Solar and Storage generating facility located in St. Joseph County, Indiana. The installed facilities will have a total capability of 300 MW with 155.684 MW of this output being recognized by PJM as Capacity. This capability will consist of 178.42 MW (107.052 MW Capacity) from the solar portion, and 121.58 MW (48.632 MW Capacity) from the storage portion. The storage portion will be AC-connected, and may charge from the grid.

The proposed in-service date for this project is October 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	AF1-176
Project Name	COREY 138 KV
State	Michigan
County	St. Joseph
Transmission Owner	AEP
MFO	300
MWE	300
MWC	155.684
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 Primary Point of Interconnection

AF1-176 will interconnect with the AEP transmission system via a direct connection to the Corey 138 kV substation.

To accommodate the interconnection to the Corey 138 kV substation, one (1) new 138 kV circuit breaker will be installed (Figure 1). Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

Installation of the generator lead first span exiting the POI station, including the first structure outside the AEP fence, will also be included in AEP's scope. In the case where the generator lead is a single span, the structure in the customer station will be the customer's responsibility.

5 Cost Summary

The AF1-176 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$788,000
Direct Connection Network Upgrade	\$633,000
Non Direct Connection Network Upgrades	\$45,000
Allocation New System Upgrades*	\$0
Contribution to Previously Identified Upgrades*	\$1,328,000
Total Costs	\$2,794,000

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

The estimates provided in this report are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements. In addition, Stability analysis will be completed during the Facilities Study stage. It is possible that a need for additional upgrades could be identified by these studies.

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.

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
138 kV Revenue Metering	\$388,000
Generator lead first span exiting the POI station, including the first structure outside the fence	\$400,000
Total Attachment Facility Costs	\$788,000

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
One (1) new 138 kV circuit breaker will be installed (Figure 1). Installation of associated protection and control equipment, 138 kV line risers, and SCADA will also be required.	\$633,000
Total Direct Connection Facility Costs	\$633,000

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
Review line protection and control settings at the Corey 138 kV substation	\$45,000
Total Non-Direct Connection Facility Costs	\$45,000

7 Incremental Capacity Transfer Rights (ICTRs)

None

8 Schedule

It is anticipated that the time between receipt of executed Agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would generally be between 24 to 36 months after Agreement execution.

9 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.

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 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/meter²)
- Ambient air temperature (Fahrenheit) – (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

10.3 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/>

11 Summer Peak Analysis

The Queue Project AF1-176 was evaluated as a 300.0 MW (Capacity 155.7 MW) injection at the Corey 138 kV substation in the AEP area. Project AF1-176 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-176 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

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

None

11.2 Multiple Facility Contingency

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

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)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC/D C	MW IMPACT
43497520	243215	05COOK	345.0	AEP	243229	05OLIVE	345.0	AEP	1	AEP_P4_#8621_05COOK 345_K	breaker	1409.0	126.87	128.35	AC	23.18
43497521	243215	05COOK	345.0	AEP	243229	05OLIVE	345.0	AEP	1	AEP_P4_#7443_05DUMONT 765_A	breaker	1409.0	120.55	122.21	AC	29.03
43497852	243215	05COOK	345.0	AEP	243229	05OLIVE	345.0	AEP	1	AEP_P1-2_#358	single	1409.0	112.5	113.72	AC	16.29
41012438	256583	18MOROCO	345.0	METC	238530	02ALLEN	345.0	ATSI	1	ATSI-P7-1-TE-345-022T	tower	1793.0	133.58	134.6	AC	30.87
41589299	256583	18MOROCO	345.0	METC	238530	02ALLEN	345.0	ATSI	1	ATSI-P2-3-TE-345-033T	breaker	1793.0	104.6	105.82	AC	23.74
42743027	955620	J1046 TAP	345.0	ITCT	238889	02LEMOYN	345.0	ATSI	1	ATSI-P7-1-TE-138-027T-A	tower	953.0	122.92	124.49	AC	17.55

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.

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 IMPACT
43497851	243215	05COOK	345.0	AEP	243229	05OLIVE	345.0	AEP	1	AEP_P1 - 2_#358	operation	1409.0	122.48	124.79	AC	31.39
43498069	243412	05STURGI	69.0	AEP	255331	17HOWE	69.0	NIPS	1	AEP_P1 - 2_#5577	operation	47.0	49.87	125.22	AC	43.59
41263479	256583	18MOROCCO	345.0	METC	238530	02ALLEN	345.0	ATSI	1	ATSI-P1-2-TE-345-601T	operation	1793.0	104.56	105.78	AC	23.74
41263109	264612	19MON12	345.0	ITCT	241901	02LALLENDORF	345.0	ATSI	1	Base Case	operation	1099.0	107.04	108.42	AC	17.86

11.6 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF1-176	Upgrade Number
43497520,43 497521,4349 7852	1	05COOK 345.0 kV - 05OLIVE 345.0 kV Ckt 1	Upgrade: (N3800) – A sag study will be required for the ACSR ~ 954 ~ 45/7 ~ RAIL Conductor Section 1 to determine if the line section can be operated above its emergency rating of 1409 MVA. The results could prove that no additional upgrades are necessary, that some upgrades on the circuit are necessary, or that the entire 23.6 mile section of line would need to be rebuilt for \$47.2M. Estimated Cost: \$93,600. Sag Study: 6-12 months b) Rebuild: The standard time required for construction differs from state to state. An approximate construction time would be 24 to 36 months after signing an interconnection agreement. New expected SE rating of 1868 MVA. N3800 is driven by a prior queue cycle and presently AF1-176 does not receive cost allocation.	\$93,600	\$0	N3800
42743027	3	J1046 TAP 345.0 kV - 02LEMOYN 345.0 kV Ckt 1	ATSI-end SE rating is 1545 MVA SE and is sufficient. No ATSI upgrade required. MISO-end SE rating is 953 MVA. Remediate the sag limit and replace terminal equipment at Majestic. \$3M. New MISO SE rating 1758 MVA. Note: the terminal work at Majestic is not needed if J1046 taps into the line. The line is overloaded by a prior queue cycle and presently AF1-176 does not receive cost allocation.	\$3M	\$0	N/A

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF1-176	Upgrade Number			
41589299,41012438	2	18MOROCCO 345.0 kV - 02ALLEN 345.0 kV Ckt 1	ATSI end: The ATSI SE rating is 1793 MVA. Upgrade is required to build a Morocco – Allen 345 kV line. New Line will be built and owned by MISO transmission owner and the same conductor size to be used as the existing line. ATSI will need to build a new line exit at Allen Junction 345kV substation for the new (2nd) Allen Junction-Morocco 345kV line. Install new 345kV Breaker, Metering, Disconnect Switches and Protection Relaying. Cost estimate for the ATSI portion of work is \$3.4586 M. PJM Network Upgrade N6289.	\$25.4586 M	\$1.328 M	N6289			
			MISO end: The MISO SE rating is 2148 MVA. Upgrade is required to build a Morocco – Allen 345 kV line. New Line will be built and owned by MISO transmission owner and the same conductor size to be used as the existing line. Cost estimate for the MISO portion of work is \$22 M.						
			The cost allocation is as follows:						
							MW		\$Cost
			Queue				Contribution	% cost	(25.4586 M)
			J841				127.3	21.50%	5.473
			J833				18.1	3.05%	0.776
			J857				22.3	3.77%	0.959
			J875				49.7	8.39%	2.137
			J984				32.9	5.56%	1.414
			J989				19.4	3.28%	0.835
			J996				32.7	5.51%	1.404
			J1005				43.1	7.27%	1.851
			J1043				52.6	8.88%	2.261
			J1062				44.2	7.47%	1.902
			J1088				32.6	5.50%	1.399
			J1089				37.2	6.28%	1.599
			J1090				21.5	3.63%	0.925
			J1173				27.8	4.69%	1.195
			AF1-176				30.9	5.22%	1.328
			Total Cost	\$28,552,200	\$1,328,000				

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.

11.7 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".

11.7.1 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
43497520	243215	05COOK	AEP	243229	05OLIVE	AEP	1	AEP_P4_#8621_05COOK 345_K	breaker	1409.0	126.87	128.35	AC	23.18

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	1.9574	Adder	2.3
243440	05CKG1	66.9222	50/50	66.9222
244412	05WTRV SLR C	0.0570	50/50	0.0570
247528	05COVRT1	9.7843	50/50	9.7843
247529	05COVRT2	9.7843	50/50	9.7843
247530	05COVRT3	9.7843	50/50	9.7843
247531	05COVRT4	5.8724	50/50	5.8724
247532	05COVRT5	5.8724	50/50	5.8724
247533	05COVRT6	5.8724	50/50	5.8724
247604	X1-042	0.0828	50/50	0.0828
247651	AA2-116	47.4367	50/50	47.4367
247966	05WTRV SLR E	0.3221	50/50	0.3221
276171	Z1-107 BAT	1.2056	Merchant Transmission	1.2056
918052	AA1-018 E OP	-6.6300	Adder	-7.8
925961	AC1-072	0.9076	50/50	0.9076
926581	AC1-141	4.3428	50/50	4.3428
931951	AB1-107 1	14.4088	Adder	16.95
931961	AB1-107 2	32.4234	Adder	38.15
932931	AC2-117	-3.0998	Adder	-3.65
934891	AD1-118	3.7039	Adder	4.36
936141	AD2-020 C O1	4.8737	Adder	5.73
936142	AD2-020 E O1	2.9998	Adder	3.53
936601	AD2-075	37.1533	50/50	37.1533
938261	AE1-039	0.1246	50/50	0.1246
938911	AE1-119	29.1019	Adder	34.24
939683	AE1-198 BAT	6.1552	Merchant Transmission	6.1552
941781	AE2-181 C	1.5304	Adder	1.8
941782	AE2-181 E	1.0203	Adder	1.2
942661	AE2-282 C O1	2.3661	Adder	2.78
942662	AE2-282 E O1	1.2451	Adder	1.46
943021	AE2-325 C	2.4684	Adder	2.9
943022	AE2-325 E	1.6416	Adder	1.93
943961	AF1-064 C O1	1.7687	Adder	2.08
943962	AF1-064 E O1	0.8791	Adder	1.03
944161	AF1-084 C	6.0376	50/50	6.0376
944162	AF1-084 E	3.4484	50/50	3.4484
944551	AF1-120 C	1.4337	Adder	1.69
944552	AF1-120 E	0.7222	Adder	0.85
944961	AF1-161 C	1.9684	Adder	2.32
944962	AF1-161 E	1.9684	Adder	2.32
945111	AF1-176 C O1	10.2250	Adder	12.03
945112	AF1-176 E O1	9.4789	Adder	11.15

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945401	AF1-205 C O1	1.2697	Adder	1.49
945402	AF1-205 E O1	0.8465	Adder	1.0
945411	AF1-206 C O1	6.4355	Adder	7.57
945412	AF1-206 E O1	4.2903	Adder	5.05
950311	G934 C	4.9068	PJM External (MISO)	4.9068
950312	G934 E	19.6272	PJM External (MISO)	19.6272
950351	J466	3.8037	PJM External (MISO)	3.8037
950791	J201 C	0.5445	PJM External (MISO)	0.5445
950792	J201 E	2.1781	PJM External (MISO)	2.1781
950871	J246 C	0.2210	PJM External (MISO)	0.2210
950872	J246 E	0.8841	PJM External (MISO)	0.8841
950942	J325 E	0.4952	PJM External (MISO)	0.4952
951531	J533 C	6.3148	PJM External (MISO)	6.3148
951532	J533 E	25.2592	PJM External (MISO)	25.2592
951571	J538 C	3.4188	PJM External (MISO)	3.4188
951572	J538 E	13.6752	PJM External (MISO)	13.6752
951941	J602 C	4.3680	PJM External (MISO)	4.3680
951942	J602 E	23.6320	PJM External (MISO)	23.6320
952161	J571	0.9891	PJM External (MISO)	0.9891
952201	J589 C	4.7652	PJM External (MISO)	4.7652
952202	J589 E	25.7808	PJM External (MISO)	25.7808
952312	J646 E	0.1847	PJM External (MISO)	0.1847
952401	J752 C	2.0093	PJM External (MISO)	2.0093
952402	J752 E	10.8707	PJM External (MISO)	10.8707
952611	J717 C	4.5250	PJM External (MISO)	4.5250
952612	J717 E	24.4815	PJM External (MISO)	24.4815
952761	J728 C	4.2082	PJM External (MISO)	4.2082
952762	J728 E	22.7979	PJM External (MISO)	22.7979
952881	J758	28.8180	PJM External (MISO)	28.8180
952971	J793	152.9290	PJM External (MISO)	152.9290
953071	J794 C	0.2909	PJM External (MISO)	0.2909
953072	J794 E	1.5741	PJM External (MISO)	1.5741
953271	J701 C	0.9891	PJM External (MISO)	0.9891
953272	J701 E	5.3515	PJM External (MISO)	5.3515
953291	J796	33.9786	PJM External (MISO)	33.9786
953321	J799	18.7469	PJM External (MISO)	18.7469
953361	J806	20.2968	PJM External (MISO)	20.2968
953771	J832	15.5290	PJM External (MISO)	15.5290
953781	J833	9.8220	PJM External (MISO)	9.8220
953811	J839	11.8590	PJM External (MISO)	11.8590
953941	J857	17.4780	PJM External (MISO)	17.4780
954111	J875	16.3605	PJM External (MISO)	16.3605
954591	J937	88.0931	PJM External (MISO)	88.0931
955071	J984 C	5.1031	PJM External (MISO)	5.1031
955072	J984 E	27.6089	PJM External (MISO)	27.6089
955121	J989	10.4312	PJM External (MISO)	10.4312
955181	J996	7.7912	PJM External (MISO)	7.7912
955261	J1005	28.4380	PJM External (MISO)	28.4380
955591	J1043 C	3.5074	PJM External (MISO)	3.5074
955592	J1043 E	62.1511	PJM External (MISO)	62.1511
955781	J1062	12.7605	PJM External (MISO)	12.7605
955861	J1071	17.5710	PJM External (MISO)	17.5710

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
956011	J1088	21.0270	PJM External (MISO)	21.0270
956021	J1089	23.7422	PJM External (MISO)	23.7422
956031	J1090	11.3769	PJM External (MISO)	11.3769
956161	J1103	2.5880	PJM External (MISO)	2.5880
956741	J1172	6.7215	PJM External (MISO)	6.7215
956751	J1173	8.5088	PJM External (MISO)	8.5088
956801	J1178	8.5995	PJM External (MISO)	8.5995
NEWTON	NEWTON	3.5061	Confirmed LTF	3.5061
FARMERCITY	FARMERCITY	0.2294	Confirmed LTF	0.2294
G-007A	G-007A	1.5632	Confirmed LTF	1.5632
VFT	VFT	4.2312	Confirmed LTF	4.2312
PRAIRIE	PRAIRIE	8.4852	Confirmed LTF	8.4852
COFFEEN	COFFEEN	0.7447	Confirmed LTF	0.7447
CHEOAH	CHEOAH	0.6131	Confirmed LTF	0.6131
EDWARDS	EDWARDS	1.8459	Confirmed LTF	1.8459
TILTON	TILTON	2.3852	Confirmed LTF	2.3852
GIBSON	GIBSON	1.2290	Confirmed LTF	1.2290
CALDERWOOD	CALDERWOOD	0.6173	Confirmed LTF	0.6173
BLUEG	BLUEG	2.6960	Confirmed LTF	2.6960
TRIMBLE	TRIMBLE	0.8498	Confirmed LTF	0.8498
CATAWBA	CATAWBA	0.2478	Confirmed LTF	0.2478
CBM-W1	CBM-W1	15.2622	Confirmed LTF	15.2622

11.7.2 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
41012438	256583	18MOROCCO	METC	238530	02ALLEN	ATSI	1	ATSI-P7-1-TE-345-022T	tower	1793.0	133.58	134.6	AC	30.87

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243071	05BERRINSP G	0.1184	50/50	0.1184
243440	05CKG1	19.5744	50/50	19.5744
244357	05GRANGER EL	-0.2462	Adder	-0.29
244412	05WTRV SLR C	0.0488	50/50	0.0488
246422	05MAYFLWER	0.0856	50/50	0.0856
246431	05BUCHANAN	0.0161	50/50	0.0161
246536	05MOTTVILL	0.0287	50/50	0.0287
247528	05COVRT1	6.2009	50/50	6.2009
247529	05COVRT2	6.2009	50/50	6.2009
247530	05COVRT3	6.2009	50/50	6.2009
247531	05COVRT4	3.7217	50/50	3.7217
247532	05COVRT5	3.7217	50/50	3.7217
247533	05COVRT6	3.7217	50/50	3.7217
247604	X1-042	0.0654	50/50	0.0654
247651	AA2-116	18.0627	50/50	18.0627
247966	05WTRV SLR E	0.2758	50/50	0.2758
247967	05OLIV SLR E	0.1955	Adder	0.23
247969	Z2-116 E	0.1049	Adder	0.12
274788	SE CHICAG;5U (Deactivation : 01/06/2020)	2.4100	Adder	2.84
274789	SE CHICAG;6U (Deactivation : 01/06/2020)	2.4164	Adder	2.84
274790	SE CHICAG;7U (Deactivation : 01/06/2020)	2.4482	Adder	2.88
274791	SE CHICAG;8U (Deactivation : 01/06/2020)	2.4482	Adder	2.88
274792	SE CHICAG;9U (Deactivation : 01/06/2020)	2.4534	Adder	2.89
274793	SE CHICAG;0U (Deactivation : 01/06/2020)	2.4534	Adder	2.89
274794	SE CHICAG;1U (Deactivation : 01/06/2020)	2.4534	Adder	2.89
274795	SE CHICAG;2U (Deactivation : 01/06/2020)	2.4534	Adder	2.89

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925961	AC1-072	0.5752	50/50	0.5752
926581	AC1-141	1.6536	50/50	1.6536
931951	AB1-107 1	-41.9052	Adder	-49.3
931961	AB1-107 2	-73.7508	Adder	-86.77
932931	AC2-117	2.9086	Adder	3.42
933281	AC2-140 C	2.7200	Adder	3.2
933282	AC2-140 E	0.1432	Adder	0.17
934252	AD1-052 E1	-0.7182	Adder	-0.84
934262	AD1-052 E2	-0.7182	Adder	-0.84
936141	AD2-020 C O1	6.8096	50/50	6.8096
936142	AD2-020 E O1	4.1914	50/50	4.1914
936601	AD2-075	23.5465	50/50	23.5465
936631	AD2-079 C O1	0.9665	Adder	1.14
936632	AD2-079 E O1	0.6443	Adder	0.76
938261	AE1-039	0.0985	50/50	0.0985
939391	AE1-170 C O1	6.5816	50/50	6.5816
939392	AE1-170 E O1	9.0889	50/50	9.0889
939631	AE1-193 C	4.1813	Adder	4.92
939632	AE1-193 E	27.9827	Adder	32.92
939641	AE1-194 C	4.1813	Adder	4.92
939642	AE1-194 E	27.9827	Adder	32.92
939651	AE1-195 C	4.1813	Adder	4.92
939652	AE1-195 E	27.9827	Adder	32.92
939681	AE1-198 C	12.4153	Adder	14.61
939682	AE1-198 E	10.5498	Adder	12.41
943001	AE2-323 C	4.3734	Adder	5.15
943002	AE2-323 E	2.1444	Adder	2.52
943021	AE2-325 C	3.4488	50/50	3.4488
943022	AE2-325 E	2.2937	50/50	2.2937
943781	AF1-046 C	2.0414	Adder	2.4
943782	AF1-046 E	1.3609	Adder	1.6
944161	AF1-084 C	6.1604	50/50	6.1604
944162	AF1-084 E	3.5186	50/50	3.5186
944931	AF1-158 C O1	7.0831	Adder	8.33
944932	AF1-158 E O1	4.7221	Adder	5.56
944961	AF1-161 C	2.7502	50/50	2.7502
944962	AF1-161 E	2.7502	50/50	2.7502
945111	AF1-176 C O1	16.0195	50/50	16.0195
945112	AF1-176 E O1	14.8505	50/50	14.8505
945501	AF1-215 C O1	11.8835	Adder	13.98
945502	AF1-215 E O1	7.9223	Adder	9.32
950311	G934 C	4.8558	PJM External (MISO)	4.8558
950312	G934 E	19.4232	PJM External (MISO)	19.4232
950351	J466	7.4880	PJM External (MISO)	7.4880
950791	J201 C	0.9045	PJM External (MISO)	0.9045
950792	J201 E	3.6181	PJM External (MISO)	3.6181
950871	J246 C	0.2453	PJM External (MISO)	0.2453
950872	J246 E	0.9812	PJM External (MISO)	0.9812
950942	J325 E	1.0279	PJM External (MISO)	1.0279
951531	J533 C	7.0088	PJM External (MISO)	7.0088
951532	J533 E	28.0352	PJM External (MISO)	28.0352
951571	J538 C	8.5029	PJM External (MISO)	8.5029

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
951572	J538 E	34.0116	PJM External (MISO)	34.0116
951941	J602 C	6.7548	PJM External (MISO)	6.7548
951942	J602 E	36.5452	PJM External (MISO)	36.5452
952161	J571	0.7200	PJM External (MISO)	0.7200
952201	J589 C	5.7792	PJM External (MISO)	5.7792
952202	J589 E	31.2668	PJM External (MISO)	31.2668
952312	J646 E	0.4444	PJM External (MISO)	0.4444
952401	J752 C	3.8164	PJM External (MISO)	3.8164
952402	J752 E	20.6476	PJM External (MISO)	20.6476
952611	J717 C	6.3786	PJM External (MISO)	6.3786
952612	J717 E	34.5098	PJM External (MISO)	34.5098
952761	J728 C	5.9320	PJM External (MISO)	5.9320
952762	J728 E	32.1366	PJM External (MISO)	32.1366
952881	J758	31.2220	PJM External (MISO)	31.2220
952971	J793	366.3130	PJM External (MISO)	366.3130
953071	J794 C	0.3783	PJM External (MISO)	0.3783
953072	J794 E	2.0468	PJM External (MISO)	2.0468
953271	J701 C	1.8587	PJM External (MISO)	1.8587
953272	J701 E	10.0561	PJM External (MISO)	10.0561
953291	J796	50.6871	PJM External (MISO)	50.6871
953321	J799	65.8155	PJM External (MISO)	65.8155
953361	J806	28.5544	PJM External (MISO)	28.5544
953771	J832	17.7230	PJM External (MISO)	17.7230
953781	J833	36.0200	PJM External (MISO)	36.0200
953811	J839	26.9690	PJM External (MISO)	26.9690
953941	J857	22.0012	PJM External (MISO)	22.0012
954111	J875	49.3770	PJM External (MISO)	49.3770
954591	J937	14.4629	PJM External (MISO)	14.4629
955071	J984 C	5.0500	PJM External (MISO)	5.0500
955072	J984 E	27.3220	PJM External (MISO)	27.3220
955121	J989	19.1544	PJM External (MISO)	19.1544
955181	J996	32.3864	PJM External (MISO)	32.3864
955261	J1005	42.4000	PJM External (MISO)	42.4000
955591	J1043 C	2.7594	PJM External (MISO)	2.7594
955592	J1043 E	48.8966	PJM External (MISO)	48.8966
955781	J1062	43.8165	PJM External (MISO)	43.8165
955861	J1071	12.4410	PJM External (MISO)	12.4410
956011	J1088	32.0580	PJM External (MISO)	32.0580
956021	J1089	36.6350	PJM External (MISO)	36.6350
956031	J1090	21.2751	PJM External (MISO)	21.2751
956161	J1103	4.8632	PJM External (MISO)	4.8632
956741	J1172	11.5115	PJM External (MISO)	11.5115
956751	J1173	27.5504	PJM External (MISO)	27.5504
956801	J1178	13.6903	PJM External (MISO)	13.6903
WEC	WEC	2.1366	Confirmed LTF	2.1366
LGEE	LGEE	1.6214	Confirmed LTF	1.6214
CPL	CPL	0.2891	Confirmed LTF	0.2891
CBM-W2	CBM-W2	31.0647	Confirmed LTF	31.0647
NY	NY	1.1917	Confirmed LTF	1.1917
TVA	TVA	3.6106	Confirmed LTF	3.6106
O-066	O-066	12.8890	Confirmed LTF	12.8890
CBM-S2	CBM-S2	4.8668	Confirmed LTF	4.8668

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CBM-S1	CBM-S1	22.3906	Confirmed LTF	22.3906
G-007	G-007	1.9812	Confirmed LTF	1.9812
MADISON	MADISON	7.8140	Confirmed LTF	7.8140
MEC	MEC	8.9588	Confirmed LTF	8.9588
CBM-W1	CBM-W1	195.5313	Confirmed LTF	195.5313

11.7.3 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
42743027	955620	J1046 TAP	ITCT	238889	02LEMOYN	ATSI	1	ATSI-P7-1-TE-138-027T-A	tower	953.0	122.92	124.49	AC	17.55

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
244357	05GRANGER EL	-0.1400	Adder	-0.16
247966	05WTRV SLR E	0.1343	Adder	0.16
247967	05OLIV SLR E	0.1121	Adder	0.13
247969	Z2-116 E	0.0601	Adder	0.07
931951	AB1-107 1	-18.5743	Adder	-21.85
931961	AB1-107 2	-39.7310	Adder	-46.74
934252	AD1-052 E1	-0.3775	Adder	-0.44
934262	AD1-052 E2	-0.3775	Adder	-0.44
936141	AD2-020 C O1	3.3084	Adder	3.89
936142	AD2-020 E O1	2.0364	Adder	2.4
936601	AD2-075	11.4869	Adder	13.51
936631	AD2-079 C O1	0.5540	Adder	0.65
936632	AD2-079 E O1	0.3693	Adder	0.43
938261	AE1-039	0.0480	Adder	0.06
939391	AE1-170 C O1	3.2039	Adder	3.77
939392	AE1-170 E O1	4.4244	Adder	5.21
943021	AE2-325 C	1.6756	Adder	1.97
943022	AE2-325 E	1.1144	Adder	1.31
944161	AF1-084 C	2.9945	Adder	3.52
944162	AF1-084 E	1.7104	Adder	2.01
944931	AF1-158 C O1	4.0629	Adder	4.78
944932	AF1-158 E O1	2.7086	Adder	3.19
944961	AF1-161 C	1.3362	Adder	1.57
944962	AF1-161 E	1.3362	Adder	1.57
945111	AF1-176 C O1	7.7425	Adder	9.11
945112	AF1-176 E O1	7.1775	Adder	8.44
950311	G934 C	2.8836	PJM External (MISO)	2.8836
950312	G934 E	11.5344	PJM External (MISO)	11.5344
950351	J466	4.4847	PJM External (MISO)	4.4847
950791	J201 C	0.5400	PJM External (MISO)	0.5400
950792	J201 E	2.1602	PJM External (MISO)	2.1602
950871	J246 C	0.1459	PJM External (MISO)	0.1459
950872	J246 E	0.5835	PJM External (MISO)	0.5835
950942	J325 E	0.6163	PJM External (MISO)	0.6163
951531	J533 C	4.1676	PJM External (MISO)	4.1676
951532	J533 E	16.6704	PJM External (MISO)	16.6704
951941	J602 C	4.0273	PJM External (MISO)	4.0273
951942	J602 E	21.7887	PJM External (MISO)	21.7887
952161	J571	0.3855	PJM External (MISO)	0.3855
952201	J589 C	3.4361	PJM External (MISO)	3.4361
952202	J589 E	18.5899	PJM External (MISO)	18.5899

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
952312	J646 E	0.2644	PJM External (MISO)	0.2644
952401	J752 C	2.2840	PJM External (MISO)	2.2840
952402	J752 E	12.3570	PJM External (MISO)	12.3570
952611	J717 C	3.8027	PJM External (MISO)	3.8027
952612	J717 E	20.5735	PJM External (MISO)	20.5735
952761	J728 C	3.5364	PJM External (MISO)	3.5364
952762	J728 E	19.1586	PJM External (MISO)	19.1586
952881	J758	15.8620	PJM External (MISO)	15.8620
952971	J793	218.9761	PJM External (MISO)	218.9761
953071	J794 C	0.2252	PJM External (MISO)	0.2252
953072	J794 E	1.2184	PJM External (MISO)	1.2184
953271	J701 C	1.1121	PJM External (MISO)	1.1121
953272	J701 E	6.0169	PJM External (MISO)	6.0169
953291	J796	30.2216	PJM External (MISO)	30.2216
953321	J799	35.3109	PJM External (MISO)	35.3109
953361	J806	13.8659	PJM External (MISO)	13.8659
953771	J832	10.5410	PJM External (MISO)	10.5410
953781	J833	18.9440	PJM External (MISO)	18.9440
953811	J839	16.1320	PJM External (MISO)	16.1320
953941	J857	10.0710	PJM External (MISO)	10.0710
954111	J875	8.6445	PJM External (MISO)	8.6445
954591	J937	27.4562	PJM External (MISO)	27.4562
955071	J984 C	2.9989	PJM External (MISO)	2.9989
955072	J984 E	16.2251	PJM External (MISO)	16.2251
955121	J989	11.5536	PJM External (MISO)	11.5536
955261	J1005	25.2940	PJM External (MISO)	25.2940
955591	J1043 C	1.6336	PJM External (MISO)	1.6336
955592	J1043 E	28.9474	PJM External (MISO)	28.9474
955781	J1062	76.7715	PJM External (MISO)	76.7715
955861	J1071	7.3330	PJM External (MISO)	7.3330
956011	J1088	19.0290	PJM External (MISO)	19.0290
956021	J1089	21.7719	PJM External (MISO)	21.7719
956031	J1090	11.4516	PJM External (MISO)	11.4516
956161	J1103	2.9098	PJM External (MISO)	2.9098
956741	J1172	6.8895	PJM External (MISO)	6.8895
956801	J1178	8.3557	PJM External (MISO)	8.3557
WEC	WEC	1.2263	Confirmed LTF	1.2263
LGEE	LGEE	0.9299	Confirmed LTF	0.9299
CPL	CPL	0.1607	Confirmed LTF	0.1607
CBM-W2	CBM-W2	17.8132	Confirmed LTF	17.8132
NY	NY	0.6896	Confirmed LTF	0.6896
TVA	TVA	2.0664	Confirmed LTF	2.0664
O-066	O-066	7.4659	Confirmed LTF	7.4659
CBM-S2	CBM-S2	2.7571	Confirmed LTF	2.7571
CBM-S1	CBM-S1	12.8226	Confirmed LTF	12.8226
G-007	G-007	1.1482	Confirmed LTF	1.1482
MADISON	MADISON	4.4876	Confirmed LTF	4.4876
MEC	MEC	5.1404	Confirmed LTF	5.1404
CBM-W1	CBM-W1	110.2631	Confirmed LTF	110.2631

11.8 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
AA1-018	Powerton-Goodings Grove	In Service
AA2-116	Cook-East Elkhart 345kV	Under Construction
AB1-107	Bayshore-GM Powertrain 138 kV & Lallendorf 345kV	Engineering and Procurement
AC1-072	Segreto (Covert) 345kV	In Service
AC1-141	Cook-East Elkhart 345kV	Under Construction
AC2-117	University Park North	Engineering and Procurement
AC2-140	DC Cook Unit 2	Engineering and Procurement
AD1-052	Freemont Energy Center	Under Construction
AD1-118	Lemoyne	Active
AD2-020	Valley 138 kV	Active
AD2-075	Segreto 345kV	Active
AD2-079	Capitol Ave 34.5kV	Active
AE1-039	West Street (Orchard Hills) 12.47 kV	Active
AE1-119	Lemoyne 345 kV	Active
AE1-170	Kenzie Creek-Colby 138 kV	Active
AE1-193	Crete 345 kV	Active
AE1-194	Crete 345 kV	Active
AE1-195	Crete 345 kV	Active
AE1-198	Crete 345 kV	Active
AE2-181	Snyder 69kV	Active
AE2-282	East Fayette 138 kV	Active
AE2-323	Twin Branch-Guardian 138 kV	Active
AE2-325	Valley 138 kV	Active
AF1-046	Twin Branch-Guardian 138 kV	Active
AF1-064	Weston 69 kV	Active
AF1-084	East Hartford-Murch 69 kV	Active
AF1-120	East Fayette 2 138 kV	Active
AF1-158	Edison-Gravel Pit 138 kV	Active
AF1-161	Valley 138 kV	Active
AF1-176	Corey 138 kV	Active
AF1-205	Napolean Muni 138 kV	Active
AF1-206	Fayette-Lyons 138 kV	Active
AF1-215	Reynolds-Olive 345 kV	Active
X1-042	Watervliet	In Service
Z1-107	Joliet 34kV	In Service
Z2-116	Twin Branch 12.47kV	In Service
J1005	MISO	MISO
J1043	MISO	MISO

Queue Number	Project Name	Status
J1062	MISO	MISO
J1071	MISO	MISO
J1088	MISO	MISO
J1089	MISO	MISO
J1090	MISO	MISO
J1103	MISO	MISO
J1172	MISO	MISO
J1173	MISO	MISO
J1178	MISO	MISO
J201	MISO	MISO
J246	MISO	MISO
J325	MISO	MISO
J466	MISO	MISO
J533	MISO	MISO
J538	MISO	MISO
J571	MISO	MISO
J589	MISO	MISO
J602	MISO	MISO
J646	MISO	MISO
J701	MISO	MISO
J717	MISO	MISO
J728	MISO	MISO
J752	MISO	MISO
J758	MISO	MISO
J793	MISO	MISO
J794	MISO	MISO
J796	MISO	MISO
J799	MISO	MISO
J806	MISO	MISO
J832	MISO	MISO
J833	MISO	MISO
J839	MISO	MISO
J857	MISO	MISO
J875	MISO	MISO
J937	MISO	MISO
J984	MISO	MISO
J989	MISO	MISO
J996	MISO	MISO

11.9 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#358	CONTINGENCY 'AEP_P1-2_#358' OPEN BRANCH FROM BUS 243205 TO BUS 243206 CKT 1 / 243205 05COOK 765 243206 05DUMONT 765 1 END
AEP_P1-2_#5577	CONTINGENCY 'AEP_P1-2_#5577' OPEN BRANCH FROM BUS 243287 TO BUS 243346 CKT 1 / 243287 05E.ELKHART 138 243346 05MOTTV 138 1 END
ATSI-P7-1-TE-138-027T-A	CONTINGENCY 'ATSI-P7-1-TE-138-027T-A' /* ALLEN-MIL-MONRO & BAYSH-MONRO 345KV DISCONNECT BRANCH FROM BUS 264594 TO BUS 256583 CKT 1 /* 19LULU 345 18LENAAWEE 345 DISCONNECT BRANCH FROM BUS 264594 TO BUS 264839 CKT 1 /* 19LULU 345 19MILAN 345 DISCONNECT BRANCH FROM BUS 264594 TO BUS 955720 CKT 1 /* 19LULU 345 J1056 TAP 345 DISCONNECT BRANCH FROM BUS 241901 TO BUS 264612 CKT 1 /* 02_Y1-069 345 19MON12 345 END
ATSI-P7-1-TE-345-022T	CONTINGENCY 'ATSI-P7-1-TE-345-022T' /* Y1-069-MONROE/LEMOYNE-MAJ 345 DISCONNECT BRANCH FROM BUS 241901 TO BUS 264612 CKT 1 /* 02_Y1-069 345 19MON12 345 DISCONNECT BRANCH FROM BUS 238889 TO BUS 955620 CKT 1 /* 02LEMOYN 345 19MAJTC 345 END
ATSI-P1-2-TE-345-601T	CONTINGENCY 'ATSI-P1-2-TE-345-601T' /*LINE OUTAGE: LALLEND
ATSI-P2-3-TE-345-033T	CONTINGENCY 'ATSI-P2-3-TE-345-033T' /* LALLEND
Base Case	
AEP_P4_#7443_05DUMONT 765_A	CONTINGENCY 'AEP_P4_#7443_05DUMONT 765_A' OPEN BRANCH FROM BUS 243205 TO BUS 243206 CKT 1 / 243205 05COOK 765 243206 05DUMONT 765 1 OPEN BRANCH FROM BUS 243206 TO BUS 246999 CKT 1 / 243206 05DUMONT 765 246999 05SORENS 765 1 END

Contingency Name	Contingency Definition
AEP_P4_#8621_05COOK 345_K	CONTINGENCY 'AEP_P4_#8621_05COOK 345_K' OPEN BRANCH FROM BUS 243205 TO BUS 243215 CKT 4 / 243205 05COOK 765 243215 05COOK 345 4 OPEN BRANCH FROM BUS 243215 TO BUS 920210 CKT 1 / 243215 05COOK 345 920210 AA2-116 TAPK 345 1 OPEN BRANCH FROM BUS 243224 TO BUS 920210 CKT 1 / 243224 05KENZIE 345 920210 AA2-116 TAPK 345 1 END

12 Light Load Analysis

The Queue Project AF1-176 was evaluated as a 121.7 MW injection at the Corey 138 kV substation in the AEP area. Project AF1-176 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-176 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

12.1 Generation Deliverability

(Single or N-1 contingencies)

None

12.2 Multiple Facility Contingency

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

None

12.3 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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADI NG %	POST PROJE CT LOADI NG %	AC D C	MW IMPA CT
71730355	243211	05ALLE N	345.0	AEP	242933	05RPMO NE	345.0	AEP	1	AEP_P4_#7445_05MA RYSV 765_B	breaker	897.0	105.88	106.74	AC	10.74
71730357	243211	05ALLE N	345.0	AEP	242933	05RPMO NE	345.0	AEP	1	AEP_P4_#7446_05MA RYSV 765_B2	breaker	897.0	101.43	102.27	AC	10.41
102159438	243211	05ALLE N	345.0	AEP	242933	05RPMO NE	345.0	AEP	1	AEP_P1-2_#7441	single	897.0	134.39	135.7	DC	10.9

12.4 Steady-State Voltage Requirements

None

12.5 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.

ID	FROM BUS#	FROM BUS	kV	FRO M BUS AREA	TO BUS#	TO BUS	kV	TO BUS ARE A	CK T ID	CONT NAME	Type	Ratin g MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
10215943 9	24321 1	05ALLE N	345. 0	AEP	24293 3	05RPMON E	345. 0	AEP	1	AEP_P1 - 2_#744 1	operatio n	897.0	102.67	103.54	AC	10.9

12.6 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF1-176	Upgrade Number
102159438,717 30357,7173035 5	1	05ALLEN 345.0 kV - 05RPMONE 345.0 kV Ckt 1	A sag study is required on 12.25 miles of line. Cost of sag study is \$49 K. New expected SE rating to be 971 MVA. If the sag study concludes a complete Rebuild/Reconductor is required, the estimated cost is \$ 24.5 million. A sag study will be required on ACSR/PE~ 1414 ~ 62/19, 6.07 miles of line. The cost is expected to be 24,280. New Ratings after sag study: S/N: 971 MVA S/E: 1419 MVA. If required, rebuild/reconductor, cost: \$ 12.14 million. This overload is presently driven by a prior queue cycle and AF1-176 presently has no cost responsibility.	\$49 K + \$24.280 K	\$0	N6740 N6740.1
			Total Cost	\$24,329,000	\$0	

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.

12.7 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".

12.7.1 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
102159438	243211	05ALLEN	AEP	242933	05RPMONE	AEP	1	AEP_P1-2_#7441	single	897.0	134.39	135.7	DC	10.9

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243795	05HDWTR1G C	0.6617	80/20	0.6617
243859	05FR-11G C	0.5315	80/20	0.5315
243862	05FR-12G C	0.5234	80/20	0.5234
243864	05FR-21G C	0.5586	80/20	0.5586
243866	05FR-22G C	0.5342	80/20	0.5342
243870	05FR-3G C	1.0820	80/20	1.0820
243873	05FR-4G C	0.8379	80/20	0.8379
246909	05MDL-1G C	1.1299	80/20	1.1299
246910	05MDL-2G C	0.5593	80/20	0.5593
246953	05TIMB G C	1.1144	80/20	1.1144
246976	05MDL-3G C	0.5706	80/20	0.5706
246979	05MDL-4G C	0.5565	80/20	0.5565
246991	05WLD G1 C	0.3442	80/20	0.3442
247255	05WLD G2 C	0.3614	80/20	0.3614
247521	T-131 C	1.2976	80/20	1.2976
247536	05BLUFF P WF	0.6334	80/20	0.6334
247543	V3-007 C	0.6617	80/20	0.6617
247556	T-127 C	0.5650	80/20	0.5650
247901	05FR-12G E	2.0880	80/20	2.0880
247902	05FR-21G E	2.2317	80/20	2.2317
247904	05FR-3G E	4.3279	80/20	4.3279
247905	05FR-4G E	3.3897	80/20	3.3897
247906	05MDL-1G E	4.5112	80/20	4.5112
247907	05MDL-2G E	2.2598	80/20	2.2598
247911	05TIMB G E	4.4872	80/20	4.4872
247912	05MDL-3G E	2.2598	80/20	2.2598
247913	05MDL-4G E	2.2598	80/20	2.2598
247925	T-131 E	5.1902	80/20	5.1902
247929	S-071 E	2.5336	80/20	2.5336
247943	T-127 E	2.2598	80/20	2.2598
247958	05WLD G2 E	4.7233	80/20	4.7233
247963	05HDWTR1G E	4.4282	80/20	4.4282
274847	GR RIDGE ;BU	0.8867	80/20	0.8867
274848	CAMP GROVE;RU	0.8106	80/20	0.8106
274849	CRESCENT ;1U	0.2646	80/20	0.2646
274850	MENDOTA H;RU	0.1479	80/20	0.1479
274851	PROVIDENC;RU	0.4036	80/20	0.4036
274853	TWINGROVE;U1	1.0327	80/20	1.0327
274854	TWINGROVE;U2	1.0327	80/20	1.0327
274855	GSG-6 ;RU	0.6229	80/20	0.6229
274856	ECOGROVE ;U1	0.5602	80/20	0.5602
274857	BIG SKY ;U1	0.6642	80/20	0.6642

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274858	BIG SKY ;U2	0.6642	80/20	0.6642
274859	EASYR;U1 E	2.6568	80/20	2.6568
274860	EASYR;U2 E	2.6568	80/20	2.6568
274861	TOP CROP ;1U	0.5944	80/20	0.5944
274862	TOP CROP ;2U	1.1539	80/20	1.1539
274863	CAYUGA RI;1U	0.8462	80/20	0.8462
274864	CAYUGA RI;2U	0.8462	80/20	0.8462
274871	GR RIDGE ;2U	1.1260	80/20	1.1260
274872	LEE DEKAL;1U	1.3755	80/20	1.3755
274877	BISHOP HL;1U	0.5424	80/20	0.5424
274878	BISHOP HL;2U	0.5424	80/20	0.5424
274879	MINONK ;1U	1.1437	80/20	1.1437
274880	GENERATOR;	1.1448	80/20	1.1448
274881	PILOT HIL;1E	4.2124	80/20	4.2124
274882	W4-005 E	7.6661	80/20	7.6661
274887	PILOT HIL;1U	1.0531	80/20	1.0531
274888	KELLYCK ;1U	1.0531	80/20	1.0531
274890	CAYUG;1U E	3.3849	80/20	3.3849
274891	CAYUG;2U E	3.3849	80/20	3.3849
275149	KELLYCK ;1E	4.2124	80/20	4.2124
276156	O-029 C	0.3034	80/20	0.3034
276157	O-029 C	0.3280	80/20	0.3280
276158	O-029 C	0.5986	80/20	0.5986
290021	O50 E	4.5748	80/20	4.5748
290051	GSG-6; E	2.4917	80/20	2.4917
290108	LEEDK;1U E	5.7314	80/20	5.7314
290261	S-027 E	4.1309	80/20	4.1309
290265	S-028 E	4.1309	80/20	4.1309
293061	N-015 E	3.5466	80/20	3.5466
293513	O-009 C1	0.5603	80/20	0.5603
293514	O-009 C2	0.2843	80/20	0.2843
293515	O-009 C3	0.3143	80/20	0.3143
293516	O-009 E1	2.2425	80/20	2.2425
293517	O-009 E2	1.1390	80/20	1.1390
293518	O-009 E3	1.2543	80/20	1.2543
293644	O22 E1	2.3777	80/20	2.3777
293645	O22 E2	4.6155	80/20	4.6155
293715	O-029 E	2.3974	80/20	2.3974
293716	O-029 E	1.3145	80/20	1.3145
293717	O-029 E	1.2082	80/20	1.2082
293771	O-035 E	1.6146	80/20	1.6146
294392	P-010 E	4.5042	80/20	4.5042
294401	BSHIL;1U E	2.1697	80/20	2.1697
294410	BSHIL;2U E	2.1697	80/20	2.1697
294763	P-046 E	2.2409	80/20	2.2409
917501	Z2-087 C	0.7128	80/20	0.7128
917502	Z2-087 E	4.7700	80/20	4.7700
918051	AA1-018 C OP	0.5671	80/20	0.5671
923881	AB2-028 C	1.3189	80/20	1.3189
923882	AB2-028 E	8.8267	80/20	8.8267
924041	AB2-047 C O1	1.7776	80/20	1.7776
924042	AB2-047 E O1	11.8964	80/20	11.8964

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
924261	AB2-070 C O1	1.3040	80/20	1.3040
924262	AB2-070 E O1	8.7264	80/20	8.7264
925301	AB2-191	0.2389	80/20	0.2389
925581	AC1-033 C	0.7089	80/20	0.7089
925582	AC1-033 E	4.7456	80/20	4.7456
925771	AC1-053 C	1.2998	80/20	1.2998
925772	AC1-053 E	8.6986	80/20	8.6986
926821	AC1-168 C O1	0.5655	80/20	0.5655
926822	AC1-168 E O1	3.7949	80/20	3.7949
926841	AC1-171 C O1	0.5472	80/20	0.5472
926842	AC1-171 E O1	3.6552	80/20	3.6552
926861	AC1-173 C	0.4365	80/20	0.4365
926862	AC1-173 E	2.9101	80/20	2.9101
926901	AC1-176 C (Withdrawn : 07/09/2020)	0.5633	80/20	0.5633
926902	AC1-176 E (Withdrawn : 07/09/2020)	3.7871	80/20	3.7871
927201	AC1-214 C O1	1.0339	80/20	1.0339
927202	AC1-214 E O1	3.2867	80/20	3.2867
930041	AB1-006 C	0.7344	80/20	0.7344
930042	AB1-006 E	4.9151	80/20	4.9151
932601	AC2-080 C O1	1.5255	80/20	1.5255
932602	AC2-080 E O1	10.2089	80/20	10.2089
933281	AC2-140 C	3.1415	80/20	3.1415
933282	AC2-140 E	0.1653	80/20	0.1653
933591	AC2-176 C O1	0.2529	80/20	0.2529
933592	AC2-176 E O1	3.2458	80/20	3.2458
933601	AC2-177 C O1	1.3202	80/20	1.3202
933602	AC2-177 E O1	8.8350	80/20	8.8350
934431	AD1-067 C	0.0624	80/20	0.0624
934432	AD1-067 E	0.2625	80/20	0.2625
934721	AD1-100 C	8.9064	80/20	8.9064
934722	AD1-100 E	41.5632	80/20	41.5632
935141	AD1-148	2.4324	80/20	2.4324
936291	AD2-038 C O1	1.1084	80/20	1.1084
936292	AD2-038 E O1	7.4176	80/20	7.4176
936371	AD2-047 C O1	2.0411	80/20	2.0411
936372	AD2-047 E O1	9.9653	80/20	9.9653
936722	AD2-091 BAT	6.7775	80/20	6.7775
936752	AD2-096 BAT	3.0915	80/20	3.0915
936971	AD2-131 C	0.4852	80/20	0.4852
936972	AD2-131 E	2.4378	80/20	2.4378
937001	AD2-134 C	1.2996	80/20	1.2996
937002	AD2-134 E	5.3687	80/20	5.3687
937041	AD2-138 C	2.0653	80/20	2.0653
937042	AD2-138 E	9.6691	80/20	9.6691
937211	AD2-159 C	1.6529	80/20	1.6529
937212	AD2-159 E	7.7386	80/20	7.7386
938851	AE1-113 C	3.7652	80/20	3.7652
938852	AE1-113 E	13.3492	80/20	13.3492
938861	AE1-114 C O1	1.8877	80/20	1.8877
938862	AE1-114 E O1	6.4403	80/20	6.4403
939321	AE1-163 C O1	2.7852	80/20	2.7852

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
939322	AE1-163 E O1	17.1088	80/20	17.1088
939401	AE1-172 C O1	2.5611	80/20	2.5611
939402	AE1-172 E O1	12.0167	80/20	12.0167
939631	AE1-193 C	4.0357	80/20	4.0357
939632	AE1-193 E	27.0083	80/20	27.0083
939641	AE1-194 C	4.0357	80/20	4.0357
939642	AE1-194 E	27.0083	80/20	27.0083
939651	AE1-195 C	4.0357	80/20	4.0357
939652	AE1-195 E	27.0083	80/20	27.0083
939681	AE1-198 C	0.0001	80/20	0.0001
939682	AE1-198 E	6.9073	80/20	6.9073
939781	AE1-209 C O1	0.7508	80/20	0.7508
939782	AE1-209 E O1	5.0244	80/20	5.0244
939791	AE1-210 C O1	0.7508	80/20	0.7508
939792	AE1-210 E O1	5.0244	80/20	5.0244
940101	AE1-252 C O1	0.0001	80/20	0.0001
940102	AE1-252 E O1	10.7190	80/20	10.7190
940752	AE2-062 E	0.0743	80/20	0.0743
941561	AE2-153 C O1	2.1092	80/20	2.1092
941562	AE2-153 E O1	9.8748	80/20	9.8748
941571	AE2-154 C	1.8317	80/20	1.8317
941572	AE2-154 E	12.2583	80/20	12.2583
941691	AE2-169	2.6291	80/20	2.6291
941711	AE2-171	1.9833	80/20	1.9833
941721	AE2-172	2.9032	80/20	2.9032
941731	AE2-173 O1	3.4185	80/20	3.4185
942042	AE2-216 BAT	7.4553	80/20	7.4553
942111	AE2-223 C	1.0666	80/20	1.0666
942112	AE2-223 E	7.1378	80/20	7.1378
942421	AE2-255 C O1	1.4262	80/20	1.4262
942422	AE2-255 E O1	4.2786	80/20	4.2786
942651	AE2-281 C O1	0.3979	80/20	0.3979
942652	AE2-281 E O1	2.4441	80/20	2.4441
943021	AE2-325 C	2.6503	80/20	2.6503
943022	AE2-325 E	1.7627	80/20	1.7627
943381	AF1-009 C	0.3541	80/20	0.3541
943382	AF1-009 E	1.4164	80/20	1.4164
943401	AF1-011 C	0.7635	80/20	0.7635
943402	AF1-011 E	1.2816	80/20	1.2816
943781	AF1-046 C	3.4671	80/20	3.4671
943782	AF1-046 E	2.3114	80/20	2.3114
943791	AF1-047 C	1.2392	80/20	1.2392
943792	AF1-047 E	0.8262	80/20	0.8262
943801	AF1-048 C	2.2375	80/20	2.2375
943802	AF1-048 E	1.4917	80/20	1.4917
943921	AF1-060	0.7224	80/20	0.7224
944121	AF1-080	1.3540	80/20	1.3540
944221	AF1-090 C O1	1.6029	80/20	1.6029
944222	AF1-090 E O1	7.5043	80/20	7.5043
944232	AF1-091 E O1	16.9319	80/20	16.9319
944241	AF1-092 C O1	0.0001	80/20	0.0001
944242	AF1-092 E O1	12.5936	80/20	12.5936

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
944532	AF1-118 E O1	35.7980	80/20	35.7980
944542	AF1-119 E O1	17.6880	80/20	17.6880
944831	AF1-148 C O1	0.0001	80/20	0.0001
944832	AF1-148 E O1	15.9016	80/20	15.9016
944931	AF1-158 C O1	0.0001	80/20	0.0001
944932	AF1-158 E O1	12.5145	80/20	12.5145
944961	AF1-161 C	2.1135	80/20	2.1135
944962	AF1-161 E	2.1135	80/20	2.1135
945111	AF1-176 C O1	4.3602	80/20	4.3602
945112	AF1-176 E O1	6.5407	80/20	6.5407
945351	AF1-200 FTIR	121.4325	80/20	121.4325
945371	AF1-202 C O1	2.3251	80/20	2.3251
945372	AF1-202 E O1	11.3517	80/20	11.3517
945391	AF1-204 C O1	2.8994	80/20	2.8994
945392	AF1-204 E O1	8.6981	80/20	8.6981
945421	AF1-207 C	1.9519	80/20	1.9519
945422	AF1-207 E	8.3816	80/20	8.3816
945623	AF1-227 BAT	8.5370	80/20	8.5370
945871	AF1-252 O1	3.5518	80/20	3.5518
945881	AF1-253 O1	2.4589	80/20	2.4589
946161	AF1-281 C	0.2063	80/20	0.2063
946162	AF1-281 E	1.1693	80/20	1.1693
946203	AF1-285 BAT	2.4868	80/20	2.4868
946321	AF1-296 C O1	1.9731	80/20	1.9731
946322	AF1-296 E O1	9.2376	80/20	9.2376
946501	AF1-314 C	2.0853	80/20	2.0853
946502	AF1-314 E	9.7630	80/20	9.7630
946531	AF1-317 C O1	1.3794	80/20	1.3794
946532	AF1-317 E O1	2.0691	80/20	2.0691
946541	AF1-318 C O1	2.8950	80/20	2.8950
946542	AF1-318 E O1	13.5554	80/20	13.5554
990901	L-005 E	3.2425	80/20	3.2425

12.8 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
AA1-018	Powerton-Goodings Grove	In Service
AB1-006	Meadow Lake 345kV	In Service
AB2-028	Fall Creek-Desoto 345kV	Active
AB2-047	Brokaw-Pontiac Midpoint	Engineering and Procurement
AB2-070	Brokaw-Lanesville	Active
AB2-191	Mendota Hills	In Service
AC1-033	Kewanee	Active
AC1-053	Lanesville-Brokaw	Active
AC1-168	Kewanee-Streator	Active
AC1-171	Powerton	Active
AC1-173	Logtown 138kV	In Service
AC1-176	Timber Switch 138kV	Withdrawn
AC1-214	Crescent Ridge	Engineering and Procurement
AC2-080	Olive-Reynolds 345kV	Active
AC2-140	DC Cook Unit 2	Engineering and Procurement
AC2-176	Jay 138 kV	Under Construction
AC2-177	Desoto-Tanners Creek 345kV	Active
AD1-067	Mendota Hills	Active
AD1-100	Loretto-Wilton & Braidwood-Davis Creek	Active
AD1-148	Brokaw-Lanesville	Active
AD2-038	Powerton	Active
AD2-047	Davis Creek 138 kV	Active
AD2-091	Hardin Tap 345kV	Active
AD2-096	Marysville 345kV	Active
AD2-131	Latham Kincaid	Active
AD2-134	Shady Oaks	Active
AD2-138	Olive-Reynolds 345kV	Active
AD2-159	Chestnut 345kV	Active
AE1-113	Mole Creek 345 kV	Active
AE1-114	Maryland-Lancaster 138 kV	Active
AE1-163	Powerton-Nevada 345 kV	Active
AE1-172	Loretto-Wilton Center	Active
AE1-193	Crete 345 kV	Active
AE1-194	Crete 345 kV	Active
AE1-195	Crete 345 kV	Active
AE1-198	Crete 345 kV	Active
AE1-209	Desoto 345 kV	Active
AE1-210	Desoto 345 kV	Active
AE1-252	Loretto-Wilton Center	Active

Queue Number	Project Name	Status
AE2-062	Normantown	Active
AE2-153	Braidwood-Davis Creek	Active
AE2-154	Meadow Lake 345 kV (MLV VIII)	Active
AE2-169	Delaware-Van Buren 138 kV	Active
AE2-171	Makahoy 138 kV	Active
AE2-172	Mississinewa-Gaston 138 kV	Active
AE2-173	McLean 345 kV	Active
AE2-216	Hardin Switch 345 kV	Active
AE2-223	McLean 345 kV	Active
AE2-255	Molecreek 345 kV	Active
AE2-281	Powerton-Nevada 345 kV	Active
AE2-325	Valley 138 kV	Active
AF1-009	Dixon-McGirr	Active
AF1-011	Schauff Road	Active
AF1-046	Twin Branch-Guardian 138 kV	Active
AF1-047	Mark Center 69 kV	Active
AF1-048	Belvidere-Marengo	Active
AF1-060	Lena 138 kV	Active
AF1-080	Deer Creek-Fisher Body-Mullin 138 kV	Active
AF1-090	Kincaid-Pana	Active
AF1-091	Butler-S Hicksville 138 kV	Active
AF1-092	Huntington Jct. 138 kV	Active
AF1-118	Sorenson-Desoto 345 kV	Active
AF1-119	Keystone-Desoto 345 kV	Active
AF1-148	Sorenson-Desoto 345 kV	Active
AF1-158	Edison-Gravel Pit 138 kV	Active
AF1-161	Valley 138 kV	Active
AF1-176	Corey 138 kV	Active
AF1-200	Plano 345 kV	Active
AF1-202	Keystone-Desoto 345 kV	Active
AF1-204	Eugene 345 kV	Active
AF1-207	Reynolds-Olive #1 345 kV	Active
AF1-227	Marysville-East Lima 345 kV	Active
AF1-252	Kincaid-Pana	Active
AF1-253	Kincaid-Pana	Active
AF1-281	Nelson-Lee County	Active
AF1-285	Gunn Road 345 kV	Active
AF1-296	Garden Plain 138 kV	Active
AF1-314	Lena 138 kV	Active
AF1-317	Electric Jct-Nelson	Active
AF1-318	Crescent Ridge-Corbin	Active
V3-007	Desoto-Tanners Creek #1 345kV	Under Construction
W4-005	Blue Mound-Latham	Partially in Service - Under Construction
Z2-087	Pontiac MidPoint-Brokaw 345kV	In Service

12.9 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#7441	CONTINGENCY 'AEP_P1-2_#7441' OPEN BRANCH FROM BUS 242928 TO BUS 246999 CKT 1 / 242928 05MARYSV 765 246999 05SORENS 765 1 END
AEP_P4_#7445_05MARYSV 765_B	CONTINGENCY 'AEP_P4_#7445_05MARYSV 765_B' OPEN BRANCH FROM BUS 242922 TO BUS 242928 CKT 1 / 242922 05FTLCK 765 242928 05MARYSV 765 1 OPEN BRANCH FROM BUS 242928 TO BUS 246999 CKT 1 / 242928 05MARYSV 765 246999 05SORENS 765 1 END
AEP_P4_#7446_05MARYSV 765_B2	CONTINGENCY 'AEP_P4_#7446_05MARYSV 765_B2' OPEN BRANCH FROM BUS 242928 TO BUS 246999 CKT 1 / 242928 05MARYSV 765 246999 05SORENS 765 1 OPEN BRANCH FROM BUS 242928 TO BUS 242939 CKT 2 / 242928 05MARYSV 765 242939 05MARYSV 345 2 END

13 Short Circuit Analysis

The following Breakers are overdutied

None

14 Stability and Reactive Power

To be determined in the Facilities Study Phase.

15 Affected Systems

15.1 TVA

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

15.2 Duke Energy Progress

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

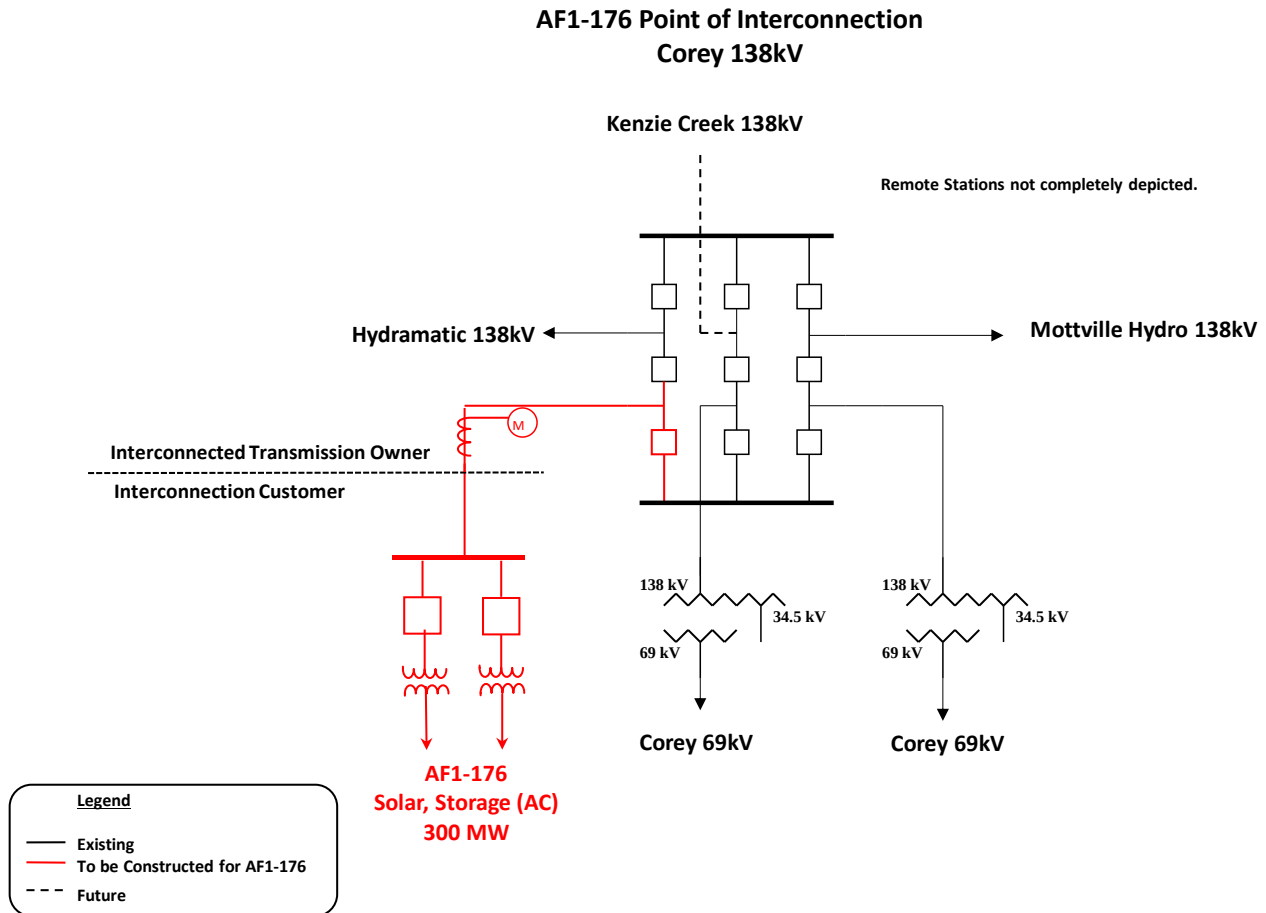
15.3 MISO

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

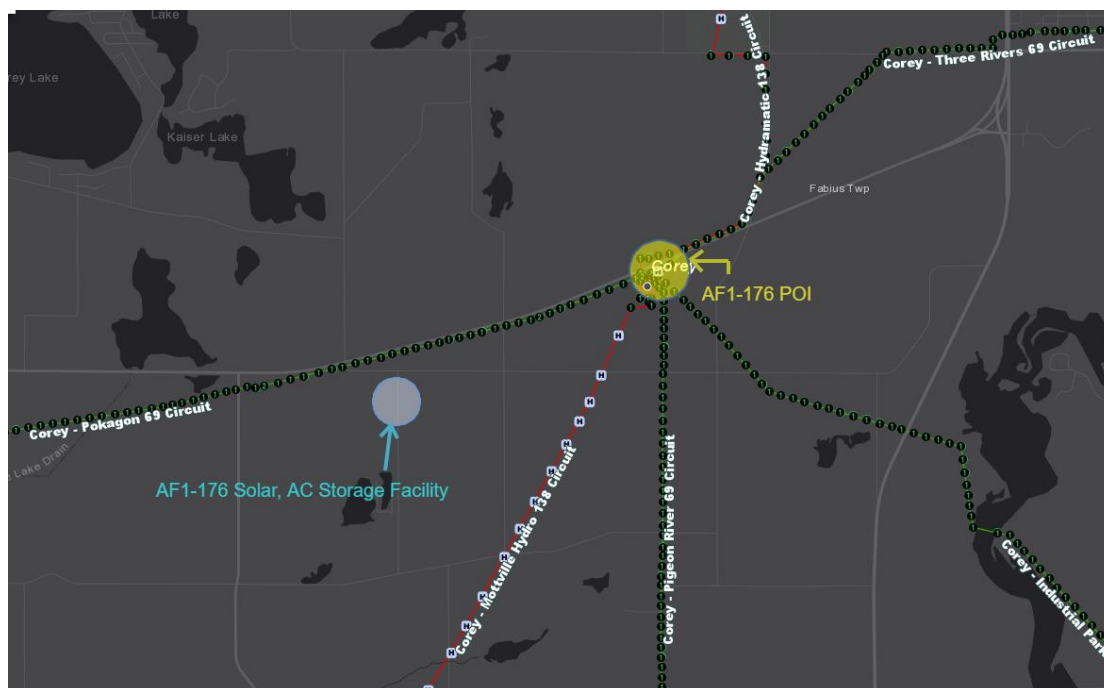
15.4 LG&E

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

16 Attachment 1: One-Line Diagram



17 Attachment 2: Site Location



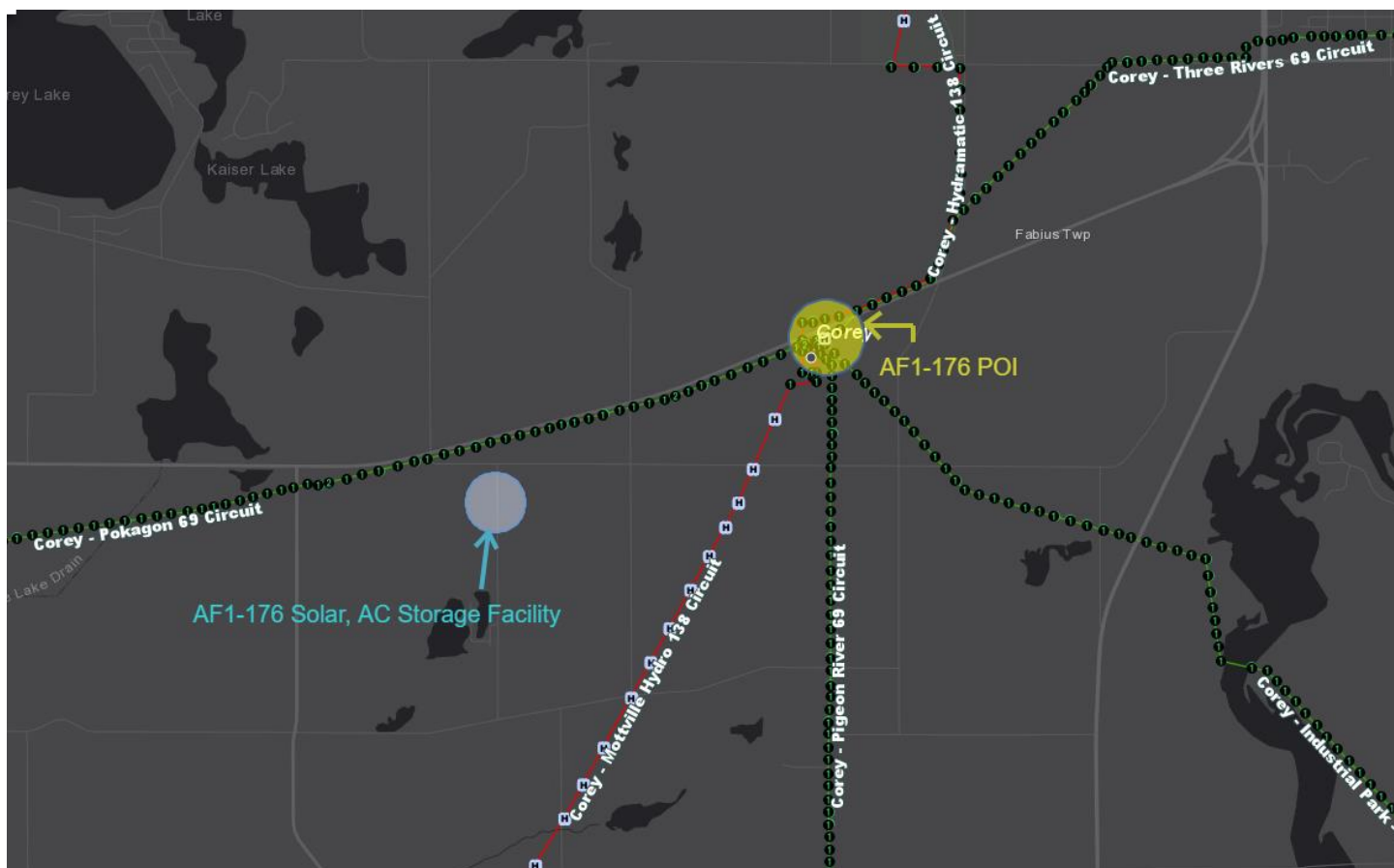


Figure 1: AF1-176 Primary and Secondary Points of Interconnection Map