



**Generation Interconnection
System Impact Study Report
for
Queue Project AF2-396
STINGER 138 KV
200 MW Capacity / 200 MW Energy**

June 2022

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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; Storage generating facility located in Cass County, Michigan. The installed facilities will have a total capability of 200 MW with 200 MW of this output being recognized by PJM as Capacity.

The proposed in-service date for this project is December 31, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-396
Project Name	STINGER 138 KV
State	Michigan
County	Cass
Transmission Owner	AEP
MFO	200
MWE	200
MWC	200
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

AF2-396 will interconnect with the AEP transmission system via a direct connection to the Stinger 138 kV substation.

To accommodate the interconnection of the AEP-owned Stinger 138 kV substation, one (1) new 138 kV circuit breaker will be installed (Attachment 1). Installation of associated protection and control equipment, 138 kV line risers, SCADA, jumpers, switches 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.

AEP will extend one span of 138 kV transmission line for the generation-leads going to the AF2-396 site. Unless this span extends directly from within the AEP station at the POI to the IC collector station structure, AEP will build and own the first transmission line structure outside of the Stinger 138 kV station fence to which the AEP and AF2-396 transmission line conductors will attach.

5 Cost Summary

The AF2-396 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$1,509,000
Total System Network Upgrade Costs (Summer Peak)	\$8,385,200
Total System Network Upgrade Costs(Light Load)	\$0
Total Costs	\$9,894,200

*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.

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

The total physical interconnection costs is given in the tables below:

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 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
Expand the Stinger 138 kV substation: install one (1) new 138 kV circuit breaker. Installation of associated protection and control equipment, 138 kV line risers and SCADA will also be required.	\$631,000
Total Direct Connection Facility Costs	\$631,000

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 Valley 138 kV substation	\$45,000
Review line protection and control settings at the Brody 138 kV substation	\$45,000
Total Non-Direct Connection Facility Costs	\$90,000

7 Schedule

Based on the scope of work for the interconnection facilities, it is expected to take a minimum of 12 to 18 months after the signing of an [Interconnection Construction Service Agreement (if FERC connection) or Interconnection Agreement (if non-FERC connection)] and construction kickoff call to complete the installation of the physical connection work. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined interconnection work, and that all system outages will be allowed when requested.

The schedule for any required Network Impact Reinforcements will be more clearly identified in future study phases. The estimated time to complete each of the required reinforcements is identified in the "System Reinforcements" section of the report.

8 Interconnection Customer Requirements

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

The Generation Interconnection Agreement does not in or by itself establish a requirement for the 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.

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) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter²) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- 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 AF2-396 was evaluated as a 200.1 MW (Capacity 200.0 MW) injection at the Stinger 138 kV substation in the AEP area. Project AF2-396 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-396 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)

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
95535275	243412	05STURGI	69.0	AEP	255331	17HOWE	69.0	NIPS	1	AEP_P1-2_#5577	single	47.0	94.83	133.53	AC	19.76
95535279	243412	05STURGI	69.0	AEP	255331	17HOWE	69.0	NIPS	1	AEP_P1-2_#6388	single	47.0	89.26	115.28	AC	13.02

10.2 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
189431714	243212	05BENTON	345.0	AEP	243250	05BENTON	138.0	AEP	1	AEP_P7-1_#11028	tower	564.0	98.63	101.76	AC	22.23
95968168	243265	05COREY	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_SUBT_P2-2_#1012_05VALLEY 69.0_1	bus	185.0	80.78	121.32	AC	76.87
95968363	243265	05COREY	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_SUBT_P4_#1342_05VALLEY 69.0_A	breaker	185.0	81.22	121.76	AC	76.87
145199099	243265	05COREY	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_SUBT_P2-2_#1279_05POKAGON 69.0_1	bus	185.0	99.39	121.42	AC	42.97
157084730	243265	05COREY	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_SUBT_P4_#1280_05POKAGON 69.0_F-AA	breaker	185.0	99.95	121.95	AC	42.97
157084731	243265	05COREY	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_SUBT_P4_#1281_05POKAGON 69.0_H	breaker	185.0	99.49	121.51	AC	42.97
157084733	243265	05COREY	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_SUBT_P4_#1282_05POKAGON 69.0_E	breaker	185.0	99.39	121.42	AC	42.97
95968476	243294	05FLWRFD8 SS	138.0	AEP	243345	05MOORPK	138.0	AEP	1	AEP_P4_#9218_05KENZIE 138_G	breaker	251.0	61.87	105.7	AC	111.42
95968186	243346	05MOTTV	138.0	AEP	243287	05E.LKHART	138.0	AEP	1	AEP_SUBT_P2-2_#1279_05POKAGON 69.0_1	bus	185.0	98.58	123.26	AC	47.88
145199409	243346	05MOTTV	138.0	AEP	243287	05E.LKHART	138.0	AEP	1	AEP_SUBT_P4_#1281_05POKAGON 69.0_H	breaker	185.0	98.69	123.37	AC	47.88
145199410	243346	05MOTTV	138.0	AEP	243287	05E.LKHART	138.0	AEP	1	AEP_SUBT_P4_#1282_05POKAGON 69.0_E	breaker	185.0	98.58	123.26	AC	47.88
157084642	243346	05MOTTV	138.0	AEP	243287	05E.LKHART	138.0	AEP	1	AEP_SUBT_P4_#1280_05POKAGON 69.0_F-AA	breaker	185.0	99.3	123.95	AC	47.88
95968469	247330	05BRODY	138.0	AEP	243294	05FLWRFD8 SS	138.0	AEP	1	AEP_P4_#9218_05KENZIE 138_G	breaker	251.0	62.76	106.58	AC	111.42

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
189431713	243212	05BENTON	345.0	AEP	243250	05BENTON	138.0	AEP	1	AEP_P7-1_#10998	tower	564.0	164.94	167.78	AC	14.39
95535034	243215	05COOK	345.0	AEP	243229	05OLIVE	345.0	AEP	1	AEP_P4_#7443_05DUMONT 765_A	breaker	1409.0	112.96	114.44	AC	21.86
157084986	243287	05E.ELKHART	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_P4_#9220_05KENZIE 138_J2	breaker	185.0	106.59	114.19	AC	23.99
98936948	256583	18MOROCO	345.0	METC	238530	02ALLEN	345.0	ATSI	1	ATSI-P7-1-TE-345-022T	tower	1793.0	109.72	110.86	AC	21.49
98936979	264612	19MON12	345.0	ITCT	241901	02LALLENDORF	345.0	ATSI	1	ATSI-P7-1-TE-138-025T-A	tower	1702.0	104.8	105.42	AC	18.4

10.4 Steady-State Voltage Requirements

To be determined

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.

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
95535343	243215	05COOK	345.0	AEP	243229	05OLIVE	345.0	AEP	1	AEP_P1-2_#358	operation	1409.0	104.84	106.47	AC	23.51
189431704	243224	05KENZIE	345.0	AEP	243322	05KENZIE	138.0	AEP	1	AEP_P1-3_#7019_05BENTON 345_1	operation	535.0	94.49	100.1	AC	28.32
95968658	243265	05COREY	138.0	AEP	243346	05MOTTV	138.0	AEP	1	Base Case	operation	185.0	79.38	100.74	AC	41.07
157084736	243265	05COREY	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_SUBT_P1-2_#726-B	operation	185.0	98.0	119.86	AC	42.67
157084988	243287	05E.ELKHART	138.0	AEP	243346	05MOTTV	138.0	AEP	1	AEP_P1-2_#9208	operation	185.0	95.29	108.61	AC	23.32
95968723	243294	05FLWRFD 8 SS	138.0	AEP	243345	05MOORPK	138.0	AEP	1	AEP_P1-2_#5574-B	operation	251.0	61.95	105.24	AC	111.03
157084646	243346	05MOTTV	138.0	AEP	243287	05E.ELKHART	138.0	AEP	1	AEP_SUBT_P1-2_#726-B	operation	185.0	97.15	121.65	AC	47.54
95535274	243412	05STURGI	69.0	AEP	255331	17HOWE	69.0	NIPS	1	AEP_P1-2_#5577	operation	47.0	156.3	192.04	AC	19.76
95968718	247330	05BRODY	138.0	AEP	243294	05FLWRFD 8 SS	138.0	AEP	1	AEP_P1-2_#5574-B	operation	251.0	62.84	106.12	AC	111.03

10.6 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-396	Upgrade Number
145199099,959 68168,1570847 33,157084730,1 57084731,9596 8363	3	05COREY 138.0 kV - 05MOTTV 138.0 kV Ckt 1	<u>AEP</u> N7018: A Sag Study will be required on the 8.5 mile section of ACSR 477 26/7 HAWK line to mitigate the overload. New Rating of conductor after the Sag Study: S/N: 185 MVA S/E: 257 MVA. New overall line SE to be 220 MVA SE. Depending on the sag study results, cost for this upgrade is expected to be between \$34,000 (No remediations required just sag study) and \$12.75 million (complete line reconductor/rebuild required). Time Estimate: a) 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. Project Type : FAC Cost : \$ 34,000 Time Estimate : 12 Months This AF2-396 is the driver for this project.	\$34,000	\$34,000	N7018
95968469	6	05BRODY 138.0 kV - 05FLWRFD8 SS 138.0 kV Ckt 1	<u>AEP</u> N8063: A Sag Study will be required on the 8.5 mile section of ACSR ~ 795 ~ 45/7 ~ TERN line to mitigate the overload . New Rating after the Sag Study : S/N: 251 MVA S/E: 335 MVA. Depending on the sag study results, cost for this upgrade is expected to be between \$34,000 (No remediations required just sag study) and \$12.75 million (complete line reconductor/rebuild required). Time Estimate: a) 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. Project Type : FAC Cost : \$ 34,000 Time Estimate : 12 Months This AF2-396 is the driver for this project.	\$34,000	\$34,000	N8063

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-396	Upgrade Number																				
98936979	10	19MON12 345.0 kV - 02LALLENDORF 345.0 kV Ckt 1	<u>ATSI:</u> Baseline Upgrade B2972: Is now in-service which upgraded the span over the Maumee River to bring the ATSI-end ratings to 1486/1824 MVA SN/SE. Project Type : FAC Cost : \$ 0 Time Estimate : 0 Months <u>ATSI</u> N6292: Reconductor the existing 6.5 miles of Lallendorf-Monroe 345kV line with bundled (2) 795 26/7 ACSS. Replace substation conductor, Line Drop, Wave Traps, Bitronics Meter for the Monroe 345kV exit at Lallendorf substation to increase the Summer Emergency rating to at least 2578 MVA for ATSI. Project Type : FAC Cost : \$ 26,095,000 Time Estimate : 20 Months The cost allocation is as follows: <table><tr><th>Queue</th><th>MW contribution</th><th>Percentage of Cost</th><th>\$ cost (\$26.095 M)</th></tr><tr><td>AF2-096</td><td>23.7</td><td>29.19%</td><td>7.6164</td></tr><tr><td>AF2-132</td><td>19.7</td><td>24.26%</td><td>6.3309</td></tr><tr><td>AF2-133</td><td>19.4</td><td>23.89%</td><td>6.2345</td></tr><tr><td>AF2-396</td><td>18.4</td><td>22.66%</td><td>5.9132</td></tr></table> <u>MISO End:</u> Ratings after MTEP Project #13814 (Projected in-service date is 5/1/2020, now in service) are expected to be 1702/1702 MVA SN/SE. Ratings after MTEP Project #15878 (Projected in-service date is 12/31/2021, now in service) are expected to be 1716/1975 MVA SN/SE.	Queue	MW contribution	Percentage of Cost	\$ cost (\$26.095 M)	AF2-096	23.7	29.19%	7.6164	AF2-132	19.7	24.26%	6.3309	AF2-133	19.4	23.89%	6.2345	AF2-396	18.4	22.66%	5.9132	\$26,095,000	\$5,913,200	N6292
Queue	MW contribution	Percentage of Cost	\$ cost (\$26.095 M)																							
AF2-096	23.7	29.19%	7.6164																							
AF2-132	19.7	24.26%	6.3309																							
AF2-133	19.4	23.89%	6.2345																							
AF2-396	18.4	22.66%	5.9132																							

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-396	Upgrade Number
95535034	7	05COOK 345.0 kV - 05OLIVE 345.0 kV Ckt 1	<u>AEP</u> 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. Project Type : FAC Cost : \$93,600 Time Estimate : 12 Months N3800 is needed for a prior queue cycle. AF2-396 currently does not receive cost allocation towards this upgrade. As changes to the PJM queue process occur (such as prior queued projects withdrawing from the queue, reducing in size, etc.) AF2-396 could receive cost allocation. Although Queue Project AF2-396 may not presently have cost responsibility for this upgrade, Queue Project AF2-396 may need this upgrade in-service to be deliverable to the PJM system. If Queue Project AF2-396 comes into service prior to completion of the upgrade, Queue Project AF2-396 will need an interim study.	\$93,600	\$0	N3800

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-396	Upgrade Number
98936948	9	18MOROCCO 345.0 kV - 02ALLEN 345.0 kV Ckt 1	<u>ATSI</u> N6289: Build 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. New Line will be built and owned by ITC. ITC has indicated that the new line rating will be 2036 MVA SN / 2298 MVA SE and plans to use the same size conductor as the existing Allen Junction-Morocco 345kV line. Project Type : CON Cost : \$3,458,600 Time Estimate : 18 Months <u>MISO End</u> MISO end SE rating is 2148 MVA (terminal equipment limited). MISO end is sufficient N6289 is needed for a prior queue cycle. AF2-396 currently does not receive cost allocation towards this upgrade. As changes to the PJM queue process occur (such as prior queued projects withdrawing from the queue, reducing in size, etc.) AF2-396 could receive cost allocation. Although Queue Project AF2-396 may not presently have cost responsibility for this upgrade, Queue Project AF2-396 may need this upgrade in-service to be deliverable to the PJM system. If Queue Project AF2-396 comes into service prior to completion of the upgrade, Queue Project AF2-396 will need an interim study.	\$3,458,600	\$0	N6289

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-396	Upgrade Number																																																																
189431713,189431714	2	05BENTON 345.0 kV - 05BENTON 138.0 kV Ckt 1	<u>AEP</u> N4731: Add a 2nd Benton 345/138 kV transformer Project Type : FAC Cost : \$7,912,565 Time Estimate : 12 Months The cost allocation is as follows: <table><tr><th>Queue</th><th>MW contribution</th><th>% of Cost</th><th>Cost (\$7.912565 M)</th></tr><tr><td>J793</td><td>83.5</td><td>0.272</td><td>2.149</td></tr><tr><td>J799</td><td>11.1</td><td>0.036</td><td>0.286</td></tr><tr><td>J806</td><td>12.1</td><td>0.039</td><td>0.311</td></tr><tr><td>J857</td><td>10.4</td><td>0.034</td><td>0.268</td></tr><tr><td>J875</td><td>9.6</td><td>0.031</td><td>0.247</td></tr><tr><td>AD2-075</td><td>31.1</td><td>0.101</td><td>0.801</td></tr><tr><td>J984</td><td>23.3</td><td>0.076</td><td>0.600</td></tr><tr><td>J1043</td><td>47.5</td><td>0.155</td><td>1.223</td></tr><tr><td>J1062</td><td>7.7</td><td>0.025</td><td>0.198</td></tr><tr><td>J1071</td><td>12.8</td><td>0.042</td><td>0.329</td></tr><tr><td>J1088</td><td>14.4</td><td>0.047</td><td>0.371</td></tr><tr><td>J1089</td><td>16.3</td><td>0.053</td><td>0.420</td></tr><tr><td>J1090</td><td>7.5</td><td>0.024</td><td>0.193</td></tr><tr><td>J1178</td><td>5.7</td><td>0.019</td><td>0.147</td></tr><tr><td>AF2-396</td><td>14.39</td><td>0.047</td><td>0.370</td></tr></table>	Queue	MW contribution	% of Cost	Cost (\$7.912565 M)	J793	83.5	0.272	2.149	J799	11.1	0.036	0.286	J806	12.1	0.039	0.311	J857	10.4	0.034	0.268	J875	9.6	0.031	0.247	AD2-075	31.1	0.101	0.801	J984	23.3	0.076	0.600	J1043	47.5	0.155	1.223	J1062	7.7	0.025	0.198	J1071	12.8	0.042	0.329	J1088	14.4	0.047	0.371	J1089	16.3	0.053	0.420	J1090	7.5	0.024	0.193	J1178	5.7	0.019	0.147	AF2-396	14.39	0.047	0.370	\$7,912,565	\$370,000	N4731
Queue	MW contribution	% of Cost	Cost (\$7.912565 M)																																																																			
J793	83.5	0.272	2.149																																																																			
J799	11.1	0.036	0.286																																																																			
J806	12.1	0.039	0.311																																																																			
J857	10.4	0.034	0.268																																																																			
J875	9.6	0.031	0.247																																																																			
AD2-075	31.1	0.101	0.801																																																																			
J984	23.3	0.076	0.600																																																																			
J1043	47.5	0.155	1.223																																																																			
J1062	7.7	0.025	0.198																																																																			
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J1089	16.3	0.053	0.420																																																																			
J1090	7.5	0.024	0.193																																																																			
J1178	5.7	0.019	0.147																																																																			
AF2-396	14.39	0.047	0.370																																																																			
95968476	4	05FLWRFD8 SS 138.0 kV - 05MOORPK 138.0 kV Ckt 1	<u>AEP</u> N8062: A Sag Study will be required on the 0.7 mile section of ACSR ~ 795 ~ 45/7 ~ TERN line to mitigate the overload . New Rating after the Sag Study : S/N: 251 MVA S/E: 335 MVA. Depending on the sag study results, cost for this upgrade is expected to be between \$2,800 (No remediations required just sag study) and \$2.1 million (complete line reconductor/rebuild required). Time Estimate: a) 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. Project Type : FAC Cost : \$2,800 Time Estimate : 12 Months This AF2-396 is the driver for this project.	\$2,800	\$2,800	N8062																																																																

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-396	Upgrade Number
95535275,95535279	1	05STURGI 69.0 kV - 17HOWE 69.0 kV Ckt 1	<u>AEP</u> N4713: Reconductor/rebuild 2.8 miles of AEP owned line. New AEP SE rating expected to be 71 MVA. Project Type : FAC Cost : \$2,000,000 Time Estimate : 36 Months This AF2-396 is the driver for this project.	\$2,000,000	\$2,000,000	N4713
95968186,145199409,157084642,145199410	5	05MOTTV 138.0 kV - 05E.ELKHART 138.0 kV Ckt 1	<u>AEP</u> N7017: A Sag Study will be required on the 7.8 mile section of ACSR 477 26/7 HAWK line to mitigate the overload. New Rating after the Sag Study: S/N: 185 MVA S/E: 257 MVA. Depending on the sag study results, cost for this upgrade is expected to be between \$31,200 (No remediations required just sag study) and \$23.4 million (complete line reconductor/rebuild required). Time Estimate: a) 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. Project Type : FAC Cost : \$31,000 Time Estimate : 12 Months This AF2-396 is the driver for this project.	\$31,200	\$31,200	N7017
157084986	8	05E.ELKHART 138.0 kV - 05MOTTV 138.0 kV Ckt 1	<u>AEP</u> N7017: A Sag Study will be required on the 7.8 mile section of ACSR 477 26/7 HAWK line to mitigate the overload. New Rating after the Sag Study: S/N: 185 MVA S/E: 257 MVA. Depending on the sag study results, cost for this upgrade is expected to be between \$31,200 (No remediations required just sag study) and \$23.4 million (complete line reconductor/rebuild required). Time Estimate: a) 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. Project Type : FAC Cost : \$31,000 Time Estimate : 12 Months This AF2-396 is the driver for this project.	\$31,200	\$31,200	N7017
			TOTAL COST	\$39,661,765	\$8,385,200	

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

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
95535275	243412	05STURGI	AEP	255331	17HOWE	NIPS	1	AEP_P1-2_#5577	single	47.0	94.83	133.53	AC	19.76

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
246536	05MOTTVILL	0.0582	80/20	0.0582
936141	AD2-020 C O1	3.8799	80/20	3.8799
943021	AE2-325 C	1.9650	80/20	1.9650
944161	AF1-084 C	3.0274	80/20	3.0274
944961	AF1-161 C	1.5670	80/20	1.5670
945111	AF1-176 C O1	22.6187	80/20	22.6187
957891	AF2-083 C O1	7.2490	80/20	7.2490
960981	AF2-389 C	2.1477	80/20	2.1477
961051	AF2-396 O1	19.7580	80/20	19.7580
WEC	WEC	0.0507	Confirmed LTF	0.0507
CBM-W2	CBM-W2	0.3276	Confirmed LTF	0.3276
NY	NY	0.0243	Confirmed LTF	0.0243
TVA	TVA	0.0238	Confirmed LTF	0.0238
CBM-S1	CBM-S1	0.1108	Confirmed LTF	0.1108
MADISON	MADISON	0.3044	Confirmed LTF	0.3044
MEC	MEC	0.1811	Confirmed LTF	0.1811
BLUEG	BLUEG	0.0052	Confirmed LTF	0.0052
TRIMBLE	TRIMBLE	0.0017	Confirmed LTF	0.0017
CATAWBA	CATAWBA	0.0042	Confirmed LTF	0.0042
CBM-W1	CBM-W1	1.0008	Confirmed LTF	1.0008

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
189431713	243212	05BENTON	AEP	243250	05BENTON	AEP	1	AEP_P7-1_#10998	tower	564.0	164.94	167.78	AC	14.39

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247528	05COVRT1	8.0175	50/50	8.0175
247529	05COVRT2	8.0175	50/50	8.0175
247530	05COVRT3	8.0175	50/50	8.0175
247531	05COVRT4	4.8120	50/50	4.8120
247532	05COVRT5	4.8120	50/50	4.8120
247533	05COVRT6	4.8120	50/50	4.8120
925961	AC1-072	0.7437	50/50	0.7437
936601	AD2-075	30.9372	50/50	30.9372
943023	AE2-325 BAT	11.5821	50/50	11.5821
944963	AF1-161 BAT	11.0940	50/50	11.0940
945113	AF1-176 BAT	13.7349	50/50	13.7349
950311	G934 C	3.4896	PJM External (MISO)	3.4896
950312	G934 E	13.9584	PJM External (MISO)	13.9584
950351	J466	2.5545	PJM External (MISO)	2.5545
950791	J201 C	0.3717	PJM External (MISO)	0.3717
950792	J201 E	1.4869	PJM External (MISO)	1.4869
950871	J246 C	0.1561	PJM External (MISO)	0.1561
950872	J246 E	0.6242	PJM External (MISO)	0.6242
950942	J325 E	0.3305	PJM External (MISO)	0.3305
951531	J533 C	4.4588	PJM External (MISO)	4.4588
951532	J533 E	17.8352	PJM External (MISO)	17.8352
951571	J538 C	2.0688	PJM External (MISO)	2.0688
951572	J538 E	8.2752	PJM External (MISO)	8.2752
952161	J571	0.6511	PJM External (MISO)	0.6511
952201	J589 C	3.3356	PJM External (MISO)	3.3356
952202	J589 E	18.0464	PJM External (MISO)	18.0464
952312	J646 E	0.1210	PJM External (MISO)	0.1210
952401	J752 C	1.3547	PJM External (MISO)	1.3547
952402	J752 E	7.3293	PJM External (MISO)	7.3293
952611	J717 C	3.1334	PJM External (MISO)	3.1334
952612	J717 E	16.9526	PJM External (MISO)	16.9526
952761	J728 C	2.9140	PJM External (MISO)	2.9140
952762	J728 E	15.7868	PJM External (MISO)	15.7868
952881	J758	18.8560	PJM External (MISO)	18.8560
952971	J793	100.2605	PJM External (MISO)	100.2605
953071	J794 C	0.2027	PJM External (MISO)	0.2027
953072	J794 E	1.0967	PJM External (MISO)	1.0967
953271	J701 C	0.6676	PJM External (MISO)	0.6676
953272	J701 E	3.6120	PJM External (MISO)	3.6120
953291	J796	23.4435	PJM External (MISO)	23.4435
953321	J799	11.7048	PJM External (MISO)	11.7048
953361	J806	13.2297	PJM External (MISO)	13.2297
953771	J832	10.8950	PJM External (MISO)	10.8950
953781	J833	6.1120	PJM External (MISO)	6.1120
953941	J857	11.4017	PJM External (MISO)	11.4017
954111	J875	10.3035	PJM External (MISO)	10.3035
955071	J984 C	3.6292	PJM External (MISO)	3.6292
955072	J984 E	19.6348	PJM External (MISO)	19.6348
955181	J996	4.7560	PJM External (MISO)	4.7560
955591	J1043 C	2.5338	PJM External (MISO)	2.5338
955592	J1043 E	44.8989	PJM External (MISO)	44.8989
955781	J1062	7.6245	PJM External (MISO)	7.6245
955861	J1071	12.5940	PJM External (MISO)	12.5940
956011	J1088	14.4000	PJM External (MISO)	14.4000

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
956021	J1089	16.2571	PJM External (MISO)	16.2571
956031	J1090	7.4259	PJM External (MISO)	7.4259
956741	J1172	4.5735	PJM External (MISO)	4.5735
956801	J1178	5.6570	PJM External (MISO)	5.6570
961052	AF2-396 BAT	14.3912	50/50	14.3912
NEWTON	NEWTON	1.5279	Confirmed LTF	1.5279
FARMERCITY	FARMERCITY	0.0954	Confirmed LTF	0.0954
G-007A	G-007A	1.0333	Confirmed LTF	1.0333
VFT	VFT	2.7993	Confirmed LTF	2.7993
GIBSON	GIBSON	0.6126	Confirmed LTF	0.6126
PRAIRIE	PRAIRIE	3.6472	Confirmed LTF	3.6472
COFFEEN	COFFEEN	0.3170	Confirmed LTF	0.3170
CHEOAH	CHEOAH	0.2828	Confirmed LTF	0.2828
EDWARDS	EDWARDS	0.7504	Confirmed LTF	0.7504
TILTON	TILTON	1.0111	Confirmed LTF	1.0111
CALDERWOOD	CALDERWOOD	0.2848	Confirmed LTF	0.2848
BLUEG	BLUEG	1.4565	Confirmed LTF	1.4565
TRIMBLE	TRIMBLE	0.4625	Confirmed LTF	0.4625
CATAWBA	CATAWBA	0.1099	Confirmed LTF	0.1099
CBM-W1	CBM-W1	23.3061	Confirmed LTF	23.3061

10.7.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE C T LOADIN G %	POST PROJE C T LOADIN G %	AC/D C	MW IMPAC T
157084733	243265	05COREY	AEP	243346	05MOTT V	AEP	1	AEP_SUBT_P4_#1282_05POKAGON 69.0_E	breaker	185.0	99.39	121.42	AC	42.97

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247966	05WTRV SLR E	0.1269	Adder	0.15
936141	AD2-020 C O1	7.9634	50/50	7.9634
936142	AD2-020 E O1	4.9016	50/50	4.9016
939391	AE1-170 C O1	3.0909	Adder	3.64
939392	AE1-170 E O1	4.2684	Adder	5.02
943021	AE2-325 C	4.0332	50/50	4.0332
943022	AE2-325 E	2.6824	50/50	2.6824
944161	AF1-084 C	5.8704	50/50	5.8704
944162	AF1-084 E	3.3530	50/50	3.3530
944961	AF1-161 C	3.2162	50/50	3.2162
944962	AF1-161 E	3.2162	50/50	3.2162
945111	AF1-176 C O1	57.9114	50/50	57.9114
945112	AF1-176 E O1	53.6856	50/50	53.6856
957891	AF2-083 C O1	29.3080	50/50	29.3080
957892	AF2-083 E O1	14.6540	50/50	14.6540
960981	AF2-389 C	8.7924	50/50	8.7924
960982	AF2-389 E	5.8616	50/50	5.8616
961051	AF2-396 O1	42.9720	50/50	42.9720
WEC	WEC	0.0126	Confirmed LTF	0.0126
NEWTON	NEWTON	0.0193	Confirmed LTF	0.0193
GIBSON	GIBSON	0.0213	Confirmed LTF	0.0213
NY	NY	0.0077	Confirmed LTF	0.0077
PRAIRIE	PRAIRIE	0.0207	Confirmed LTF	0.0207
O-066	O-066	0.0941	Confirmed LTF	0.0941
COFFEEN	COFFEEN	0.0012	Confirmed LTF	0.0012
CHEOAH	CHEOAH	0.0105	Confirmed LTF	0.0105
TILTON	TILTON	0.0145	Confirmed LTF	0.0145
G-007	G-007	0.0146	Confirmed LTF	0.0146
MADISON	MADISON	0.1290	Confirmed LTF	0.1290
MEC	MEC	0.0286	Confirmed LTF	0.0286
CALDERWOOD	CALDERWOOD	0.0109	Confirmed LTF	0.0109
BLUEG	BLUEG	0.0642	Confirmed LTF	0.0642
TRIMBLE	TRIMBLE	0.0206	Confirmed LTF	0.0206
CATAWBA	CATAWBA	0.0073	Confirmed LTF	0.0073
CBM-W1	CBM-W1	1.2010	Confirmed LTF	1.2010

10.7.4 Index 4

ID	FROM BUS#	FROM BUS	FRO M BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Ratin g MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
95968476	243294	05FLWRFD8 SS	AEP	243345	05MOORPK	AEP	1	AEP_P4_#9218_05KENZIE 138_G	breake r	251.0	61.87	105.7	AC	111.42

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
244412	05WTRV SLR C	0.0584	50/50	0.0584
247966	05WTRV SLR E	0.3348	50/50	0.3348
936141	AD2-020 C O1	21.3289	50/50	21.3289
936142	AD2-020 E O1	13.1281	50/50	13.1281
938261	AE1-039	0.0599	Adder	0.07
939391	AE1-170 C O1	20.9859	50/50	20.9859
939392	AE1-170 E O1	28.9806	50/50	28.9806
943021	AE2-325 C	10.8023	50/50	10.8023
943022	AE2-325 E	7.1843	50/50	7.1843
944161	AF1-084 C	11.8771	50/50	11.8771
944162	AF1-084 E	6.7838	50/50	6.7838
944961	AF1-161 C	8.6143	50/50	8.6143
944962	AF1-161 E	8.6143	50/50	8.6143
945113	AF1-176 BAT	16.2540	50/50	16.2540
961051	AF2-396 O1	111.4180	50/50	111.4180
WEC	WEC	0.0060	Confirmed LTF	0.0060
NEWTON	NEWTON	0.0204	Confirmed LTF	0.0204
GIBSON	GIBSON	0.0186	Confirmed LTF	0.0186
NY	NY	0.0039	Confirmed LTF	0.0039
PRAIRIE	PRAIRIE	0.0310	Confirmed LTF	0.0310
O-066	O-066	0.0538	Confirmed LTF	0.0538
COFFEEN	COFFEEN	0.0022	Confirmed LTF	0.0022
CHEOAH	CHEOAH	0.0100	Confirmed LTF	0.0100
TILTON	TILTON	0.0132	Confirmed LTF	0.0132
G-007	G-007	0.0083	Confirmed LTF	0.0083
MADISON	MADISON	0.0867	Confirmed LTF	0.0867
MEC	MEC	0.0079	Confirmed LTF	0.0079
CALDERWOOD	CALDERWOOD	0.0099	Confirmed LTF	0.0099
BLUEG	BLUEG	0.0573	Confirmed LTF	0.0573
TRIMBLE	TRIMBLE	0.0184	Confirmed LTF	0.0184
CATAWBA	CATAWBA	0.0063	Confirmed LTF	0.0063
CBM-W1	CBM-W1	1.3261	Confirmed LTF	1.3261

10.7.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE C T LOADIN G %	POST PROJE C T LOADIN G %	AC D C	MW IMPAC T
157084642	243346	05MOTT V	AEP	243287	05E.ELKHA RT	AEP	1	AEP_SUBT_P4_#1280_05POKA GON 69.0_F-AA	breaker	185.0	99.3	123.95	AC	47.88

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
246536	05MOTTVILL	0.1466	50/50	0.1466
247966	05WTRV SLR E	0.1415	Adder	0.17
936141	AD2-020 C O1	8.9086	50/50	8.9086
936142	AD2-020 E O1	5.4834	50/50	5.4834
939391	AE1-170 C O1	3.3217	Adder	3.91
939392	AE1-170 E O1	4.5871	Adder	5.4
943021	AE2-325 C	4.5119	50/50	4.5119
943022	AE2-325 E	3.0007	50/50	3.0007
944161	AF1-084 C	6.6786	50/50	6.6786
944162	AF1-084 E	3.8146	50/50	3.8146
944961	AF1-161 C	3.5980	50/50	3.5980
944962	AF1-161 E	3.5980	50/50	3.5980
945111	AF1-176 C O1	61.9824	50/50	61.9824
945112	AF1-176 E O1	57.4596	50/50	57.4596
957891	AF2-083 C O1	37.9810	50/50	37.9810
957892	AF2-083 E O1	18.9905	50/50	18.9905
960981	AF2-389 C	11.3943	50/50	11.3943
960982	AF2-389 E	7.5962	50/50	7.5962
961051	AF2-396 O1	47.8760	50/50	47.8760
WEC	WEC	0.0041	Confirmed LTF	0.0041
NEWTON	NEWTON	0.0376	Confirmed LTF	0.0376
FARMERCITY	FARMERCITY	0.0004	Confirmed LTF	0.0004
GIBSON	GIBSON	0.0278	Confirmed LTF	0.0278
NY	NY	0.0044	Confirmed LTF	0.0044
PRAIRIE	PRAIRIE	0.0620	Confirmed LTF	0.0620
O-066	O-066	0.0605	Confirmed LTF	0.0605
COFFEEN	COFFEEN	0.0048	Confirmed LTF	0.0048
CHEOAH	CHEOAH	0.0135	Confirmed LTF	0.0135
TILTON	TILTON	0.0265	Confirmed LTF	0.0265
G-007	G-007	0.0104	Confirmed LTF	0.0104
MADISON	MADISON	0.0907	Confirmed LTF	0.0907
CALDERWOOD	CALDERWOOD	0.0139	Confirmed LTF	0.0139
BLUEG	BLUEG	0.0781	Confirmed LTF	0.0781
TRIMBLE	TRIMBLE	0.0250	Confirmed LTF	0.0250
CATAWBA	CATAWBA	0.0084	Confirmed LTF	0.0084
CBM-W1	CBM-W1	1.2260	Confirmed LTF	1.2260

10.7.6 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	ACID C	MW IMPACT
95968469	247330	05BRODY	AEP	243294	05FLWRFD8 SS	AEP	1	AEP_P4_#9218_05KENZIE 138_G	breaker	251.0	62.76	106.58	AC	111.42

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
244412	05WTRV SLR C	0.0584	50/50	0.0584
247966	05WTRV SLR E	0.3348	50/50	0.3348
936141	AD2-020 C O1	21.3289	50/50	21.3289
936142	AD2-020 E O1	13.1281	50/50	13.1281
938261	AE1-039	0.0599	Adder	0.07
939391	AE1-170 C O1	20.9859	50/50	20.9859
939392	AE1-170 E O1	28.9806	50/50	28.9806
943021	AE2-325 C	10.8023	50/50	10.8023
943022	AE2-325 E	7.1843	50/50	7.1843
944161	AF1-084 C	11.8771	50/50	11.8771
944162	AF1-084 E	6.7838	50/50	6.7838
944961	AF1-161 C	8.6143	50/50	8.6143
944962	AF1-161 E	8.6143	50/50	8.6143
945113	AF1-176 BAT	16.2540	50/50	16.2540
961051	AF2-396 O1	111.4180	50/50	111.4180
WEC	WEC	0.0060	Confirmed LTF	0.0060
NEWTON	NEWTON	0.0204	Confirmed LTF	0.0204
GIBSON	GIBSON	0.0186	Confirmed LTF	0.0186
NY	NY	0.0039	Confirmed LTF	0.0039
PRAIRIE	PRAIRIE	0.0310	Confirmed LTF	0.0310
O-066	O-066	0.0538	Confirmed LTF	0.0538
COFFEEN	COFFEEN	0.0022	Confirmed LTF	0.0022
CHEOAH	CHEOAH	0.0100	Confirmed LTF	0.0100
TILTON	TILTON	0.0132	Confirmed LTF	0.0132
G-007	G-007	0.0083	Confirmed LTF	0.0083
MADISON	MADISON	0.0867	Confirmed LTF	0.0867
MEC	MEC	0.0079	Confirmed LTF	0.0079
CALDERWOOD	CALDERWOOD	0.0099	Confirmed LTF	0.0099
BLUEG	BLUEG	0.0573	Confirmed LTF	0.0573
TRIMBLE	TRIMBLE	0.0184	Confirmed LTF	0.0184
CATAWBA	CATAWBA	0.0063	Confirmed LTF	0.0063
CBM-W1	CBM-W1	1.3261	Confirmed LTF	1.3261

10.7.7 Index 7

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
95535034	243215	05COOK	AEP	243229	05OLIVE	AEP	1	AEP_P4_#7443_05DUMONT 765_A	breaker	1409.0	112.96	114.44	AC	21.86

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243440	05CKG1	51.3216	50/50	51.3216
243441	05CKG2	57.9290	50/50	57.9290
244412	05WTRV SLR C	0.0547	50/50	0.0547
247528	05COVRT1	7.6984	50/50	7.6984
247529	05COVRT2	7.6984	50/50	7.6984
247530	05COVRT3	7.6984	50/50	7.6984
247531	05COVRT4	4.6205	50/50	4.6205
247532	05COVRT5	4.6205	50/50	4.6205
247533	05COVRT6	4.6205	50/50	4.6205
247604	X1-042	0.0748	50/50	0.0748
247651	AA2-116	30.0841	50/50	30.0841
247966	05WTRV SLR E	0.3137	50/50	0.3137
276165	Z1-106 BAT2	0.6855	Merchant Transmission	0.6855
276166	Z1-106 BAT1	0.6855	Merchant Transmission	0.6855
276171	Z1-107 BAT	1.4278	Merchant Transmission	1.4278
276172	Z1-108 BAT	1.3610	Merchant Transmission	1.3610
916221	Z1-073 E	-2.5407	Adder	-2.99
918052	AA1-018 E OP	-7.8391	Adder	-9.22
920273	AA2-123 BAT	1.3450	Merchant Transmission	1.3450
925302	AB2-191 E	-0.6520	Adder	-0.77
925961	AC1-072	0.7141	50/50	0.7141
926581	AC1-141	2.7542	50/50	2.7542
932931	AC2-117	-3.6042	Adder	-4.24
933281	AC2-140 C	11.0018	50/50	11.0018
933282	AC2-140 E	0.5790	50/50	0.5790
936141	AD2-020 C O1	7.2708	50/50	7.2708
936142	AD2-020 E O1	4.4752	50/50	4.4752
936601	AD2-075	29.7062	50/50	29.7062
938261	AE1-039	0.1144	50/50	0.1144
939391	AE1-170 C O1	7.1587	50/50	7.1587
939392	AE1-170 E O1	9.8858	50/50	9.8858
939683	AE1-198 BAT	7.2330	Merchant Transmission	7.2330
943021	AE2-325 C	3.6824	50/50	3.6824
943022	AE2-325 E	2.4490	50/50	2.4490
943803	AF1-048 BAT	3.5073	Merchant Transmission	3.5073
943922	AF1-060 BAT	0.6770	Merchant Transmission	0.6770
944161	AF1-084 C	6.6949	50/50	6.6949
944162	AF1-084 E	3.8239	50/50	3.8239
944961	AF1-161 C	2.9365	50/50	2.9365
944962	AF1-161 E	2.9365	50/50	2.9365
945111	AF1-176 C O1	12.8027	Adder	15.06
945112	AF1-176 E O1	11.8685	Adder	13.96
945352	AF1-200 NFTW	142.6530	Merchant Transmission	142.6530
946163	AF1-281 BAT	1.2856	Merchant Transmission	1.2856
950311	G934 C	4.4151	PJM External (MISO)	4.4151
950312	G934 E	17.6604	PJM External (MISO)	17.6604
950351	J466	3.5496	PJM External (MISO)	3.5496
950791	J201 C	0.5027	PJM External (MISO)	0.5027
950792	J201 E	2.0107	PJM External (MISO)	2.0107
950871	J246 C	0.1998	PJM External (MISO)	0.1998
950872	J246 E	0.7992	PJM External (MISO)	0.7992
950942	J325 E	0.4639	PJM External (MISO)	0.4639
951531	J533 C	5.7088	PJM External (MISO)	5.7088
951532	J533 E	22.8352	PJM External (MISO)	22.8352

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
951571	J538 C	3.2553	PJM External (MISO)	3.2553
951572	J538 E	13.0212	PJM External (MISO)	13.0212
952161	J571	0.9002	PJM External (MISO)	0.9002
952201	J589 C	4.3278	PJM External (MISO)	4.3278
952202	J589 E	23.4142	PJM External (MISO)	23.4142
952312	J646 E	0.1751	PJM External (MISO)	0.1751
952401	J752 C	1.8704	PJM External (MISO)	1.8704
952402	J752 E	10.1196	PJM External (MISO)	10.1196
952611	J717 C	4.1395	PJM External (MISO)	4.1395
952612	J717 E	22.3958	PJM External (MISO)	22.3958
952761	J728 C	3.8497	PJM External (MISO)	3.8497
952762	J728 E	20.8556	PJM External (MISO)	20.8556
952881	J758	26.5120	PJM External (MISO)	26.5120
952971	J793	144.8780	PJM External (MISO)	144.8780
953071	J794 C	0.2651	PJM External (MISO)	0.2651
953072	J794 E	1.4342	PJM External (MISO)	1.4342
953271	J701 C	0.9201	PJM External (MISO)	0.9201
953272	J701 E	4.9780	PJM External (MISO)	4.9780
953291	J796	31.1680	PJM External (MISO)	31.1680
953321	J799	18.2612	PJM External (MISO)	18.2612
953361	J806	18.8142	PJM External (MISO)	18.8142
953771	J832	14.0760	PJM External (MISO)	14.0760
953781	J833	9.5850	PJM External (MISO)	9.5850
953941	J857	16.1423	PJM External (MISO)	16.1423
954111	J875	15.6840	PJM External (MISO)	15.6840
955071	J984 C	4.5917	PJM External (MISO)	4.5917
955072	J984 E	24.8423	PJM External (MISO)	24.8423
955181	J996	7.6192	PJM External (MISO)	7.6192
955591	J1043 C	3.1274	PJM External (MISO)	3.1274
955592	J1043 E	55.4175	PJM External (MISO)	55.4175
955781	J1062	12.8130	PJM External (MISO)	12.8130
955861	J1071	15.6850	PJM External (MISO)	15.6850
956011	J1088	19.3350	PJM External (MISO)	19.3350
956021	J1089	21.8416	PJM External (MISO)	21.8416
956031	J1090	10.6569	PJM External (MISO)	10.6569
956741	J1172	6.2170	PJM External (MISO)	6.2170
956801	J1178	8.0008	PJM External (MISO)	8.0008
957333	AF2-027 BAT	3.4205	Merchant Transmission	3.4205
957373	AF2-031 BAT	1.4298	Merchant Transmission	1.4298
957403	AF2-034 BAT	1.4116	Merchant Transmission	1.4116
957843	AF2-078 BAT	1.4570	Merchant Transmission	1.4570
957891	AF2-083 C O1	7.6789	Adder	9.03
957892	AF2-083 E O1	3.8395	Adder	4.52
958013	AF2-095 BAT	2.8868	Merchant Transmission	2.8868
958023	AF2-096 BAT	5.4577	Merchant Transmission	5.4577
958923	AF2-183 BAT	5.1424	Merchant Transmission	5.1424
959353	AF2-226 BAT	3.4760	Merchant Transmission	3.4760
960283	AF2-319 BAT	3.4760	Merchant Transmission	3.4760
960382	AF2-329 BAT	3.5647	Merchant Transmission	3.5647
960603	AF2-351 BAT	1.4434	Merchant Transmission	1.4434
960981	AF2-389 C	2.3027	Adder	2.71
960982	AF2-389 E	1.5351	Adder	1.81
961022	AF2-393 BAT	3.8376	Merchant Transmission	3.8376
961032	AF2-394 BAT	2.5584	Merchant Transmission	2.5584
961051	AF2-396 O1	21.8580	50/50	21.8580
961503	AF2-441 BAT	14.3340	Merchant Transmission	14.3340
NEWTON	NEWTON	4.1594	Confirmed LTF	4.1594
FARMERCITY	FARMERCITY	0.2709	Confirmed LTF	0.2709
G-007A	G-007A	1.9036	Confirmed LTF	1.9036
VFT	VFT	5.1406	Confirmed LTF	5.1406
GIBSON	GIBSON	1.4360	Confirmed LTF	1.4360
PRAIRIE	PRAIRIE	9.9962	Confirmed LTF	9.9962
COFFEEN	COFFEEN	0.8834	Confirmed LTF	0.8834
CHEOAH	CHEOAH	0.6632	Confirmed LTF	0.6632
EDWARDS	EDWARDS	2.1899	Confirmed LTF	2.1899
TILTON	TILTON	2.8577	Confirmed LTF	2.8577

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LGE-TSR-0092018	LGE-TSR-0092018	0.0000	LTF	0.0000
CALDERWOOD	CALDERWOOD	0.6690	Confirmed LTF	0.6690
BLUEG	BLUEG	3.0745	Confirmed LTF	3.0745
TRIMBLE	TRIMBLE	0.9694	Confirmed LTF	0.9694
CATAWBA	CATAWBA	0.2439	Confirmed LTF	0.2439

10.7.8 Index 8

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
157084986	243287	05E.ELKHART	AEP	243346	05MOTT V	AEP	1	AEP_P4_#9220_05KENZIE 138_J2	breaker	185.0	106.59	114.19	AC	23.99

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943023	AE2-325 BAT	8.7670	50/50	8.7670
944963	AF1-161 BAT	8.3975	50/50	8.3975
945113	AF1-176 BAT	63.7517	50/50	63.7517
961052	AF2-396 BAT	23.9944	50/50	23.9944
WEC	WEC	0.0035	Confirmed LTF	0.0035
LGEE	LGEE	0.0240	Confirmed LTF	0.0240
CPL	CPL	0.0119	Confirmed LTF	0.0119
G-007A	G-007A	0.0048	Confirmed LTF	0.0048
VFT	VFT	0.0129	Confirmed LTF	0.0129
CBM-W2	CBM-W2	0.2703	Confirmed LTF	0.2703
TVA	TVA	0.0406	Confirmed LTF	0.0406
CBM-S2	CBM-S2	0.1214	Confirmed LTF	0.1214
CBM-S1	CBM-S1	0.2641	Confirmed LTF	0.2641
MEC	MEC	0.0318	Confirmed LTF	0.0318

10.7.9 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
98936948	256583	18MOROCCO	METC	238530	02ALLEN	ATSI	1	ATSI-P7-1-TE-345-022T	tower	1793.0	109.72	110.86	AC	21.49

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243071	05BERRINS P G	0.1166	50/50	0.1166
243440	05CKG1	19.2785	50/50	19.2785
244357	05GRANGER EL	-0.2463	Adder	-0.29
244412	05WTRV SLR C	0.0481	50/50	0.0481
246422	05MAYFLWER	0.0843	50/50	0.0843
246431	05BUCHANAN	0.0159	50/50	0.0159
246536	05MOTTVILL	0.0283	50/50	0.0283
247528	05COVRT1	6.1067	50/50	6.1067
247529	05COVRT2	6.1067	50/50	6.1067
247530	05COVRT3	6.1067	50/50	6.1067
247531	05COVRT4	3.6651	50/50	3.6651
247532	05COVRT5	3.6651	50/50	3.6651
247533	05COVRT6	3.6651	50/50	3.6651
247604	X1-042	0.0644	50/50	0.0644
247651	AA2-116	17.7888	50/50	17.7888
247966	05WTRV SLR E	0.2760	50/50	0.2760
247967	05OLIV SLR E	0.1956	Adder	0.23
247969	Z2-116 E	0.1049	Adder	0.12
925961	AC1-072	0.5665	50/50	0.5665
926581	AC1-141	1.6286	50/50	1.6286
932791	AC2-103 C	-4.0447	Adder	-4.76
933281	AC2-140 C	2.7222	Adder	3.2
933282	AC2-140 E	0.1433	Adder	0.17
934252	AD1-052 E1	-0.7186	Adder	-0.85
934262	AD1-052 E2	-0.7186	Adder	-0.85
936141	AD2-020 C O1	6.8152	50/50	6.8152
936142	AD2-020 E O1	4.1948	50/50	4.1948
936601	AD2-075	23.5639	50/50	23.5639
936631	AD2-079 C O1	0.9672	Adder	1.14
936632	AD2-079 E O1	0.6448	Adder	0.76
938261	AE1-039	0.0986	50/50	0.0986
939391	AE1-170 C O1	6.5873	50/50	6.5873
939392	AE1-170 E O1	9.0967	50/50	9.0967
939631	AE1-193 C	4.1852	Adder	4.92
939632	AE1-193 E	28.0086	Adder	32.95
939641	AE1-194 C	4.1852	Adder	4.92
939642	AE1-194 E	28.0086	Adder	32.95
939651	AE1-195 C	4.1852	Adder	4.92
939652	AE1-195 E	28.0086	Adder	32.95
939681	AE1-198 C	12.4268	Adder	14.62
939682	AE1-198 E	10.5596	Adder	12.42
943001	AE2-323 C	4.3774	Adder	5.15
943002	AE2-323 E	2.1463	Adder	2.53
943021	AE2-325 C	3.4516	50/50	3.4516
943022	AE2-325 E	2.2956	50/50	2.2956
943781	AF1-046 C	2.0432	Adder	2.4
943782	AF1-046 E	1.3622	Adder	1.6
944161	AF1-084 C	6.1652	50/50	6.1652
944162	AF1-084 E	3.5214	50/50	3.5214
944931	AF1-158 C O1	7.0893	Adder	8.34
944932	AF1-158 E O1	4.7262	Adder	5.56
944961	AF1-161 C	2.7525	50/50	2.7525
944962	AF1-161 E	2.7525	50/50	2.7525

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945111	AF1-176 C O1	16.0335	50/50	16.0335
945112	AF1-176 E O1	14.8635	50/50	14.8635
945501	AF1-215 C O1	11.8942	Adder	13.99
945502	AF1-215 E O1	7.9295	Adder	9.33
950311	G934 C	4.9797	PJM External (MISO)	4.9797
950312	G934 E	19.9188	PJM External (MISO)	19.9188
950351	J466	7.6140	PJM External (MISO)	7.6140
950791	J201 C	0.9212	PJM External (MISO)	0.9212
950792	J201 E	3.6850	PJM External (MISO)	3.6850
950871	J246 C	0.2511	PJM External (MISO)	0.2511
950872	J246 E	1.0044	PJM External (MISO)	1.0044
950942	J325 E	1.0448	PJM External (MISO)	1.0448
951531	J533 C	7.1744	PJM External (MISO)	7.1744
951532	J533 E	28.6976	PJM External (MISO)	28.6976
951571	J538 C	8.6256	PJM External (MISO)	8.6256
951572	J538 E	34.5024	PJM External (MISO)	34.5024
952161	J571	0.7461	PJM External (MISO)	0.7461
952201	J589 C	5.9083	PJM External (MISO)	5.9083
952202	J589 E	31.9657	PJM External (MISO)	31.9657
952312	J646 E	0.4512	PJM External (MISO)	0.4512
952401	J752 C	3.8819	PJM External (MISO)	3.8819
952402	J752 E	21.0021	PJM External (MISO)	21.0021
952611	J717 C	6.5085	PJM External (MISO)	6.5085
952612	J717 E	35.2124	PJM External (MISO)	35.2124
952761	J728 C	6.0528	PJM External (MISO)	6.0528
952762	J728 E	32.7908	PJM External (MISO)	32.7908
952881	J758	32.0420	PJM External (MISO)	32.0420
952971	J793	371.8918	PJM External (MISO)	371.8918
953071	J794 C	0.3864	PJM External (MISO)	0.3864
953072	J794 E	2.0906	PJM External (MISO)	2.0906
953271	J701 C	1.8907	PJM External (MISO)	1.8907
953272	J701 E	10.2294	PJM External (MISO)	10.2294
953291	J796	51.6838	PJM External (MISO)	51.6838
953321	J799	66.6093	PJM External (MISO)	66.6093
953361	J806	29.1682	PJM External (MISO)	29.1682
953771	J832	18.1370	PJM External (MISO)	18.1370
953781	J833	36.4390	PJM External (MISO)	36.4390
953941	J857	22.5147	PJM External (MISO)	22.5147
954111	J875	49.9950	PJM External (MISO)	49.9950
955071	J984 C	5.1789	PJM External (MISO)	5.1789
955072	J984 E	28.0191	PJM External (MISO)	28.0191
955181	J996	32.7128	PJM External (MISO)	32.7128
955591	J1043 C	2.8416	PJM External (MISO)	2.8416
955592	J1043 E	50.3531	PJM External (MISO)	50.3531
955781	J1062	44.4735	PJM External (MISO)	44.4735
955861	J1071	12.8510	PJM External (MISO)	12.8510
956011	J1088	32.6835	PJM External (MISO)	32.6835
956021	J1089	37.3439	PJM External (MISO)	37.3439
956031	J1090	21.6486	PJM External (MISO)	21.6486
956741	J1172	11.7205	PJM External (MISO)	11.7205
956801	J1178	13.9601	PJM External (MISO)	13.9601
957891	AF2-083 C O1	10.2990	50/50	10.2990
957892	AF2-083 E O1	5.1495	50/50	5.1495
958401	AF2-134 C O1	3.9647	Adder	4.66
958402	AF2-134 E O1	2.6432	Adder	3.11
959001	AF2-191 C O1	5.1696	Adder	6.08
959002	AF2-191 E O1	3.4464	Adder	4.05
960681	AF2-359 C	5.5259	Adder	6.5
960682	AF2-359 E	3.6839	Adder	4.33
960981	AF2-389 C	3.0894	50/50	3.0894
960982	AF2-389 E	2.0596	50/50	2.0596
961051	AF2-396 O1	21.4900	50/50	21.4900
WEC	WEC	2.1382	Confirmed LTF	2.1382
LGEE	LGEE	1.6225	Confirmed LTF	1.6225
CPLE	CPLE	0.2891	Confirmed LTF	0.2891
CBM-W2	CBM-W2	31.1138	Confirmed LTF	31.1138

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
NY	NY	1.1917	Confirmed LTF	1.1917
TVA	TVA	3.6134	Confirmed LTF	3.6134
O-066	O-066	12.8957	Confirmed LTF	12.8957
CBM-S2	CBM-S2	4.8725	Confirmed LTF	4.8725
CBM-S1	CBM-S1	22.3991	Confirmed LTF	22.3991
G-007	G-007	1.9822	Confirmed LTF	1.9822
MADISON	MADISON	7.8281	Confirmed LTF	7.8281
MEC	MEC	8.9651	Confirmed LTF	8.9651
CBM-W1	CBM-W1	188.6883	Confirmed LTF	188.6883

10.7.10 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
98936979	264612	19MON12	ITCT	241901	02LALLENDORF	ATSI	1	ATSI-P7-1-TE-138-025T-A	tower	1702.0	104.8	105.42	AC	18.4

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
244357	05GRANGER EL	-0.1902	Adder	-0.22
244412	05WTRV SLR C	0.0413	50/50	0.0413
247528	05COVRT1	5.2394	50/50	5.2394
247529	05COVRT2	5.2394	50/50	5.2394
247530	05COVRT3	5.2394	50/50	5.2394
247531	05COVRT4	3.1446	50/50	3.1446
247532	05COVRT5	3.1446	50/50	3.1446
247533	05COVRT6	3.1446	50/50	3.1446
247604	X1-042	0.0554	50/50	0.0554
247966	05WTRV SLR E	0.2371	50/50	0.2371
247967	05OLIV SLR E	0.1689	Adder	0.2
247969	Z2-116 E	0.0905	Adder	0.11
274788	SE CHICAG;5U (Deactivation : 01/06/2020)	2.0908	Adder	2.46
274789	SE CHICAG;6U (Deactivation : 01/06/2020)	2.0963	Adder	2.47
274790	SE CHICAG;7U (Deactivation : 01/06/2020)	2.1239	Adder	2.5
274791	SE CHICAG;8U (Deactivation : 01/06/2020)	2.1239	Adder	2.5
274792	SE CHICAG;9U (Deactivation : 01/06/2020)	2.1281	Adder	2.5
274793	SE CHICAG;0U (Deactivation : 01/06/2020)	2.1281	Adder	2.5
274794	SE CHICAG;1U (Deactivation : 01/06/2020)	2.1281	Adder	2.5
274795	SE CHICAG;2U (Deactivation : 01/06/2020)	2.1281	Adder	2.5
274881	PILOT HIL;1E	7.4756	Adder	8.79
275149	KELLYCK ;1E	7.4756	Adder	8.79
910542	X3-005 E	0.3046	Adder	0.36
925961	AC1-072	0.4860	50/50	0.4860
930501	AB1-091 O1	29.3870	Adder	34.57
932791	AC2-103 C	-3.7635	Adder	-4.43
932931	AC2-117	2.5235	Adder	2.97
933281	AC2-140 C	2.3556	Adder	2.77
933282	AC2-140 E	0.1240	Adder	0.15
933411	AC2-154 C	1.0145	Adder	1.19
933412	AC2-154 E	1.6553	Adder	1.95
934252	AD1-052 E1	-0.5442	Adder	-0.64

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
934262	AD1-052 E2	-0.5442	Adder	-0.64
936141	AD2-020 C O1	4.9705	Adder	5.85
936142	AD2-020 E O1	3.0594	Adder	3.6
936371	AD2-047 C O1	1.8155	Adder	2.14
936372	AD2-047 E O1	8.8639	Adder	10.43
936461	AD2-060	1.0679	Adder	1.26
936601	AD2-075	20.2174	50/50	20.2174
936631	AD2-079 C O1	0.8341	Adder	0.98
936632	AD2-079 E O1	0.5560	Adder	0.65
938261	AE1-039	0.0847	50/50	0.0847
939391	AE1-170 C O1	4.8158	Adder	5.67
939392	AE1-170 E O1	6.6503	Adder	7.82
939631	AE1-193 C	3.6266	Adder	4.27
939632	AE1-193 E	24.2704	Adder	28.55
939641	AE1-194 C	3.6266	Adder	4.27
939642	AE1-194 E	24.2704	Adder	28.55
939651	AE1-195 C	3.6266	Adder	4.27
939652	AE1-195 E	24.2704	Adder	28.55
939681	AE1-198 C	10.7682	Adder	12.67
939682	AE1-198 E	9.1502	Adder	10.76
943001	AE2-323 C	3.8567	Adder	4.54
943002	AE2-323 E	1.8910	Adder	2.22
943021	AE2-325 C	2.5174	Adder	2.96
943022	AE2-325 E	1.6742	Adder	1.97
943781	AF1-046 C	1.8002	Adder	2.12
943782	AF1-046 E	1.2001	Adder	1.41
944161	AF1-084 C	4.4969	Adder	5.29
944162	AF1-084 E	2.5685	Adder	3.02
944931	AF1-158 C O1	6.1177	Adder	7.2
944932	AF1-158 E O1	4.0785	Adder	4.8
944961	AF1-161 C	2.0075	Adder	2.36
944962	AF1-161 E	2.0075	Adder	2.36
945111	AF1-176 C O1	11.6488	Adder	13.7
945112	AF1-176 E O1	10.7988	Adder	12.7
945501	AF1-215 C O1	10.3030	Adder	12.12
945502	AF1-215 E O1	6.8687	Adder	8.08
950311	G934 C	4.5108	PJM External (MISO)	4.5108
950312	G934 E	18.0432	PJM External (MISO)	18.0432
950351	J466	7.3995	PJM External (MISO)	7.3995
950791	J201 C	0.8756	PJM External (MISO)	0.8756
950792	J201 E	3.5026	PJM External (MISO)	3.5026
950871	J246 C	0.2304	PJM External (MISO)	0.2304
950872	J246 E	0.9214	PJM External (MISO)	0.9214
950942	J325 E	1.0200	PJM External (MISO)	1.0200
951531	J533 C	6.5816	PJM External (MISO)	6.5816
951532	J533 E	26.3264	PJM External (MISO)	26.3264
952201	J589 C	5.4506	PJM External (MISO)	5.4506
952202	J589 E	29.4894	PJM External (MISO)	29.4894
952312	J646 E	0.4478	PJM External (MISO)	0.4478
952401	J752 C	3.7604	PJM External (MISO)	3.7604
952402	J752 E	20.3446	PJM External (MISO)	20.3446
952611	J717 C	6.1133	PJM External (MISO)	6.1133
952612	J717 E	33.0743	PJM External (MISO)	33.0743
952761	J728 C	5.6852	PJM External (MISO)	5.6852
952762	J728 E	30.7998	PJM External (MISO)	30.7998
952971	J793	368.3092	PJM External (MISO)	368.3092
953071	J794 C	0.3595	PJM External (MISO)	0.3595
953072	J794 E	1.9450	PJM External (MISO)	1.9450
953271	J701 C	1.8297	PJM External (MISO)	1.8297
953272	J701 E	9.8994	PJM External (MISO)	9.8994
953291	J796	48.6795	PJM External (MISO)	48.6795
953321	J799	54.1126	PJM External (MISO)	54.1126
953361	J806	18.5088	PJM External (MISO)	18.5088
953771	J832	16.6610	PJM External (MISO)	16.6610
953781	J833	27.7920	PJM External (MISO)	27.7920
953941	J857	1.7461	PJM External (MISO)	1.7461

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
955071	J984 C	4.6912	PJM External (MISO)	4.6912
955072	J984 E	25.3808	PJM External (MISO)	25.3808
955591	J1043 C	2.4984	PJM External (MISO)	2.4984
955592	J1043 E	44.2716	PJM External (MISO)	44.2716
955781	J1062	38.3625	PJM External (MISO)	38.3625
955861	J1071	10.9240	PJM External (MISO)	10.9240
956011	J1088	29.7465	PJM External (MISO)	29.7465
956021	J1089	34.2856	PJM External (MISO)	34.2856
956031	J1090	15.1542	PJM External (MISO)	15.1542
956741	J1172	11.1050	PJM External (MISO)	11.1050
956801	J1178	10.9785	PJM External (MISO)	10.9785
957371	AF2-031 C O1	0.4407	Adder	0.52
957372	AF2-031 E O1	0.6611	Adder	0.78
957891	AF2-083 C O1	7.5089	Adder	8.83
957892	AF2-083 E O1	3.7544	Adder	4.42
958011	AF2-095 C O1	7.2620	Adder	8.54
958012	AF2-095 E O1	3.4174	Adder	4.02
958381	AF2-132 C O1	9.9603	Adder	11.72
958382	AF2-132 E O1	6.6402	Adder	7.81
958391	AF2-133 C O1	9.7828	Adder	11.51
958392	AF2-133 E O1	6.5219	Adder	7.67
958401	AF2-134 C O1	3.4343	Adder	4.04
958402	AF2-134 E O1	2.2896	Adder	2.69
959001	AF2-191 C O1	4.4622	Adder	5.25
959002	AF2-191 E O1	2.9748	Adder	3.5
959141	AF2-205 C	6.4362	Adder	7.57
959142	AF2-205 E	4.2908	Adder	5.05
960591	AF2-350 C O1	3.2038	Adder	3.77
960592	AF2-350 E O1	2.1359	Adder	2.51
960601	AF2-351 C O1	0.4272	Adder	0.5
960602	AF2-351 E O1	0.6408	Adder	0.75
960681	AF2-359 C	4.7761	Adder	5.62
960682	AF2-359 E	3.1841	Adder	3.75
960981	AF2-389 C	2.2527	Adder	2.65
960982	AF2-389 E	1.5018	Adder	1.77
961051	AF2-396 O1	15.6434	Adder	18.4
961501	AF2-441 C O1	4.3676	Adder	5.14
961502	AF2-441 E O1	6.5515	Adder	7.71
WEC	WEC	1.8566	Confirmed LTF	1.8566
LGEE	LGEE	1.4485	Confirmed LTF	1.4485
CPLE	CPLE	0.2752	Confirmed LTF	0.2752
CBM-W2	CBM-W2	27.3382	Confirmed LTF	27.3382
NY	NY	1.0452	Confirmed LTF	1.0452
TVA	TVA	3.1990	Confirmed LTF	3.1990
O-066	O-066	11.2627	Confirmed LTF	11.2627
CBM-S2	CBM-S2	4.4622	Confirmed LTF	4.4622
CBM-S1	CBM-S1	19.8686	Confirmed LTF	19.8686
G-007	G-007	1.7306	Confirmed LTF	1.7306
MADISON	MADISON	6.6165	Confirmed LTF	6.6165
MEC	MEC	7.8068	Confirmed LTF	7.8068
CBM-W1	CBM-W1	176.3034	Confirmed LTF	176.3034

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
AA1-018	Powerton-Goodings Grove	In Service
AA2-116	Cook-East Elkhart 345kV	Partially in Service - Under Construction
AA2-123	Marengo 34kV	In Service
AB1-091	Davis Creek 345kV	Active
AB2-191	Mendota Hills	In Service
AC1-072	Segreto (Covert) 345kV	In Service
AC1-141	Cook-East Elkhart 345kV	Partially in Service - Under Construction
AC2-103	Beaver-Davis Besse 345 kV I	Engineering and Procurement
AC2-117	University Park North	Engineering and Procurement
AC2-140	DC Cook Unit 2	In Service
AC2-154	Davis Creek 138kV	Active
AD1-052	Freemont Energy Center	In Service
AD2-020	Valley 138 kV	Active
AD2-047	Davis Creek 138 kV	Active
AD2-060	Davis Creek 138kV	Active
AD2-075	Segreto 345kV	Active
AD2-079	Capitol Ave 34.5kV	In Service
AE1-039	West Street (Orchard Hills) 12.47 kV	In Service
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
AE2-323	Twin Branch-Guardian 138 kV	Active
AE2-325	Valley 138 kV	Active
AF1-046	Twin Branch-Guardian 138 kV	Active
AF1-048	Belvidere-Marengo	Active
AF1-060	Lena 138 kV	Active
AF1-084	East Hartford-Murch 69 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
AF1-215	Reynolds-Olive 345 kV	Active
AF1-281	Nelson-Lee County	Active
AF2-027	Zion Energy Center 345 kV	Active
AF2-031	River E.C.	Active
AF2-034	Kendall 345kV	Active
AF2-078	Reynolds-Olive #1 345 kV	Active
AF2-083	Kenzie Creek-Stone Lake 69 kV	Active
AF2-095	Davis Creek 138 kV	Active
AF2-096	Braidwood-East Frankfort 345 kV	Active
AF2-132	Reynolds-Olive #1 345 kV	Active
AF2-133	Reynolds-Olive #2 345 kV	Active
AF2-134	Reynolds-Olive #2 345 kV	Active
AF2-183	Nelson-Lee County 345 kV	Active
AF2-191	New Carlisle 138 kV	Active
AF2-205	Olive-Reynolds #2 345 kV	Active
AF2-226	Katydid Road 345 kV	Active
AF2-319	Katydid Road 345 kV	Active
AF2-329	Sandwich-Plano 138 kV	Active

Queue Number	Project Name	Status
AF2-350	Kensington 138 kV	Active
AF2-351	Kensington 138 kV	Active
AF2-359	Olive-University Park 345 kV	Active
AF2-389	Pokagon-Corey 69 kV	Active
AF2-393	Nelson-Dixon 138 kV	Active
AF2-394	Nelson-Dixon 138 kV	Active
AF2-396	Stinger 138 kV	Active
AF2-441	Burnham 138kV	Active
X1-042	Watervliet	In Service
X3-005	Wildwood 12kV	In Service
Z1-073	Mendota Hills	In Service
Z1-106	West Chicago 34kV	In Service
Z1-107	Joliet 34kV	In Service
Z1-108	McHenry 34kV	In Service
Z2-116	Twin Branch 12.47kV	In Service
J1043	MISO	MISO
J1062	MISO	MISO
J1071	MISO	MISO
J1088	MISO	MISO
J1089	MISO	MISO
J1090	MISO	MISO
J1172	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
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
J857	MISO	MISO
J875	MISO	MISO
J984	MISO	MISO
J996	MISO	MISO

10.9 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#6388	CONTINGENCY 'AEP_P1-2_#6388' OPEN BRANCH FROM BUS 243220 TO BUS 255105 CKT 1 / 243220 05E.ELKHART 345 255105 17HIPLE 345 1 END
AEP_SUBT_P2-2_#1279_05POKAGON 69.0_1	CONTINGENCY 'AEP_SUBT_P2-2_#1279_05POKAGON 69.0_1' OPEN BRANCH FROM BUS 243360 TO BUS 246480 CKT 1 / 243360 05POKAGO 138 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246506 TO BUS 246480 CKT 1 / 246506 05BARRETTZ 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246516 TO BUS 246480 CKT 1 / 246516 05DAILEY 8 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246464 TO BUS 246480 CKT 1 / 246464 05LAKE ST 69.0 246480 05POKAGON 69.0 1 REMOVE SWSHUNT FROM BUS 246480 / 246480 05POKAGON 69.0 END
AEP_SUBT_P4_#1281_05POKAGON 69.0_H	CONTINGENCY 'AEP_SUBT_P4_#1281_05POKAGON 69.0_H' OPEN BRANCH FROM BUS 243360 TO BUS 246480 CKT 1 / 243360 05POKAGO 138 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246505 TO BUS 246506 CKT 1 / 246505 05BARRETTZ 69.0 246506 05BARRETTZ 69.0 1 OPEN BRANCH FROM BUS 246506 TO BUS 246511 CKT 1 / 246506 05BARRETTZ 69.0 246511 05COLBY 69.0 1 OPEN BRANCH FROM BUS 246506 TO BUS 246480 CKT 1 / 246506 05BARRETTZ 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246516 TO BUS 246480 CKT 1 / 246516 05DAILEY 8 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246464 TO BUS 246480 CKT 1 / 246464 05LAKE ST 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246511 TO BUS 243420 CKT 1 / 246511 05COLBY 69.0 243420 05COLBY 34.5 1 REMOVE SWSHUNT FROM BUS 246480 / 246480 05POKAGON 69.0 END
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
AEP_P4_#9218_05KENZIE 138_G	CONTINGENCY 'AEP_P4_#9218_05KENZIE 138_G' OPEN BRANCH FROM BUS 939390 TO BUS 243322 CKT 1 / 939390 AE1-170 TAP 138 243322 05KENZIE 138 1 OPEN BRANCH FROM BUS 243322 TO BUS 244510 CKT 1 / 243322 05KENZIE 138 244510 05BLOSSOM TR 138 1 OPEN BRANCH FROM BUS 244510 TO BUS 243365 CKT 1 / 244510 05BLOSSOM TR 138 243365 05RIVRSD 138 1 END
AEP_P1-2_#5574-B	CONTINGENCY 'AEP_P1-2_#5574-B' OPEN BRANCH FROM BUS 939390 TO BUS 243322 CKT 1 / 939390 AE1-170 TAP 138 243322 05KENZIE 138 1 END
AEP_P1-3_#7019_05BENTON 345_1	CONTINGENCY 'AEP_P1-3_#7019_05BENTON 345_1' OPEN BRANCH FROM BUS 243212 TO BUS 243250 CKT 1 / 243212 05BENTON 345 243250 05BENTON 138 1 END
AEP_SUBT_P1-2_#726-B	CONTINGENCY 'AEP_SUBT_P1-2_#726-B' OPEN BRANCH FROM BUS 246516 TO BUS 246480 CKT 1 / 246516 05DAILEY 8 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246516 TO BUS 246555 CKT 1 / 246516 05DAILEY 8 69.0 246555 05WOLVERIN 69.0 1 OPEN BRANCH FROM BUS 960980 TO BUS 246555 CKT 1 / 960980 AF2-389 TAP 69.0 246555 05WOLVERIN 69.0 1 END

Contingency Name	Contingency Definition
AEP_SUBT_P4_#1282_05POKAGON 69.0_E	CONTINGENCY 'AEP_SUBT_P4_#1282_05POKAGON 69.0_E' OPEN BRANCH FROM BUS 243360 TO BUS 246480 CKT 1 / 243360 05POKAGO 138 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246506 TO BUS 246480 CKT 1 / 246506 05BARRETTZ 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246516 TO BUS 246480 CKT 1 / 246516 05DAILEY 8 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246464 TO BUS 246480 CKT 1 / 246464 05LAKE ST 69.0 246480 05POKAGON 69.0 1 REMOVE SWSHUNT FROM BUS 246480 / 246480 05POKAGON 69.0 END
AEP_SUBT_P2-2_#1012_05VALLEY 69.0_1	CONTINGENCY 'AEP_SUBT_P2-2_#1012_05VALLEY 69.0_1' OPEN BRANCH FROM BUS 243204 TO BUS 243386 CKT 1 / 243204 05VALLEYEQ 999 243386 05VALLY 138 1 OPEN BRANCH FROM BUS 243204 TO BUS 246551 CKT 1 / 243204 05VALLEYEQ 999 246551 05VALLEY 69.0 1 OPEN BRANCH FROM BUS 243204 TO BUS 246550 CKT 1 / 243204 05VALLEYEQ 999 246550 05VALLEY 34.5 1 OPEN BRANCH FROM BUS 243261 TO BUS 243386 CKT 1 / 243261 05COLBYTAPSS 138 243386 05VALLY 138 1 OPEN BRANCH FROM BUS 243307 TO BUS 243386 CKT 1 / 243307 05HARTFO 138 243386 05VALLY 138 1 OPEN BRANCH FROM BUS 247329 TO BUS 243386 CKT 1 / 247329 05STINGER 138 243386 05VALLY 138 1 REMOVE SWSHUNT FROM BUS 243386 / 243386 05VALLY 138 OPEN BRANCH FROM BUS 246509 TO BUS 246551 CKT 1 / 246509 05CAMERON 69.0 246551 05VALLEY 69.0 1 OPEN BRANCH FROM BUS 247174 TO BUS 246550 CKT 1 / 247174 05ROTHDEW 34.5 246550 05VALLEY 34.5 1 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
AEP_P4_#9220_05KENZIE 138_J2	CONTINGENCY 'AEP_P4_#9220_05KENZIE 138_J2' OPEN BRANCH FROM BUS 243265 TO BUS 243322 CKT 1 / 243265 05COREY 138 243322 05KENZIE 138 1 OPEN BRANCH FROM BUS 243322 TO BUS 243360 CKT 1 / 243322 05KENZIE 138 243360 05POKAGO 138 1 OPEN BRANCH FROM BUS 243355 TO BUS 246764 CKT 1 / 243355 05ONTWAZ 138 246764 05SAUKTR 138 1 OPEN BRANCH FROM BUS 243360 TO BUS 246764 CKT 1 / 243360 05POKAGO 138 246764 05SAUKTR 138 1 OPEN BRANCH FROM BUS 243360 TO BUS 246480 CKT 1 / 243360 05POKAGO 138 246480 05POKAGON 69.0 1 END
AEP_P1-2_#9208	CONTINGENCY 'AEP_P1-2_#9208' OPEN BRANCH FROM BUS 243265 TO BUS 243322 CKT 1 / 243265 05COREY 138 243322 05KENZIE 138 1 END
AEP_P7-1_#10998	CONTINGENCY 'AEP_P7-1_#10998' OPEN BRANCH FROM BUS 243212 TO BUS 243215 CKT 1 / 243212 05BENTON 345 243215 05COOK 345 1 OPEN BRANCH FROM BUS 243215 TO BUS 247803 CKT 1 / 243215 05COOK 345 247803 05SEGRETO 345 1 END
ATSI-P7-1-TE-138-025T-A	CONTINGENCY 'ATSI-P7-1-TE-138-025T-A' /* ALLEN-MAJ-MONROE & LEMO-MAJESTIC 345KV DISCONNECT BRANCH FROM BUS 264594 TO BUS 256583 CKT 1 /* 19LULU 345 18LENAWEE 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 238889 TO BUS 955620 CKT 1 /* 02LEMOYN 345 19MAJTC 345 END
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_SUBT_P4_#1280_05POKAGON 69.0_F-AA	CONTINGENCY 'AEP_SUBT_P4_#1280_05POKAGON 69.0_F-AA' OPEN BRANCH FROM BUS 243360 TO BUS 246480 CKT 1 / 243360 05POKAGO 138 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246506 TO BUS 246480 CKT 1 / 246506 05BARRETTZ 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246516 TO BUS 246480 CKT 1 / 246516 05DAILEY 8 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 246516 TO BUS 246555 CKT 1 / 246516 05DAILEY 8 69.0 246555 05WOLVERIN 69.0 1 OPEN BRANCH FROM BUS 246464 TO BUS 246480 CKT 1 / 246464 05LAKE ST 69.0 246480 05POKAGON 69.0 1 OPEN BRANCH FROM BUS 960980 TO BUS 246555 CKT 1 / 957890 AF2-389 TAP 69.0 246555 05WOLVERIN 69.0 1 REMOVE SWSHUNT FROM BUS 246480 / 246480 05POKAGON 69.0 END
AEP_SUBT_P4_#1342_05VALLEY 69.0_A	CONTINGENCY 'AEP_SUBT_P4_#1342_05VALLEY 69.0_A' OPEN BRANCH FROM BUS 243204 TO BUS 243386 CKT 1 / 243204 05VALLEYEQ 999 243386 05VALLY 138 1 OPEN BRANCH FROM BUS 243204 TO BUS 246551 CKT 1 / 243204 05VALLEYEQ 999 246551 05VALLEY 69.0 1 OPEN BRANCH FROM BUS 243204 TO BUS 246550 CKT 1 / 243204 05VALLEYEQ 999 246550 05VALLEY 34.5 1 OPEN BRANCH FROM BUS 243261 TO BUS 243386 CKT 1 / 243261 05COLBYTAPSS 138 243386 05VALLY 138 1 OPEN BRANCH FROM BUS 243307 TO BUS 243386 CKT 1 / 243307 05HARTFO 138 243386 05VALLY 138 1 OPEN BRANCH FROM BUS 247329 TO BUS 243386 CKT 1 / 247329 05STINGER 138 243386 05VALLY 138 1 REMOVE SWSHUNT FROM BUS 243386 / 243386 05VALLY 138 OPEN BRANCH FROM BUS 246502 TO BUS 246509 CKT 1 / 246502 05ALMENA 69.0 246509 05CAMERON 69.0 1 OPEN BRANCH FROM BUS 246509 TO BUS 246551 CKT 1 / 246509 05CAMERON 69.0 246551 05VALLEY 69.0 1 OPEN BRANCH FROM BUS 247174 TO BUS 246550 CKT 1 / 247174 05ROTHDEW 34.5 246550 05VALLEY 34.5 1 END
AEP_P7-1_#11028	CONTINGENCY 'AEP_P7-1_#11028' OPEN BRANCH FROM BUS 243215 TO BUS 920220 CKT 1 / 243215 05COOK 345 920220 AA2-116 TAPE 345 1 OPEN BRANCH FROM BUS 243215 TO BUS 920210 CKT 1 / 243215 05COOK 345 920210 AA2-116 TAPK 345 1 OPEN BRANCH FROM BUS 243220 TO BUS 920220 CKT 1 / 243220 05E.ELKHART 345 920220 AA2-116 TAPE 345 1 OPEN BRANCH FROM BUS 243224 TO BUS 243234 CKT 1 / 243224 05KENZIE 345 243234 05TWIN B 345 1 OPEN BRANCH FROM BUS 243224 TO BUS 920210 CKT 1 / 243224 05KENZIE 345 920210 AA2-116 TAPK 345 1 OPEN BRANCH FROM BUS 243224 TO BUS 243322 CKT 1 / 243224 05KENZIE 345 243322 05KENZIE 138 1 END

11 Light Load Analysis

The Queue Project AF2-396 was evaluated as an 80.0 MW injection at the Stinger 138 kV substation in the AEP area. Project AF2-396 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-396 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

11.1 Light Load 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 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.

11.5 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-396	Upgrade Number
					\$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 Short Circuit Analysis

The following Breakers are overdutied:

None.

13 Stability and Reactive Power

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

To be determined in the Facilities Study Phase.

14 Affected Systems

14.1 TVA

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

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

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

15 Attachment 1: One Line Diagram and Project Site Location



