



**Generation Interconnection
Feasibility Study Report
for
Queue Project AF2-375
FOSTORIA CENTRAL 138 KV
77.76 MW Capacity / 129.6 MW Energy**

July 2020

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1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility 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 feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

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.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

3 General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Hancock County, Ohio. The installed facilities will have a total capability of 129.6 MW with 77.76 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 31, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-375
Project Name	FOSTORIA CENTRAL 138 KV
State	Ohio
County	Hancock
Transmission Owner	AEP
MFO	129.6
MWE	129.6
MWC	77.76
Fuel	Solar
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

AF2-375 will interconnect with the AEP transmission system via a direct connection to Fostoria Central 138 kV substation.

To accommodate the interconnection on the Fostoria Central 138 kV substation, the substation will have to be expanded requiring the installation of one (1) 138 kV circuit breaker (see Attachment 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 AF2-375 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$1,464,000
Total System Network Upgrade Costs	\$276,654,420
Total Costs	\$278,118,420

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 onsite 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.

Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

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 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
Expand the Fostoria Central 138 kV substation: Install one (1) additional 138 kV 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 protection and control settings at the Fostoria Central 138 kV station	\$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 signing Agreement execution.

9 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.

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

Solar generation facilities 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 - Load Flow Analysis – Primary POI

The Queue Project AF2-375 was evaluated as a 129.6 MW (Capacity 77.8 MW) injection at the Fostoria Central 138 kV substation in the AEP area. Project AF2-375 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-375 was studied with a commercial probability of 53.0 %. 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)

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 DC	MW IMPACT
98918572	238654	02DAV-BE	345.0	ATSI	239289	02HAYES	345.0	ATSI	1	ATSI-P2-3-OEC-345-026	breaker	1878.0	99.99	100.35	DC	14.52
95515923	243024	05HOWARD	138.0	AEP	241111	02ASHLAND	138.0	ATSI	1	AEP_P7-1_#10926	tower	245.0	99.44	100.88	DC	7.83

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 DC	MW IMPACT
98918543	238569	02BEAVER	345.0	ATSI	239725	02LAKEAVER	345.0	ATSI	2	ATSI-P2-3-OEC-345-023	breaker	1878.0	103.85	104.33	DC	19.66
100801300	238874	02LAKVED	138.0	ATSI	238768	02GRNFLED	138.0	ATSI	1	ATSI-P7-1-TE-345-027A	tower	316.0	120.14	121.08	DC	6.57
100801307	239030	02OTTAWA	138.0	ATSI	238874	02LAKVED	138.0	ATSI	1	ATSI-P7-1-TE-345-027A	tower	380.0	116.72	117.5	DC	6.57
95515853	242936	05FOSTOR	345.0	AEP	242935	05ELIMA	345.0	AEP	1	ATSI-P7-1-TE-345-029A	tower	1318.0	121.01	122.6	DC	23.38
95947779	242984	05CHATFEL	138.0	AEP	932050	AC2-015TAP	138.0	AEP	1	AEP_SUBT_P4_#1208_05HOWARD 69.0_U	breaker	167.0	146.55	148.67	DC	7.85
95947617	243008	05FREMCT	138.0	AEP	243009	05FRMNT	138.0	AEP	1	AEP_P2-2_#7118_05HOWARD 138_1-B	bus	251.0	139.69	141.88	DC	12.18
95947618	243008	05FREMCT	138.0	AEP	243009	05FRMNT	138.0	AEP	1	AEP_SUBT_P2-2_#1175_05FREMNT C 69.0_1	bus	251.0	128.72	130.45	DC	9.66
95947793	243008	05FREMCT	138.0	AEP	243009	05FRMNT	138.0	AEP	1	AEP_P4_#10134_05HOWARD 138_B	breaker	251.0	139.69	141.88	DC	12.18
95947794	243008	05FREMCT	138.0	AEP	243009	05FRMNT	138.0	AEP	1	AEP_P4_#10133_05HOWARD 138_H	breaker	251.0	139.73	141.92	DC	12.18
95947795	243008	05FREMCT	138.0	AEP	243009	05FRMNT	138.0	AEP	1	AEP_SUBT_P4_#1176_05FREMNT C 69.0_L	breaker	251.0	129.44	131.17	DC	9.66
95947796	243008	05FREMCT	138.0	AEP	243009	05FRMNT	138.0	AEP	1	AEP_SUBT_P4_#2200_05FREMNT C 69.0_E	breaker	251.0	128.72	130.45	DC	9.66
95515017	243009	05FRMNT	138.0	AEP	239154	02W.FREEM	138.0	ATSI	1	AEP_P2-2_#7118_05HOWARD 138_1-B	bus	361.0	103.91	108.01	DC	14.81
95515235	243009	05FRMNT	138.0	AEP	239154	02W.FREEM	138.0	ATSI	1	AEP_P4_#10133_05HOWARD 138_H	breaker	361.0	103.91	108.01	DC	14.81
95515236	243009	05FRMNT	138.0	AEP	239154	02W.FREEM	138.0	ATSI	1	AEP_P4_#10134_05HOWARD 138_B	breaker	361.0	103.91	108.01	DC	14.81

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 PROJE CT LOADIN G %	POST PROJE CT LOADIN G %	AC DC	MW IMPACT
95515023	243024	05HOWARD	138.0	AEP	241111	02ASHLAND	138.0	ATS I	1	AEP_P2-2_#7725_05FREMCT138_1	bus	245.0	102.3	103.53	DC	6.71
95515261	243024	05HOWARD	138.0	AEP	241111	02ASHLAND	138.0	ATS I	1	AEP_P4_#7725_05FREMCT138_M	breaker	245.0	102.3	103.53	DC	6.71
95515262	243024	05HOWARD	138.0	AEP	241111	02ASHLAND	138.0	ATS I	1	AEP_P4_#7728_05FREMCT138_C	breaker	245.0	100.55	101.82	DC	6.92
95515922	243024	05HOWARD	138.0	AEP	241111	02ASHLAND	138.0	ATS I	1	AEP_P7-1_#10927	tower	245.0	101.6	103.04	DC	7.83
95947592	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P2-2_#9521_05CHATFL138_2	bus	167.0	154.19	156.3	DC	7.8
95947769	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P4_#7112_05MELMOR138_C	breaker	167.0	164.75	166.65	DC	7.03
95947770	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P4_#10729_05CHATFL138_E	breaker	167.0	154.78	156.93	DC	7.98
95947771	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P4_#9521_05CHATFL138_F	breaker	167.0	154.19	156.3	DC	7.8
95947751	932050	AC2-015TAP	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_SUBT_P4_#1208_05HOWARD69.0_U	breaker	167.0	177.94	180.06	DC	7.85

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.

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 PROJE CT LOADIN G %	POST PROJE CT LOADIN G %	AC DC	MW IMPACT
95515506	242935	05E LIMA	345.0	AEP	242945	05SW LIM	345.0	AEP	1	AEP_P1-2_#11144-B	operation	971.0	109.16	110.65	DC	14.45
95515463	242936	05FOSTOR	345.0	AEP	242935	05E LIMA	345.0	AEP	1	Base Case	operation	1025.0	115.71	117.67	DC	19.97
95515464	242936	05FOSTOR	345.0	AEP	242935	05E LIMA	345.0	AEP	1	AEP_P1-3_#5063_05SBERWI345_1-B	operation	1318.0	112.93	114.84	DC	25.18
95948032	242984	05CHATFL	138.0	AEP	932050	AC2-015TAP	138.0	AEP	1	AEP_P1-2_#7105	operation	167.0	137.46	139.52	DC	7.65
95948121	243006	05FOSTOR	138.0	AEP	247172	05EBERSO	138.0	AEP	1	AEP_P1-2_#7761-A	operation	245.0	108.52	117.59	DC	22.22
95948172	243006	05FOSTOR	138.0	AEP	939160	AE1-146TAP	138.0	AEP	2	AEP_P1-2_#7757	operation	245.0	96.38	105.1	DC	21.36
95947989	243039	05MELMOR	138.0	AEP	242984	05CHATFL	138.0	AEP	1	AEP_P1-2_#7105	operation	167.0	173.29	175.54	DC	8.35
95948018	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P1-2_#7709	operation	167.0	154.08	156.18	DC	7.77
95948001	932050	AC2-015TAP	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P1-2_#7105	operation	167.0	170.63	172.69	DC	7.65

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/DC	MW IMPACT
95948074	939160	AE1-146 TAP	138.0	AEP	247172	05EBERS O	138.0	AEP	2	AEP_P1-2_#7757	operation	245.0	116.29	125.01	DC	21.36
95515486	945620	AF1-227 TAP	345.0	AEP	242939	05MARYS V	345.0	AEP	1	Base Case	operation	897.0	111.07	111.7	DC	12.5

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
95515235,95515236,95515017	9	05FRMNT 138.0 kV - 02W.FREM 138.0 kV Ckt 1	<u>AEP</u> AEPO0026b (450) : Replace 1200 A Switch at Fremont Project Type : FAC Cost : \$200,000 Time Estimate : 12-18 Months <u>ATSI</u> TE-002B (803) : Re-conductor the 0.8 miles of transmission line between West Fremont-Fremont 138 kV line. Existing transmission line conductor size 954 ACSR should be replaced with 954 ACSS. AEP would need to replace their section of limiting conductor and provide estimates for their replacement. Project Type : Facility Cost : \$1,950,000 Time Estimate : 18.0 Months	\$2,150,000
95947617,95947794,95947618,95947796,95947793,95947795	8	05FREMCT 138.0 kV - 05FRMNT 138.0 kV Ckt 1	<u>AEP</u> AEPO0020a (422) : Reconfigure Fremont Center 69kV yard into 8 breaker ring for \$12,000,000. This upgrade will be tested during the System Impact studies. If not adequate, additional mitigation may be required including : 1) Rebuild 7 miles of single circuit line (ACSR ~ 795 ~ 45/7 ~ TERN conductor) between Fremont and Fremont Center with 1590 ACSR. [\$10,500,000] 2) Replace 1200A switch at Fremont [\$200,000] 3) Replace two Sub Cond 1590 AAC 61 Str at Fremont [\$200,000] Project Type : Con Cost : \$12,000,000 Time Estimate : 24-36 Months AEPO0020b (423) : Rebuild 7 miles of single circuit line (ACSR ~ 795 ~ 45/7 ~ TERN conductor) between Fremont and Fremont Center with 1590 ACSR. Project Type : FAC Cost : \$10,500,000 Time Estimate : 24-36 Months AEPO0020e (426) : A sag study will be required on the 4.0 miles of ACSR ~ 795 ~ 45/7 ~ TERN - Conductor Section 1 to mitigate the overload. Depending on the sag study results, the cost for this upgrade is expected to be around \$20,000 (no remediation required, just sag study) and \$6 million (complete line re-conductor/rebuild). New rating after sag study: S/N: 251 S/E: 335 MVA. 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 : \$20,000 Time Estimate : Sag Study : 6 - 12 Months	\$22,500,020

ID	Idx	Facility	Upgrade Description	Cost
95947592,95947769,95947770,95947771	10	05MELMOR 138.0 kV - 05HOWARD 138.0 kV Ckt 1	<u>AEP</u> AEPO0023b (435) : Rebuild 27 mile double circuit line between Melmore and Howard with 1033 ACSR (Replacing ACSR ~ 397.5 ~ 30/7 ~ LARK). Project Type : FAC Cost : \$81,000,000 Time Estimate : 24-36 Months AEPO0023c (436) : Replace two sub Cond 300 MCM CU 37 Str at Howard Project Type : FAC Cost : \$200,000 Time Estimate : 12-18 Months AEPO0023d (437) : Replace Bus 0.75" CU Tubular at Howard Project Type : FAC Cost : \$100,000 Time Estimate : 12-18 Months AEPO0023e (438) : Replace five Sub cond 795 AAC 37 Str at Howard Project Type : FAC Cost : \$500,000 Time Estimate : 12-18 Months	\$81,800,000
98918543	3	02BEAVER 345.0 kV - 02LAKEAVE 345.0 kV Ckt 2	<u>ATSI</u> N6186 : Reconductor Beaver - LakeAve 345kV #2 line with dual 954Kcmil ACSR Project Type : FAC Cost : \$5,921,900 Time Estimate : 12 Months	\$ 5,921,900
95515922,95515023,95515262,95515261,95515923	2	05HOWARD 138.0 kV - 02ASHLAND 138.0 kV Ckt 1	<u>AEP</u> AEPO0029a (467) : 1) 8 miles of ACSR ~ 397.5 ~ 30/7 ~ LARK - Conductor Section 1 will need to be rebuilt/reconductored. Estimated cost: \$12 million. Project Type : FAC Cost : \$12,000,000 Time Estimate : 24-36 Months AEPO0029b (468) : 2) Replace five Sub cond 795 AAC 37 Str at Howard. Estimated cost: \$100,000. Project Type : FAC Cost : \$500,000 Time Estimate : 12- 18 Months	\$12,500,000
100801307	5	02OTTAWA 138.0 kV - 02LAKVEW 138.0 kV Ckt 1	<u>ATSI</u> b3033 (734) : Ottawa-Lakeview 138 kV Re-conductor and Substation Upgrades Project Type : FAC Cost : \$20,000,000 Time Estimate : Projected in-service date: 12/01/2023 Months	\$20,000,000

ID	Idx	Facility	Upgrade Description	Cost
95515853	6	05FOSTOR 345.0 kV - 05E LIMA 345.0 kV Ckt 1	<u>AEP</u> AEPO0030a (469) : Replace five sub Cond 2156 ACSR 84/19 Std at E Lima Project Type : FAC Cost : \$500,000 Time Estimate : 12- 18 Months AEPO0030b (470) : Sag study is required on 4 mile single circuit line between Fremont Center and Fremont with 954 ACSR. The cost is expected to be around \$20,000. The Rating after the sag study S/N: 1409MVA, S/E: 1887MVA. Rebuild/Re-conductor, cost : \$ 8 million Project Type : FAC Cost : \$20,000 Time Estimate : Sag Study : 6 - 12 Months AEPO0030c (471) : Replace sub Cond 2870 MCM ACSR at E Lima Project Type : FAC Cost : \$100,000 Time Estimate : 12- 18 Months	\$620,000
95947779	7	05CHATFL 138.0 kV - AC2-015 TAP 138.0 kV Ckt 1	<u>AEP</u> AEPO0021c (429) : Replace 600A switch at Chatfield Project Type : FAC Cost : \$200,000 Time Estimate : 12-18 Months AEPO0044b (525) : Rebuild/Re-conductor 4.5miles of ACSR ~ 397.5 ~ 30/7 ~ LARK - Conductor Section 1 to mitigate the overload. Project Type : FAC Cost : \$6,750,000 Time Estimate : 24-36 Months	\$6,950,000

ID	Idx	Facility	Upgrade Description	Cost
95947751	11	AC2-015 TAP 138.0 kV - 05HOWARD 138.0 kV Ckt 1	<u>AEP</u> AEPO0027a (455) : Relocate Fostoria Central- Melmore or the Howard-Melmore #1 line into a new breaker string at Melmore. This upgrade will be tested during the System Impact studies. If not adequate, additional mitigation may be required including: Project Type : CON Cost : \$4,000,000 Time Estimate : 24-36 Months AEPO0027b (456) : Rebuild 11.5 mile double circuit line between AC2-015 TAP and Howard with 1590 ACSR (replacing ACSR ~ 397.5 ~ 30/7 ~ LARK conductor) Project Type : FAC Cost : \$34,500,000 Time Estimate : 24-36 Months AEPO0027c (457) : Replace sub Cond 300 MCM CU 37 Str at Howard Project Type : FAC Cost : \$100,000 Time Estimate : 12-18 Months AEPO0027d (458) : Upgrade CT Thermal Limit 749 Amps & Relay Thermal Limit 749 Amps at Howard Project Type : FAC Cost : \$50,000 Time Estimate : 12-18 Months AEPO0027e (459) : Replace Sub cond 397.5 ACSR 26/7 at Howard Project Type : Cost : \$100,000 Time Estimate : 12-18 Months AEPO0027f (460) : Upgrade Relay Compliance Trip Limit 975 Amps at Howard Project Type : FAC Cost : \$25,000 Time Estimate : 12-18 Months AEPO0027g (461) : Replace five Sub cond 795 AAC 37 Str at Howard Project Type : FAC Cost : \$500,000 Time Estimate : 12-18 Months	\$39,275,000
98918572	1	02DAV-BE 345.0 kV - 02HAYES 345.0 kV Ckt 1	<u>ATSI</u> TE-008B : Reconductor the existing 30.3 miles of the Davis Besse-Hayes 345 kV line with 954 ACSS 45/7 bundled (2 conductors per phase). Reconductor the substation conductor and line drops at Davis Besse 345 kV and at Hayes 345 kV with 1590 ACSS bundled (2 conductors per phase). Project Type : FAC Cost : \$61,357,500 Time Estimate : 36 Months	\$61,357,500

ID	Idx	Facility	Upgrade Description	Cost
100801300	4	02LAKVEW 138.0 kV - 02GRNFLD 138.0 kV Ckt 1	<u>ATSI</u> OEC-011-B (770) : Re-conductor roughly 13.1 miles of the Greenfield-Lakeview 138 kV Line (currently bundled 336 ACSR) with 795 ACSS conductor. Replace two 1200A line switches with 2000A line switches. Upgrade 500 CU substation conductor at Greenfield to exceed line ratings of 795 ACSS. Upgrade RT for B-242 to exceed line ratings of 795 ACSS. Project Type : Facility Cost : \$23,580,000 Time Estimate : 24.0 Months	\$23,580,000
			TOTAL COST	\$276,654,420

11.6 Flow Gate Details - Primary POI

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".

11.6.1 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
98918572	238654	02DAV-BE	ATSI	239289	02HAYES	ATSI	1	ATSI-P2-3-OEC-345-026	breaker	1878.0	99.99	100.35	DC	14.52

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	4.5595	50/50	4.5595
238670	02DVBSG1 (Deactivation : 31/05/2020)	34.8835	50/50	34.8835
238885	02LEMOG1	5.5921	50/50	5.5921
238886	02LEMOG2	5.5921	50/50	5.5921
238887	02LEMOG3	5.5921	50/50	5.5921
238888	02LEMOG4	5.5921	50/50	5.5921
238979	02NAPMUN	5.2342	Adder	6.16
239276	02COLLW 11	-2.3427	Adder	-2.76
239293	02BS-PKR	0.3980	50/50	0.3980
239297	02CPPW41	-2.6392	Adder	-3.1
241902	Y1-069 GE	31.3699	50/50	31.3699
244357	05GRANGER EL	0.2809	Adder	0.33
915952	Y3-092 NFTWR	81.0900	Merchant Transmission	81.0900
923821	AB2-019 FTWR	2.2705	Merchant Transmission	2.2705
931951	AB1-107 1	46.1063	50/50	46.1063
931961	AB1-107 2	127.5179	50/50	127.5179
932791	AC2-103 C	11.8933	50/50	11.8933
932792	AC2-103 E	79.6074	50/50	79.6074
934461	AD1-070 C O1	3.4278	Adder	4.03
934462	AD1-070 E O1	16.0917	Adder	18.93
934761	AD1-103 C O1	19.9970	50/50	19.9970
934762	AD1-103 E O1	133.8260	50/50	133.8260
934891	AD1-118	14.1834	50/50	14.1834
936601	AD2-075	10.5268	Adder	12.38
938911	AE1-119	111.4410	50/50	111.4410
939161	AE1-146 C O1	7.3931	Adder	8.7
939162	AE1-146 E O1	3.4525	Adder	4.06
940841	AE2-072 C	8.3515	Adder	9.83
940842	AE2-072 E	5.5677	Adder	6.55
941781	AE2-181 C	3.9649	Adder	4.66
941782	AE2-181 E	2.6433	Adder	3.11
942661	AE2-282 C O1	6.0573	Adder	7.13
942662	AE2-282 E O1	3.1873	Adder	3.75
943951	AF1-063 C O1	1.7603	Adder	2.07
943952	AF1-063 E O1	0.9759	Adder	1.15
943961	AF1-064 C O1	4.7085	Adder	5.54
943962	AF1-064 E O1	2.3401	Adder	2.75
944551	AF1-120 C	3.6703	Adder	4.32
944552	AF1-120 E	1.8489	Adder	2.18
945401	AF1-205 C O1	3.3952	Adder	3.99
945402	AF1-205 E O1	2.2634	Adder	2.66

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945411	AF1-206 C O1	16.4749	Adder	19.38
945412	AF1-206 E O1	10.9832	Adder	12.92
945641	AF1-229 C	7.2045	Adder	8.48
945642	AF1-229 E	4.8030	Adder	5.65
950351	J466	2.4510	PJM External (MISO)	2.4510
950942	J325 E	0.3362	PJM External (MISO)	0.3362
952312	J646 E	0.1451	PJM External (MISO)	0.1451
952401	J752 C	1.2500	PJM External (MISO)	1.2500
952402	J752 E	6.7630	PJM External (MISO)	6.7630
952971	J793	119.5617	PJM External (MISO)	119.5617
953271	J701 C	0.6089	PJM External (MISO)	0.6089
953272	J701 E	3.2944	PJM External (MISO)	3.2944
953321	J799	19.1438	PJM External (MISO)	19.1438
953781	J833	10.1480	PJM External (MISO)	10.1480
953811	J839	8.8070	PJM External (MISO)	8.8070
954111	J875	13.0980	PJM External (MISO)	13.0980
955181	J996	7.7312	PJM External (MISO)	7.7312
955781	J1062	17.2095	PJM External (MISO)	17.2095
956161	J1103	1.5932	PJM External (MISO)	1.5932
956751	J1173	7.1888	PJM External (MISO)	7.1888
958321	AF2-126 C	2.9961	Adder	6.65
958322	AF2-126 E	1.4868	Adder	3.3
958331	AF2-127 C	1.2036	Adder	2.67
958332	AF2-127 E	0.6332	Adder	1.41
959181	AF2-209 C O1	3.6651	Adder	8.14
959182	AF2-209 E O1	1.7135	Adder	3.8
960301	AF2-321 C	6.0663	Adder	13.47
960302	AF2-321 E	4.0442	Adder	8.98
960841	AF2-375 C O1	3.9242	Adder	8.71
960842	AF2-375 E O1	2.6161	Adder	5.81
960951	AF2-386 C O1	0.4444	Adder	0.99
960952	AF2-386 E O1	0.6137	Adder	1.36
WEC	WEC	1.6717	Confirmed LTF	1.6717
LGEE	LGEE	2.0424	Confirmed LTF	2.0424
CPL	CPL	0.4035	Confirmed LTF	0.4035
CBM-W2	CBM-W2	29.6806	Confirmed LTF	29.6806
NY	NY	1.8653	Confirmed LTF	1.8653
CBM-W1	CBM-W1	100.5053	Confirmed LTF	100.5053
TVA	TVA	3.8346	Confirmed LTF	3.8346
O-066	O-066	19.1251	Confirmed LTF	19.1251
CBM-S2	CBM-S2	6.2886	Confirmed LTF	6.2886
CBM-S1	CBM-S1	24.6654	Confirmed LTF	24.6654
G-007	G-007	2.9370	Confirmed LTF	2.9370
MADISON	MADISON	2.1289	Confirmed LTF	2.1289
MEC	MEC	7.4047	Confirmed LTF	7.4047

11.6.2 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
95515922	243024	05HOWARD	AEP	241111	02ASHLAND	ATSI	1	AEP_P7-1_#10927	tower	245.0	101.6	103.04	DC	7.83

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247548	V4-010 C	3.5212	50/50	3.5212
247551	U4-028 C (Suspended)	2.1054	50/50	2.1054
247552	U4-029 C (Suspended)	2.1054	50/50	2.1054
247926	U1-059 E	2.1405	Adder	2.52
247940	U4-028 E (Suspended)	14.0897	50/50	14.0897
247941	U4-029 E (Suspended)	14.0897	50/50	14.0897
247942	W1-056 E	0.7873	Adder	0.93
247947	V4-010 E	23.5648	50/50	23.5648
925751	AC1-051 C	2.2454	50/50	2.2454
925752	AC1-051 E	15.0268	50/50	15.0268
932051	AC2-015 C	15.5397	50/50	15.5397
932052	AC2-015 E	18.4126	50/50	18.4126
934461	AD1-070 C O1	1.8495	Adder	2.18
934462	AD1-070 E O1	8.6822	Adder	10.21
937021	AD2-136 C O1	7.5793	50/50	7.5793
937022	AD2-136 E O1	50.7227	50/50	50.7227
937381	AD2-191 C (Withdrawn : 06/03/2020)	3.5791	50/50	3.5791
937382	AD2-191 E (Withdrawn : 06/03/2020)	23.9524	50/50	23.9524
939161	AE1-146 C O1	3.6733	Adder	4.32
939162	AE1-146 E O1	1.7154	Adder	2.02
941741	AE2-174 C	4.7197	50/50	4.7197
941742	AE2-174 E	22.0954	50/50	22.0954
960841	AF2-375 C O1	2.1173	Adder	4.7
960842	AF2-375 E O1	1.4115	Adder	3.13
WEC	WEC	0.1824	Confirmed LTF	0.1824
LGEE	LGEE	0.2094	Confirmed LTF	0.2094
CPL	CPL	0.0126	Confirmed LTF	0.0126
CBM-W2	CBM-W2	3.0712	Confirmed LTF	3.0712
NY	NY	0.1781	Confirmed LTF	0.1781
CBM-W1	CBM-W1	10.2832	Confirmed LTF	10.2832
TVA	TVA	0.3710	Confirmed LTF	0.3710
O-066	O-066	2.0294	Confirmed LTF	2.0294
CBM-S2	CBM-S2	0.4104	Confirmed LTF	0.4104
CBM-S1	CBM-S1	2.4112	Confirmed LTF	2.4112
G-007	G-007	0.3130	Confirmed LTF	0.3130
MADISON	MADISON	0.2540	Confirmed LTF	0.2540
MEC	MEC	0.7945	Confirmed LTF	0.7945

11.6.3 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
98918543	238569	02BEAVER	ATSI	239725	02LAKEAVE	ATSI	2	ATSI-P2-3-OEC-345-023	breaker	1878.0	103.85	104.33	DC	19.66

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	5.5203	50/50	5.5203
238670	02DVBSG1 (Deactivation : 31/05/2020)	30.9385	50/50	30.9385
238979	02NAPMUN	5.8692	Adder	6.9
239171	02WLOG-2	6.2588	50/50	6.2588
239172	02WLOG-3	6.3656	50/50	6.3656
239173	02WLOG-4	6.3656	50/50	6.3656
239174	02WLOG-5	6.3984	50/50	6.3984
239276	02COLLW 11	-3.2825	Adder	-3.86
239293	02BS-PKR	0.4819	50/50	0.4819
239297	02CPPW41	-3.7140	Adder	-4.37
241902	Y1-069 GE	31.6089	50/50	31.6089
244357	05GRANGER EL	0.3699	Adder	0.44
247548	V4-010 C	3.4613	Adder	4.07
247551	U4-028 C (Suspended)	1.6148	Adder	1.9
247552	U4-029 C (Suspended)	1.6148	Adder	1.9
247940	U4-028 E (Suspended)	10.8071	Adder	12.71
247941	U4-029 E (Suspended)	10.8071	Adder	12.71
247947	V4-010 E	23.1641	Adder	27.25
915952	Y3-092 NFTWR	111.1700	Merchant Transmission	111.1700
923821	AB2-019 FTWR	3.1128	Merchant Transmission	3.1128
925751	AC1-051 C	0.7882	Adder	0.93
925752	AC1-051 E	5.2747	Adder	6.21
931951	AB1-107 1	47.2190	Adder	55.55
931961	AB1-107 2	128.4895	50/50	128.4895
932051	AC2-015 C	5.4739	Adder	6.44
932052	AC2-015 E	6.4859	Adder	7.63
932791	AC2-103 C	14.3954	50/50	14.3954
932792	AC2-103 E	96.3550	50/50	96.3550
934252	AD1-052 E1	0.9741	Adder	1.15
934262	AD1-052 E2	0.9741	Adder	1.15
934461	AD1-070 C O1	4.6417	Adder	5.46
934462	AD1-070 E O1	21.7903	Adder	25.64
934761	AD1-103 C O1	24.2039	50/50	24.2039
934762	AD1-103 E O1	161.9799	50/50	161.9799
934891	AD1-118	12.3849	Adder	14.57
937021	AD2-136 C O1	5.8134	Adder	6.84
937022	AD2-136 E O1	38.9054	Adder	45.77
937381	AD2-191 C (Withdrawn : 06/03/2020)	2.7452	Adder	3.23

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
937382	AD2-191 E (Withdrawn : 06/03/2020)	18.3720	Adder	21.61
938911	AE1-119	97.3101	Adder	114.48
939161	AE1-146 C O1	9.8399	Adder	11.58
939162	AE1-146 E O1	4.5952	Adder	5.41
940841	AE2-072 C	9.6069	Adder	11.3
940842	AE2-072 E	6.4046	Adder	7.53
941741	AE2-174 C	4.6395	Adder	5.46
941742	AE2-174 E	21.7197	Adder	25.55
941761	AE2-176 C	15.7920	50/50	15.7920
941762	AE2-176 E	10.5280	50/50	10.5280
941781	AE2-181 C	4.4280	Adder	5.21
941782	AE2-181 E	2.9520	Adder	3.47
942661	AE2-282 C O1	6.7521	Adder	7.94
942662	AE2-282 E O1	3.5530	Adder	4.18
943951	AF1-063 C O1	1.9881	Adder	2.34
943952	AF1-063 E O1	1.1022	Adder	1.3
943961	AF1-064 C O1	5.5224	Adder	6.5
943962	AF1-064 E O1	2.7447	Adder	3.23
944551	AF1-120 C	4.0913	Adder	4.81
944552	AF1-120 E	2.0610	Adder	2.42
945401	AF1-205 C O1	3.8070	Adder	4.48
945402	AF1-205 E O1	2.5380	Adder	2.99
945411	AF1-206 C O1	18.3646	Adder	21.61
945412	AF1-206 E O1	12.2431	Adder	14.4
945641	AF1-229 C	8.4376	Adder	9.93
945642	AF1-229 E	5.6251	Adder	6.62
955781	J1062	17.1690	PJM External (MISO)	17.1690
957031	AF2-004 1	3.9284	50/50	3.9284
957041	AF2-004 2	3.9284	50/50	3.9284
957051	AF2-004 3	3.9284	50/50	3.9284
957061	AF2-004 4	3.9284	50/50	3.9284
957111	AF2-005	0.7134	Adder	1.58
958321	AF2-126 C	3.5140	Adder	7.8
958322	AF2-126 E	1.7439	Adder	3.87
958331	AF2-127 C	1.3594	Adder	3.02
958332	AF2-127 E	0.7152	Adder	1.59
960301	AF2-321 C	6.7971	Adder	15.09
960302	AF2-321 E	4.5314	Adder	10.06
960841	AF2-375 C O1	5.3138	Adder	11.8
960842	AF2-375 E O1	3.5426	Adder	7.86
960951	AF2-386 C O1	0.4969	Adder	1.1
960952	AF2-386 E O1	0.6862	Adder	1.52
WEC	WEC	1.8906	Confirmed LTF	1.8906
LGEE	LGEE	2.4109	Confirmed LTF	2.4109
CPLE	CPLE	0.5213	Confirmed LTF	0.5213
CBM-W2	CBM-W2	34.3816	Confirmed LTF	34.3816
NY	NY	2.3160	Confirmed LTF	2.3160
CBM-W1	CBM-W1	109.0372	Confirmed LTF	109.0372
TVA	TVA	4.5164	Confirmed LTF	4.5164
O-066	O-066	23.0832	Confirmed LTF	23.0832
CBM-S2	CBM-S2	7.7914	Confirmed LTF	7.7914
CBM-S1	CBM-S1	29.0702	Confirmed LTF	29.0702

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
G-007	G-007	3.5433	Confirmed LTF	3.5433
MADISON	MADISON	1.9616	Confirmed LTF	1.9616
MEC	MEC	8.4344	Confirmed LTF	8.4344

11.6.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
100801300	238874	02LAKVEW	ATSI	238768	02GRNFLD	ATSI	1	ATSI-P7-1-TE-345-027A	tower	316.0	120.14	121.08	DC	6.57

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	2.0137	Adder	2.37
247548	V4-010 C	1.4173	Adder	1.67
247551	U4-028 C (Suspended)	0.6058	Adder	0.71
247552	U4-029 C (Suspended)	0.6058	Adder	0.71
247940	U4-028 E (Suspended)	4.0539	Adder	4.77
247941	U4-029 E (Suspended)	4.0539	Adder	4.77
247947	V4-010 E	9.4848	Adder	11.16
931951	AB1-107 1	20.4819	Adder	24.1
931961	AB1-107 2	33.3903	Adder	39.28
934252	AD1-052 E1	0.4965	Adder	0.58
934262	AD1-052 E2	0.4965	Adder	0.58
934461	AD1-070 C O1	1.5523	Adder	1.83
934462	AD1-070 E O1	7.2874	Adder	8.57
934891	AD1-118	3.6503	Adder	4.29
937021	AD2-136 C O1	2.1807	Adder	2.57
937022	AD2-136 E O1	14.5942	Adder	17.17
937381	AD2-191 C (Withdrawn : 06/03/2020)	1.0298	Adder	1.21
937382	AD2-191 E (Withdrawn : 06/03/2020)	6.8917	Adder	8.11
938911	AE1-119	28.6811	Adder	33.74
941741	AE2-174 C	1.8997	Adder	2.23
941742	AE2-174 E	8.8934	Adder	10.46
941781	AE2-181 C	1.5261	Adder	1.8
941782	AE2-181 E	1.0174	Adder	1.2
942661	AE2-282 C O1	2.3452	Adder	2.76
942662	AE2-282 E O1	1.2341	Adder	1.45
943961	AF1-064 C O1	1.9970	Adder	2.35
943962	AF1-064 E O1	0.9925	Adder	1.17
944551	AF1-120 C	1.4210	Adder	1.67
944552	AF1-120 E	0.7159	Adder	0.84
945401	AF1-205 C O1	1.3062	Adder	1.54
945402	AF1-205 E O1	0.8708	Adder	1.02
945411	AF1-206 C O1	6.3786	Adder	7.5
945412	AF1-206 E O1	4.2524	Adder	5.0
958321	AF2-126 C	1.2707	Adder	2.82
958322	AF2-126 E	0.6306	Adder	1.4
960301	AF2-321 C	2.3259	Adder	5.16
960302	AF2-321 E	1.5506	Adder	3.44
960841	AF2-375 C O1	1.7771	Adder	3.94
960842	AF2-375 E O1	1.1847	Adder	2.63

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960951	AF2-386 C O1	0.1705	Adder	0.38
960952	AF2-386 E O1	0.2354	Adder	0.52
WEC	WEC	0.5683	Confirmed LTF	0.5683
LGEE	LGEE	0.7057	Confirmed LTF	0.7057
CPL	CPL	0.1449	Confirmed LTF	0.1449
CBM-W2	CBM-W2	10.1802	Confirmed LTF	10.1802
NY	NY	0.6371	Confirmed LTF	0.6371
CBM-W1	CBM-W1	33.3392	Confirmed LTF	33.3392
TVA	TVA	1.3230	Confirmed LTF	1.3230
O-066	O-066	6.5184	Confirmed LTF	6.5184
CBM-S2	CBM-S2	2.2137	Confirmed LTF	2.2137
CBM-S1	CBM-S1	8.5115	Confirmed LTF	8.5115
G-007	G-007	1.0015	Confirmed LTF	1.0015
MADISON	MADISON	0.6733	Confirmed LTF	0.6733
MEC	MEC	2.5249	Confirmed LTF	2.5249

11.6.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
100801307	239030	02OTTAWA	ATSI	238874	02LAKVEW	ATSI	1	ATSI-P7-1-TE-345-027A	tower	380.0	116.72	117.5	DC	6.57

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	2.0137	Adder	2.37
247548	V4-010 C	1.4173	Adder	1.67
247551	U4-028 C (Suspended)	0.6058	Adder	0.71
247552	U4-029 C (Suspended)	0.6058	Adder	0.71
247940	U4-028 E (Suspended)	4.0539	Adder	4.77
247941	U4-029 E (Suspended)	4.0539	Adder	4.77
247947	V4-010 E	9.4848	Adder	11.16
931951	AB1-107 1	20.4819	Adder	24.1
931961	AB1-107 2	33.3903	Adder	39.28
934252	AD1-052 E1	0.4965	Adder	0.58
934262	AD1-052 E2	0.4965	Adder	0.58
934461	AD1-070 C O1	1.5523	Adder	1.83
934462	AD1-070 E O1	7.2874	Adder	8.57
934891	AD1-118	3.6503	Adder	4.29
937021	AD2-136 C O1	2.1807	Adder	2.57
937022	AD2-136 E O1	14.5942	Adder	17.17
937381	AD2-191 C (Withdrawn : 06/03/2020)	1.0298	Adder	1.21
937382	AD2-191 E (Withdrawn : 06/03/2020)	6.8917	Adder	8.11
938911	AE1-119	28.6811	Adder	33.74
941741	AE2-174 C	1.8997	Adder	2.23
941742	AE2-174 E	8.8934	Adder	10.46
941781	AE2-181 C	1.5261	Adder	1.8
941782	AE2-181 E	1.0174	Adder	1.2
942661	AE2-282 C O1	2.3452	Adder	2.76
942662	AE2-282 E O1	1.2341	Adder	1.45
943961	AF1-064 C O1	1.9970	Adder	2.35
943962	AF1-064 E O1	0.9925	Adder	1.17
944551	AF1-120 C	1.4210	Adder	1.67
944552	AF1-120 E	0.7159	Adder	0.84
945401	AF1-205 C O1	1.3062	Adder	1.54
945402	AF1-205 E O1	0.8708	Adder	1.02
945411	AF1-206 C O1	6.3786	Adder	7.5
945412	AF1-206 E O1	4.2524	Adder	5.0
958321	AF2-126 C	1.2707	Adder	2.82
958322	AF2-126 E	0.6306	Adder	1.4
960301	AF2-321 C	2.3259	Adder	5.16
960302	AF2-321 E	1.5506	Adder	3.44
960841	AF2-375 C O1	1.7771	Adder	3.94
960842	AF2-375 E O1	1.1847	Adder	2.63

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960951	AF2-386 C O1	0.1705	Adder	0.38
960952	AF2-386 E O1	0.2354	Adder	0.52
WEC	WEC	0.5683	Confirmed LTF	0.5683
LGEE	LGEE	0.7057	Confirmed LTF	0.7057
CPL	CPL	0.1449	Confirmed LTF	0.1449
CBM-W2	CBM-W2	10.1802	Confirmed LTF	10.1802
NY	NY	0.6371	Confirmed LTF	0.6371
CBM-W1	CBM-W1	33.3392	Confirmed LTF	33.3392
TVA	TVA	1.3230	Confirmed LTF	1.3230
O-066	O-066	6.5184	Confirmed LTF	6.5184
CBM-S2	CBM-S2	2.2137	Confirmed LTF	2.2137
CBM-S1	CBM-S1	8.5115	Confirmed LTF	8.5115
G-007	G-007	1.0015	Confirmed LTF	1.0015
MADISON	MADISON	0.6733	Confirmed LTF	0.6733
MEC	MEC	2.5249	Confirmed LTF	2.5249

11.6.6 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
95515853	242936	05FOSTOR	AEP	242935	05E LIMA	AEP	1	ATSI-P7-1-TE-345-029A	tower	1318.0	121.01	122.6	DC	23.38

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	5.3099	50/50	5.3099
238670	02DVBSG1 (Deactivation : 31/05/2020)	23.5116	50/50	23.5116
238885	02LEMOG1	6.0712	50/50	6.0712
238886	02LEMOG2	6.0712	50/50	6.0712
238887	02LEMOG3	6.0712	50/50	6.0712
238888	02LEMOG4	6.0712	50/50	6.0712
238979	02NAPMUN	5.2701	Adder	6.2
239293	02BS-PKR	0.4635	50/50	0.4635
241902	Y1-069 GE	31.4894	50/50	31.4894
244357	05GRANGER EL	0.2415	Adder	0.28
247548	V4-010 C	3.4604	Adder	4.07
247549	V3-028 C	-1.0591	Adder	-1.25
247551	U4-028 C (Suspended)	1.6727	Adder	1.97
247552	U4-029 C (Suspended)	1.6727	Adder	1.97
247940	U4-028 E (Suspended)	11.1946	Adder	13.17
247941	U4-029 E (Suspended)	11.1946	Adder	13.17
247947	V4-010 E	23.1582	Adder	27.24
924791	AB2-131 C OP	3.1953	Adder	3.76
924792	AB2-131 E OP	5.2133	Adder	6.13
925131	AB2-170 C O1	-6.8838	Adder	-8.1
925751	AC1-051 C	0.7660	Adder	0.9
925752	AC1-051 E	5.1261	Adder	6.03
927181	AC1-212 C	-0.1288	Adder	-0.15
927183	AC1-212 BAT	1.5872	Merchant Transmission	1.5872
931951	AB1-107 1	53.4304	50/50	53.4304
931961	AB1-107 2	128.0037	50/50	128.0037
932051	AC2-015 C	5.3943	Adder	6.35
932052	AC2-015 E	6.3915	Adder	7.52
932791	AC2-103 C	8.0135	50/50	8.0135
932792	AC2-103 E	53.6379	50/50	53.6379
933721	AC2-195 C O1	2.9502	Adder	3.47
933722	AC2-195 E O1	1.7986	Adder	2.12
934252	AD1-052 E1	0.8498	Adder	1.0
934262	AD1-052 E2	0.8498	Adder	1.0
934461	AD1-070 C O1	6.4937	50/50	6.4937
934462	AD1-070 E O1	30.4842	50/50	30.4842
934761	AD1-103 C O1	13.4736	50/50	13.4736
934762	AD1-103 E O1	90.1693	50/50	90.1693
934891	AD1-118	15.3986	50/50	15.3986
936722	AD2-091 BAT	8.1970	Merchant Transmission	8.1970

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
936752	AD2-096 BAT	2.8820	Merchant Transmission	2.8820
937021	AD2-136 C O1	6.0219	Adder	7.08
937022	AD2-136 E O1	40.3004	Adder	47.41
937381	AD2-191 C (Withdrawn : 06/03/2020)	2.8437	Adder	3.35
937382	AD2-191 E (Withdrawn : 06/03/2020)	19.0307	Adder	22.39
938911	AE1-119	120.9890	50/50	120.9890
939161	AE1-146 C O1	8.4124	Adder	9.9
939162	AE1-146 E O1	3.9285	Adder	4.62
941741	AE2-174 C	4.6383	Adder	5.46
941742	AE2-174 E	21.7141	Adder	25.55
941761	AE2-176 C	9.7926	Adder	11.52
941762	AE2-176 E	6.5284	Adder	7.68
941781	AE2-181 C	3.6390	Adder	4.28
941782	AE2-181 E	2.4260	Adder	2.85
942042	AE2-216 BAT	9.0167	Merchant Transmission	9.0167
942661	AE2-282 C O1	5.7547	Adder	6.77
942662	AE2-282 E O1	3.0281	Adder	3.56
943011	AE2-324	0.9644	Adder	1.13
943961	AF1-064 C O1	6.1503	50/50	6.1503
943962	AF1-064 E O1	3.0567	50/50	3.0567
944551	AF1-120 C	3.4869	Adder	4.1
944552	AF1-120 E	1.7566	Adder	2.07
944571	AF1-122 C O1	1.7764	Adder	2.09
944572	AF1-122 E O1	2.4532	Adder	2.89
945401	AF1-205 C O1	3.4184	Adder	4.02
945402	AF1-205 E O1	2.2790	Adder	2.68
945411	AF1-206 C O1	15.6518	Adder	18.41
945412	AF1-206 E O1	10.4345	Adder	12.28
945623	AF1-227 BAT	9.1580	Merchant Transmission	9.1580
945641	AF1-229 C	17.1274	50/50	17.1274
945642	AF1-229 E	11.4182	50/50	11.4182
946203	AF1-285 BAT	2.9556	Merchant Transmission	2.9556
950311	G934 C	2.0763	PJM External (MISO)	2.0763
950312	G934 E	8.3052	PJM External (MISO)	8.3052
950351	J466	3.3606	PJM External (MISO)	3.3606
950791	J201 C	0.4014	PJM External (MISO)	0.4014
950792	J201 E	1.6056	PJM External (MISO)	1.6056
950871	J246 C	0.1060	PJM External (MISO)	0.1060
950872	J246 E	0.4238	PJM External (MISO)	0.4238
950942	J325 E	0.4626	PJM External (MISO)	0.4626
951531	J533 C	3.0272	PJM External (MISO)	3.0272
951532	J533 E	12.1088	PJM External (MISO)	12.1088
951571	J538 C	3.0615	PJM External (MISO)	3.0615
951572	J538 E	12.2460	PJM External (MISO)	12.2460
951941	J602 C	2.9787	PJM External (MISO)	2.9787
951942	J602 E	16.1153	PJM External (MISO)	16.1153
952201	J589 C	2.5107	PJM External (MISO)	2.5107
952202	J589 E	13.5833	PJM External (MISO)	13.5833
952312	J646 E	0.2014	PJM External (MISO)	0.2014
952401	J752 C	1.7094	PJM External (MISO)	1.7094
952402	J752 E	9.2486	PJM External (MISO)	9.2486

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
952611	J717 C	2.8035	PJM External (MISO)	2.8035
952612	J717 E	15.1675	PJM External (MISO)	15.1675
952761	J728 C	2.6072	PJM External (MISO)	2.6072
952762	J728 E	14.1244	PJM External (MISO)	14.1244
952881	J758	12.4160	PJM External (MISO)	12.4160
952971	J793	166.0035	PJM External (MISO)	166.0035
953071	J794 C	0.1653	PJM External (MISO)	0.1653
953072	J794 E	0.8941	PJM External (MISO)	0.8941
953271	J701 C	0.8320	PJM External (MISO)	0.8320
953272	J701 E	4.5016	PJM External (MISO)	4.5016
953291	J796	22.3489	PJM External (MISO)	22.3489
953321	J799	27.3218	PJM External (MISO)	27.3218
953361	J806	11.5237	PJM External (MISO)	11.5237
953771	J832	7.6630	PJM External (MISO)	7.6630
953781	J833	14.5530	PJM External (MISO)	14.5530
953811	J839	12.1900	PJM External (MISO)	12.1900
953941	J857	8.7178	PJM External (MISO)	8.7178
954111	J875	18.6060	PJM External (MISO)	18.6060
955071	J984 C	2.1594	PJM External (MISO)	2.1594
955072	J984 E	11.6826	PJM External (MISO)	11.6826
955121	J989	8.5008	PJM External (MISO)	8.5008
955181	J996	11.2720	PJM External (MISO)	11.2720
955261	J1005	18.7160	PJM External (MISO)	18.7160
955591	J1043 C	0.8500	PJM External (MISO)	0.8500
955592	J1043 E	15.0614	PJM External (MISO)	15.0614
955781	J1062	25.3650	PJM External (MISO)	25.3650
956011	J1088	14.0370	PJM External (MISO)	14.0370
956021	J1089	16.0820	PJM External (MISO)	16.0820
956031	J1090	8.9046	PJM External (MISO)	8.9046
956161	J1103	2.1770	PJM External (MISO)	2.1770
956741	J1172	5.1105	PJM External (MISO)	5.1105
956751	J1173	10.2680	PJM External (MISO)	10.2680
956801	J1178	5.8208	PJM External (MISO)	5.8208
957111	AF2-005	0.2221	Adder	0.49
958321	AF2-126 C	7.3840	50/50	7.3840
958322	AF2-126 E	3.6644	50/50	3.6644
958591	AF2-150 C O1	1.8664	Adder	4.14
958592	AF2-150 E O1	2.5773	Adder	5.72
960301	AF2-321 C	5.1526	Adder	11.44
960302	AF2-321 E	3.4350	Adder	7.62
960841	AF2-375 C O1	14.0263	50/50	14.0263
960842	AF2-375 E O1	9.3509	50/50	9.3509
960853	AF2-376 BAT	1.7381	Merchant Transmission	1.7381
960863	AF2-377 BAT	1.6782	Merchant Transmission	1.6782
960951	AF2-386 C O1	0.3996	Adder	0.89
960952	AF2-386 E O1	0.5518	Adder	1.22
NEWTON	NEWTON	1.5881	Confirmed LTF	1.5881
FARMERCITY	FARMERCITY	0.0669	Confirmed LTF	0.0669
G-007A	G-007A	0.4004	Confirmed LTF	0.4004
VFT	VFT	1.1094	Confirmed LTF	1.1094
CALDERWOOD	CALDERWOOD	0.6685	Confirmed LTF	0.6685
CBM-W1	CBM-W1	39.8193	Confirmed LTF	39.8193

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
PRAIRIE	PRAIRIE	3.5542	Confirmed LTF	3.5542
CHEOAH	CHEOAH	0.6687	Confirmed LTF	0.6687
EDWARDS	EDWARDS	0.3675	Confirmed LTF	0.3675
TILTON	TILTON	0.9047	Confirmed LTF	0.9047
MADISON	MADISON	3.5986	Confirmed LTF	3.5986
GIBSON	GIBSON	1.0030	Confirmed LTF	1.0030
BLUEG	BLUEG	3.5171	Confirmed LTF	3.5171
TRIMBLE	TRIMBLE	1.1347	Confirmed LTF	1.1347
CATAWBA	CATAWBA	0.3808	Confirmed LTF	0.3808

11.6.7 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 IMPACT
95947779	242984	05CHATF L	AEP	932050	AC2-015 TAP	AEP	1	AEP_SUBT_P4_#1208_05HOWA RD 69.0_U	breaker	167.0	146.55	148.67	DC	7.85

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247548	V4-010 C	3.7060	50/50	3.7060
247551	U4-028 C (Suspended)	2.2005	50/50	2.2005
247552	U4-029 C (Suspended)	2.2005	50/50	2.2005
247940	U4-028 E (Suspended)	14.7265	50/50	14.7265
247941	U4-029 E (Suspended)	14.7265	50/50	14.7265
247947	V4-010 E	24.8020	50/50	24.8020
925751	AC1-051 C	2.3830	50/50	2.3830
925752	AC1-051 E	15.9476	50/50	15.9476
934252	AD1-052 E1	0.2602	Adder	0.31
934262	AD1-052 E2	0.2602	Adder	0.31
934461	AD1-070 C O1	1.8541	Adder	2.18
934462	AD1-070 E O1	8.7038	Adder	10.24
937021	AD2-136 C O1	7.9218	50/50	7.9218
937022	AD2-136 E O1	53.0154	50/50	53.0154
937381	AD2-191 C (Withdrawn : 06/03/2020)	3.7409	50/50	3.7409
937382	AD2-191 E (Withdrawn : 06/03/2020)	25.0350	50/50	25.0350
939161	AE1-146 C O1	3.6010	Adder	4.24
939162	AE1-146 E O1	1.6816	Adder	1.98
941741	AE2-174 C	4.9675	50/50	4.9675
941742	AE2-174 E	23.2554	50/50	23.2554
960841	AF2-375 C O1	2.1225	Adder	4.71
960842	AF2-375 E O1	1.4150	Adder	3.14
WEC	WEC	0.1263	Confirmed LTF	0.1263
LGEE	LGEE	0.0930	Confirmed LTF	0.0930
CBM-W2	CBM-W2	1.6871	Confirmed LTF	1.6871
NY	NY	0.1073	Confirmed LTF	0.1073
CBM-W1	CBM-W1	8.8070	Confirmed LTF	8.8070
TVA	TVA	0.1540	Confirmed LTF	0.1540
O-066	O-066	1.3306	Confirmed LTF	1.3306
CBM-S1	CBM-S1	1.0224	Confirmed LTF	1.0224
G-007	G-007	0.2059	Confirmed LTF	0.2059
MADISON	MADISON	0.3851	Confirmed LTF	0.3851
MEC	MEC	0.5180	Confirmed LTF	0.5180
CATAWBA	CATAWBA	0.0101	Confirmed LTF	0.0101

11.6.8 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 %	ACID C	MW IMPACT
95947794	243008	05FREMCT	AEP	243009	05FRMNT	AEP	1	AEP_P4_#10133_05HOWARD 138_H	breaker	251.0	139.73	141.92	DC	12.18

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
244357	05GRANGER EL	0.1985	Adder	0.23
247548	V4-010 C	10.1278	50/50	10.1278
247551	U4-028 C (Suspended)	4.0352	50/50	4.0352
247552	U4-029 C (Suspended)	4.0352	50/50	4.0352
247926	U1-059 E	1.8732	Adder	2.2
247940	U4-028 E (Suspended)	27.0048	50/50	27.0048
247941	U4-029 E (Suspended)	27.0048	50/50	27.0048
247942	W1-056 E	0.6890	Adder	0.81
247947	V4-010 E	67.7782	50/50	67.7782
925751	AC1-051 C	2.0239	50/50	2.0239
925752	AC1-051 E	13.5443	50/50	13.5443
932051	AC2-015 C	16.1528	50/50	16.1528
932052	AC2-015 E	19.1391	50/50	19.1391
934252	AD1-052 E1	-0.6535	Adder	-0.77
934262	AD1-052 E2	-0.6535	Adder	-0.77
934461	AD1-070 C O1	2.8770	Adder	3.38
934462	AD1-070 E O1	13.5060	Adder	15.89
937021	AD2-136 C O1	14.5267	50/50	14.5267
937022	AD2-136 E O1	97.2173	50/50	97.2173
937381	AD2-191 C (Withdrawn : 06/03/2020)	6.8598	50/50	6.8598
937382	AD2-191 E (Withdrawn : 06/03/2020)	45.9082	50/50	45.9082
939161	AE1-146 C O1	5.6006	Adder	6.59
939162	AE1-146 E O1	2.6155	Adder	3.08
941741	AE2-174 C	13.5751	50/50	13.5751
941742	AE2-174 E	63.5518	50/50	63.5518
960841	AF2-375 C O1	3.2936	Adder	7.31
960842	AF2-375 E O1	2.1957	Adder	4.87
WEC	WEC	0.1118	Confirmed LTF	0.1118
LGEE	LGEE	0.2316	Confirmed LTF	0.2316
CPL	CPL	0.1217	Confirmed LTF	0.1217
CBM-W2	CBM-W2	2.8092	Confirmed LTF	2.8092
NY	NY	0.0824	Confirmed LTF	0.0824
CBM-W1	CBM-W1	1.5763	Confirmed LTF	1.5763
TVA	TVA	0.4382	Confirmed LTF	0.4382
O-066	O-066	0.6787	Confirmed LTF	0.6787
CBM-S2	CBM-S2	1.2600	Confirmed LTF	1.2600
CBM-S1	CBM-S1	2.8116	Confirmed LTF	2.8116
G-007	G-007	0.1040	Confirmed LTF	0.1040
MEC	MEC	0.5561	Confirmed LTF	0.5561

11.6.9 Index 9

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
95515236	243009	05FRMNT	AEP	239154	02W.FRE M	ATSI	1	AEP_P4_#10134_05HOWA RD 138_B	breaker	361.0	103.91	108.01	DC	14.81

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
244357	05GRANGER EL	0.2413	Adder	0.28
247548	V4-010 C	12.0247	50/50	12.0247
247551	U4-028 C (Suspended)	4.8123	50/50	4.8123
247552	U4-029 C (Suspended)	4.8123	50/50	4.8123
247926	U1-059 E	2.3087	Adder	2.72
247940	U4-028 E (Suspended)	32.2057	50/50	32.2057
247941	U4-029 E (Suspended)	32.2057	50/50	32.2057
247942	W1-056 E	0.8492	Adder	1.0
247947	V4-010 E	80.4733	50/50	80.4733
925751	AC1-051 C	2.4338	50/50	2.4338
925752	AC1-051 E	16.2880	50/50	16.2880
932051	AC2-015 C	19.3080	50/50	19.3080
932052	AC2-015 E	22.8775	50/50	22.8775
934252	AD1-052 E1	-0.8029	Adder	-0.94
934262	AD1-052 E2	-0.8029	Adder	-0.94
934461	AD1-070 C O1	4.1126	50/50	4.1126
934462	AD1-070 E O1	19.3066	50/50	19.3066
937021	AD2-136 C O1	17.3244	50/50	17.3244
937022	AD2-136 E O1	115.9404	50/50	115.9404
937381	AD2-191 C (Withdrawn : 06/03/2020)	8.1810	50/50	8.1810
937382	AD2-191 E (Withdrawn : 06/03/2020)	54.7496	50/50	54.7496
939161	AE1-146 C O1	6.8063	Adder	8.01
939162	AE1-146 E O1	3.1785	Adder	3.74
941741	AE2-174 C	16.1178	50/50	16.1178
941742	AE2-174 E	75.4552	50/50	75.4552
960841	AF2-375 C O1	8.8833	50/50	8.8833
960842	AF2-375 E O1	5.9222	50/50	5.9222
WEC	WEC	0.1367	Confirmed LTF	0.1367
LGEE	LGEE	0.2835	Confirmed LTF	0.2835
CPL	CPL	0.1488	Confirmed LTF	0.1488
CBM-W2	CBM-W2	3.4398	Confirmed LTF	3.4398
NY	NY	0.1006	Confirmed LTF	0.1006
CBM-W1	CBM-W1	1.9140	Confirmed LTF	1.9140
TVA	TVA	0.5362	Confirmed LTF	0.5362
O-066	O-066	0.8400	Confirmed LTF	0.8400
CBM-S2	CBM-S2	1.5433	Confirmed LTF	1.5433
CBM-S1	CBM-S1	3.4421	Confirmed LTF	3.4421
G-007	G-007	0.1279	Confirmed LTF	0.1279
MEC	MEC	0.6801	Confirmed LTF	0.6801

11.6.10 Index 10

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
95947769	243039	05MELMOR	AEP	243024	05HOWARD	AEP	1	AEP_P4_#7112_05MELMOR 138_C	breaker	167.0	164.75	166.65	DC	7.03

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247548	V4-010 C	3.9970	50/50	3.9970
247551	U4-028 C (Suspended)	2.5848	50/50	2.5848
247552	U4-029 C (Suspended)	2.5848	50/50	2.5848
247940	U4-028 E (Suspended)	17.2982	50/50	17.2982
247941	U4-029 E (Suspended)	17.2982	50/50	17.2982
247947	V4-010 E	26.7490	50/50	26.7490
934252	AD1-052 E1	0.2726	Adder	0.32
934262	AD1-052 E2	0.2726	Adder	0.32
934461	AD1-070 C O1	1.6604	Adder	1.95
934462	AD1-070 E O1	7.7944	Adder	9.17
937021	AD2-136 C O1	9.3052	50/50	9.3052
937022	AD2-136 E O1	62.2736	50/50	62.2736
937381	AD2-191 C (Withdrawn : 06/03/2020)	4.3941	50/50	4.3941
937382	AD2-191 E (Withdrawn : 06/03/2020)	29.4070	50/50	29.4070
941741	AE2-174 C	5.3575	50/50	5.3575
941742	AE2-174 E	25.0810	50/50	25.0810
960841	AF2-375 C O1	1.9008	Adder	4.22
960842	AF2-375 E O1	1.2672	Adder	2.81
WEC	WEC	0.0973	Confirmed LTF	0.0973
LGEE	LGEE	0.0411	Confirmed LTF	0.0411
CALDERWOOD	CALDERWOOD	0.0075	Confirmed LTF	0.0075
CBM-W2	CBM-W2	1.0319	Confirmed LTF	1.0319
NY	NY	0.0758	Confirmed LTF	0.0758
CBM-W1	CBM-W1	7.7937	Confirmed LTF	7.7937
TVA	TVA	0.0560	Confirmed LTF	0.0560
O-066	O-066	1.0147	Confirmed LTF	1.0147
CHEOAH	CHEOAH	0.0085	Confirmed LTF	0.0085
CBM-S1	CBM-S1	0.3919	Confirmed LTF	0.3919
G-007	G-007	0.1570	Confirmed LTF	0.1570
MADISON	MADISON	0.4254	Confirmed LTF	0.4254
MEC	MEC	0.3798	Confirmed LTF	0.3798
CATAWBA	CATAWBA	0.0248	Confirmed LTF	0.0248

11.6.11 Index 11

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
95947751	932050	AC2-015 TAP	AEP	243024	05HOWARD	AEP	1	AEP_SUBT_P4_#1208_05HOWARD 69.0_U	breaker	167.0	177.94	180.06	DC	7.85

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247548	V4-010 C	3.7060	50/50	3.7060
247551	U4-028 C (Suspended)	2.2005	50/50	2.2005
247552	U4-029 C (Suspended)	2.2005	50/50	2.2005
247940	U4-028 E (Suspended)	14.7265	50/50	14.7265
247941	U4-029 E (Suspended)	14.7265	50/50	14.7265
247947	V4-010 E	24.8020	50/50	24.8020
925751	AC1-051 C	2.3830	50/50	2.3830
925752	AC1-051 E	15.9476	50/50	15.9476
932051	AC2-015 C	23.9931	50/50	23.9931
932052	AC2-015 E	28.4288	50/50	28.4288
934252	AD1-052 E1	0.2602	Adder	0.31
934262	AD1-052 E2	0.2602	Adder	0.31
934461	AD1-070 C O1	1.8541	Adder	2.18
934462	AD1-070 E O1	8.7038	Adder	10.24
937021	AD2-136 C O1	7.9218	50/50	7.9218
937022	AD2-136 E O1	53.0154	50/50	53.0154
937381	AD2-191 C (Withdrawn : 06/03/2020)	3.7409	50/50	3.7409
937382	AD2-191 E (Withdrawn : 06/03/2020)	25.0350	50/50	25.0350
939161	AE1-146 C O1	3.6010	Adder	4.24
939162	AE1-146 E O1	1.6816	Adder	1.98
941741	AE2-174 C	4.9675	50/50	4.9675
941742	AE2-174 E	23.2554	50/50	23.2554
960841	AF2-375 C O1	2.1225	Adder	4.71
960842	AF2-375 E O1	1.4150	Adder	3.14
WEC	WEC	0.1263	Confirmed LTF	0.1263
LGEE	LGEE	0.0930	Confirmed LTF	0.0930
CBM-W2	CBM-W2	1.6871	Confirmed LTF	1.6871
NY	NY	0.1073	Confirmed LTF	0.1073
CBM-W1	CBM-W1	8.8070	Confirmed LTF	8.8070
TVA	TVA	0.1540	Confirmed LTF	0.1540
O-066	O-066	1.3306	Confirmed LTF	1.3306
CBM-S1	CBM-S1	1.0224	Confirmed LTF	1.0224
G-007	G-007	0.2059	Confirmed LTF	0.2059
MADISON	MADISON	0.3851	Confirmed LTF	0.3851
MEC	MEC	0.5180	Confirmed LTF	0.5180
CATAWBA	CATAWBA	0.0101	Confirmed LTF	0.0101

11.7 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
AB1-107	Bayshore-GM Powertrain 138 kV & Lallendorf 345kV	Engineering and Procurement
AB2-019	Erie West 345kV	Engineering and Procurement
AB2-131	Galion-Roberts South 138kV	Active
AB2-170	East Lima-Marysville 345kV	Under Construction
AC1-051	Willard-S. Greenwich 69kV	Active
AC1-212	Minster 69kV	Engineering and Procurement
AC2-015	Chatfield-Howard 138kV	Active
AC2-103	Beaver-Davis Besse 345 kV I	Active
AC2-195	Galion-Roberts South 138kV	Active
AD1-052	Freemont Energy Center	Under Construction
AD1-070	Fostoria Central 138 kV	Active
AD1-103	Beaver-Davis Besse 345 kV II	Active
AD1-118	Lemoyne	Active
AD2-075	Segreto 345kV	Active
AD2-091	Hardin Tap 345kV	Active
AD2-096	Marysville 345kV	Active
AD2-136	Melmore Tap 138kV	Active
AD2-191	Melmore 138kV	Withdrawn
AE1-119	Lemoyne 345 kV	Active
AE1-146	Ebersole #2-Fostoria Central 138 kV	Active
AE2-072	East Leipsic-Richland 138 kV	Active
AE2-174	Seneca 138 kV	Active
AE2-176	Groton 138 kV Solar	Active
AE2-181	Snyder 69kV	Active
AE2-216	Hardin Switch 345 kV	Active
AE2-282	East Fayette 138 kV	Active
AE2-324	Galion-Roberts South II 138 kV	Active
AF1-063	Lockwood Road 138 kV	Active
AF1-064	Weston 69 kV	Active
AF1-120	East Fayette 2 138 kV	Active
AF1-122	Cardington 138 kV	Active
AF1-205	Napolean Muni 138 kV	Active
AF1-206	Fayette-Lyons 138 kV	Active
AF1-227	Marysville-East Lima 345 kV	Active
AF1-229	Galion-South Berwick 345 kV	Active
AF1-285	Gunn Road 345 kV	Active
AF2-004	Beaver 345 kV	Active
AF2-005	Beaver 138 kV	Active
AF2-126	Weston 69 kV II	Active
AF2-127	Lockwood Road 138 kV	Active

Queue Number	Project Name	Status
AF2-150	Galion 138 kV	Active
AF2-209	South Hicksville 138 kV	Active
AF2-321	Stryker-Ridgeville 138 kV	Active
AF2-375	Fostoria Central 138 kV	Active
AF2-376	Timber Switch 138 kV	Active
AF2-377	Logtown 138 kV	Active
AF2-386	Bryan 69 kV	Active
U1-059	Ada-Dunkirk 69kV	In Service
U4-028	Fostoria Central-Greenlawn-Howard 138kV	Suspended
U4-029	Fostoria Central-Greenlawn-Howard 138kV	Suspended
V3-028	East Lima-Marysville 345kV	Under Construction
V4-010	Tiffin Center 138kV	Engineering and Procurement
W1-056	Ada-Dunkirk 69kV	In Service
Y1-069	Bay Shore-Fostoria Central 345kV & Bayshore-Monroe 345kV	In Service
Y3-092	Erie West 345kV	Engineering and Procurement
J1005	MISO	MISO
J1043	MISO	MISO
J1062	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
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
J984	MISO	MISO
J989	MISO	MISO
J996	MISO	MISO

11.8 Contingency Descriptions - Primary POI

Contingency Name	Contingency Definition
AEP_P1-2_#7105	CONTINGENCY 'AEP_P1-2_#7105' OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 END
AEP_SUBT_P4_#2200_05FREMNT C 69.0_E	CONTINGENCY 'AEP_SUBT_P4_#2200_05FREMNT C 69.0_E' OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 OPEN BRANCH FROM BUS 245645 TO BUS 245614 CKT 1 / 245645 05CLYDE 69.0 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 245611 TO BUS 245614 CKT 2 / 245611 05E FREMON 69.0 245614 05FREMNT C 69.0 2 OPEN BRANCH FROM BUS 245614 TO BUS 245623 CKT 1 / 245614 05FREMNT C 69.0 245623 05HOLRAN 69.0 1 END
AEP_P1-2_#7761-A	CONTINGENCY 'AEP_P1-2_#7761-A' OPEN BRANCH FROM BUS 247172 TO BUS 939160 CKT 2 / 247172 05EBERSO 138 939160 AE1-146 TAP 138 2 END
ATSI-P7-1-TE-345-029A	CONTINGENCY 'ATSI-P7-1-TE-345-029A' /* X1-027A - BEAVER & BEAVER - HAYES 345 DISCONNECT BRANCH FROM BUS 907060 TO BUS 238569 CKT 1 /* X1-027A_AT12 345 02BEAVER 345 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1 /* 02HAYES 345 02BEAVER 345 END

Contingency Name	Contingency Definition
AEP_SUBT_P4_#1208_05HOWARD 69.0_U	CONTINGENCY 'AEP_SUBT_P4_#1208_05HOWARD 69.0_U' OPEN BRANCH FROM BUS 245666 TO BUS 243024 CKT 1 / 245666 05HOWRD1EQ 999 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 245666 TO BUS 245663 CKT 1 / 245666 05HOWRD1EQ 999 245663 05HOWARD 69.0 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243101 CKT 1 / 243024 05HOWARD 138 243101 05SHELNS 138 1 OPEN BRANCH FROM BUS 245659 TO BUS 245663 CKT 1 / 245659 05E BUCYRU 69.0 245663 05HOWARD 69.0 1 OPEN BRANCH FROM BUS 245663 TO BUS 245678 CKT 1 / 245663 05HOWARD 69.0 245678 05NGALIOSS 69.0 1 OPEN BRANCH FROM BUS 245663 TO BUS 245679 CKT 1 / 245663 05HOWARD 69.0 245679 05WILLARD 69.0 1 OPEN BRANCH FROM BUS 245663 TO BUS 245657 CKT 1 / 245663 05HOWARD 69.0 245657 05WSHELBY 69.0 1 REMOVE SWSHUNT FROM BUS 245663 / 245663 05HOWARD 69.0 END

Contingency Name	Contingency Definition
AEP_P7-1_#10927	CONTINGENCY 'AEP_P7-1_#10927'
	OPEN BRANCH FROM BUS 242950 TO BUS 242955 CKT 1 / 242950 05ACADEM 138
	242955 05APPLY 138 1
	OPEN BRANCH FROM BUS 242950 TO BUS 246941 CKT 1 / 242950 05ACADEM 138
	246941 05MILL2Z 138 1
	OPEN BRANCH FROM BUS 242955 TO BUS 243061 CKT 1 / 242955 05APPLY 138
	243061 05NLEXTN 138 1
	OPEN BRANCH FROM BUS 247302 TO BUS 242962 CKT Z1 / 247302 05BLDBG8 138
	242962 05BLDBGZ 138 Z1
	OPEN BRANCH FROM BUS 242962 TO BUS 247278 CKT 1 / 242962 05BLDBGZ 138
	247278 05MILL1Z 138 1
	OPEN BRANCH FROM BUS 242962 TO BUS 243070 CKT 1 / 242962 05BLDBGZ 138
	243070 05OHIOCT 138 1
	OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138
	243050 05NBELVL 138 1
	OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138
	243061 05NLEXTN 138 1
	OPEN BRANCH FROM BUS 247278 TO BUS 243044 CKT Z1 / 247278 05MILL1Z 138
	243044 05MILLWO 138 Z1
	OPEN BRANCH FROM BUS 247278 TO BUS 243050 CKT 1 / 247278 05MILL1Z 138
	243050 05NBELVL 138 1
	OPEN BRANCH FROM BUS 246941 TO BUS 243044 CKT Z1 / 246941 05MILL2Z 138
	243044 05MILLWO 138 Z1
	OPEN BRANCH FROM BUS 246941 TO BUS 243160 CKT 1 / 246941 05MILL2Z 138
	243160 05WTRNWX 138 1
	OPEN BRANCH FROM BUS 243070 TO BUS 243160 CKT 1 / 243070 05OHIOCT 138
	243160 05WTRNWX 138 1
	OPEN BRANCH FROM BUS 243070 TO BUS 243160 CKT 1 / 243070 05OHIOCT 138
	243160 05WTRNWX 138 1
	OPEN BRANCH FROM BUS 243050 TO BUS 245567 CKT 1 / 243050 05NBELVL 138
	245567 05NBELLVL 69.0 1
	OPEN BRANCH FROM BUS 243160 TO BUS 245425 CKT 1 / 243160 05WTRNWX 138
	245425 05W TRINWX 12.0 1
	END

Contingency Name	Contingency Definition
AEP_P4_#10133_05HOWARD 138_H	CONTINGENCY 'AEP_P4_#10133_05HOWARD 138_H' OPEN BRANCH FROM BUS 241111 TO BUS 243024 CKT 1 / 241111 02ASHLAND 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015 TAP 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243101 CKT 1 / 243024 05HOWARD 138 243101 05SHELNS 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243117 CKT 1 / 243024 05HOWARD 138 243117 05SULFRS 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243100 CKT 1 / 243024 05HOWARD 138 243100 05SHELGH 138 1 OPEN BRANCH FROM BUS 243050 TO BUS 245567 CKT 1 / 243050 05NBELVL 138 245567 05NBELLVL 69.0 1 REMOVE SWSHUNT FROM BUS 243024 / 243024 05HOWARD 138 END
AEP_P1-3_#5063_05SBERWI 345_1-B	CONTINGENCY 'AEP_P1-3_#5063_05SBERWI 345_1-B' OPEN BRANCH FROM BUS 242917 TO BUS 242942 CKT 1 / 242917 05SBERW EQ 999 242942 05SBERWI 345 1 OPEN BRANCH FROM BUS 242917 TO BUS 243180 CKT 1 / 242917 05SBERW EQ 999 243180 05SBERWICK 69.0 1 OPEN BRANCH FROM BUS 242917 TO BUS 243199 CKT 1 / 242917 05SBERW EQ 999 243199 05SBERW1-L 12.0 1 OPEN BRANCH FROM BUS 945640 TO BUS 242942 CKT 1 / 945640 AF1-229 TAP 345 242942 05SBERWI 345 1 OPEN BRANCH FROM BUS 242936 TO BUS 242942 CKT 1 / 242936 05FOSTOR 345 242942 05SBERWI 345 1 END
AEP_P4_#10729_05CHATFL 138_E	CONTINGENCY 'AEP_P4_#10729_05CHATFL 138_E' OPEN BRANCH FROM BUS 242984 TO BUS 932050 CKT 1 / 242984 05CHATFL 138 932050 AC2-015 TAP 138 1 OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 1 / 242984 05CHATFL 138 245656 05CHATFIEL 69.0 1 OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 2 / 242984 05CHATFL 138 245656 05CHATFIEL 69.0 2 END
ATSI-P7-1-TE-345-027A	CONTINGENCY 'ATSI-P7-1-TE-345-027A' /* DB - X1-027A & DB - HAYES 345 DISCONNECT BRANCH FROM BUS 238654 TO BUS 907060 CKT 1 /* 02DAV-BE 345 X1- 027A_AT12 345 DISCONNECT BRANCH FROM BUS 238654 TO BUS 239289 CKT 1 /* 02DAV-BE 345 02HAYES 345 END

Contingency Name	Contingency Definition
AEP_P4_#7112_05MELMOR 138_C	CONTINGENCY 'AEP_P4_#7112_05MELMOR 138_C' OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8 138 243110 05STIFFI 138 1 OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8 138 243137 05W.END
AEP_P4_#9521_05CHATFL 138_F	CONTINGENCY 'AEP_P4_#9521_05CHATFL 138_F' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 2 / 242984 05CHATFL 138 245656 05CHATFIEL 69.0 2 END
AEP_P2-2_#7118_05HOWARD 138_1-B	CONTINGENCY 'AEP_P2-2_#7118_05HOWARD 138_1-B' OPEN BRANCH FROM BUS 241111 TO BUS 243024 CKT 1 / 241111 02ASHLAND 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015 TAP 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243100 CKT 1 / 243024 05HOWARD 138 243100 05SHELGH 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243101 CKT 1 / 243024 05HOWARD 138 243101 05SHELNS 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243117 CKT 1 / 243024 05HOWARD 138 243117 05SULFRS 138 1 REMOVE SWSHUNT FROM BUS 243024 / 243024 05HOWARD 138 END

Contingency Name	Contingency Definition
AEP_P7-1_#10926	CONTINGENCY 'AEP_P7-1_#10926' OPEN BRANCH FROM BUS 242950 TO BUS 242955 CKT 1 / 242950 05ACADEM 138 242955 05APPLY 138 1 OPEN BRANCH FROM BUS 242950 TO BUS 246941 CKT 1 / 242950 05ACADEM 138 246941 05MILL2Z 138 1 OPEN BRANCH FROM BUS 242955 TO BUS 243061 CKT 1 / 242955 05APPLY 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 247302 TO BUS 242962 CKT Z1 / 247302 05BLDBG8 138 242962 05BLDBGZ 138 Z1 OPEN BRANCH FROM BUS 242962 TO BUS 247278 CKT 1 / 242962 05BLDBGZ 138 247278 05MILL1Z 138 1 OPEN BRANCH FROM BUS 242962 TO BUS 243070 CKT 1 / 242962 05BLDBGZ 138 243070 05OHIOCT 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 247278 TO BUS 243044 CKT Z1 / 247278 05MILL1Z 138 243044 05MILLWO 138 Z1 OPEN BRANCH FROM BUS 247278 TO BUS 243050 CKT 1 / 247278 05MILL1Z 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 246941 TO BUS 243044 CKT Z1 / 246941 05MILL2Z 138 243044 05MILLWO 138 Z1 OPEN BRANCH FROM BUS 246941 TO BUS 243160 CKT 1 / 246941 05MILL2Z 138 243160 05WTRNWX 138 1 OPEN BRANCH FROM BUS 243070 TO BUS 243160 CKT 1 / 243070 05OHIOCT 138 243160 05WTRNWX 138 1 OPEN BRANCH FROM BUS 243070 TO BUS 243160 CKT 1 / 243070 05OHIOCT 138 243160 05WTRNWX 138 1 OPEN BRANCH FROM BUS 243160 TO BUS 245425 CKT 1 / 243160 05WTRNWX 138 245425 05W TRINWX 12.0 1 END
AEP_P1-2_#7757	CONTINGENCY 'AEP_P1-2_#7757' OPEN BRANCH FROM BUS 247172 TO BUS 243006 CKT 1 / 247172 05EBERSO 138 243006 05FOSTOR 138 1 END

Contingency Name	Contingency Definition
AEP_P4_#7728_05FREMCT 138_C	CONTINGENCY 'AEP_P4_#7728_05FREMCT 138_C' OPEN BRANCH FROM BUS 245616 TO BUS 243009 CKT 1 / 245616 05FREMNTEQ 999 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 245616 TO BUS 245617 CKT 1 / 245616 05FREMNTEQ 999 245617 05FREMONT 69.0 1 OPEN BRANCH FROM BUS 245616 TO BUS 245618 CKT 1 / 245616 05FREMNTEQ 999 245618 05FREMONT- 12.0 1 OPEN BRANCH FROM BUS 239154 TO BUS 243009 CKT 1 / 239154 02W.FREM 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 / 243008 05FREMCT 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 REMOVE SWSHUNT FROM BUS 243008 / 243008 05FREMCT 138 END
AEP_SUBT_P2-2_#1175_05FREMNT C 69.0_1	CONTINGENCY 'AEP_SUBT_P2-2_#1175_05FREMNT C 69.0_1' OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 OPEN BRANCH FROM BUS 245645 TO BUS 245614 CKT 1 / 245645 05CLYDE 69.0 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 245611 TO BUS 245614 CKT 2 / 245611 05E FREMON 69.0 245614 05FREMNT C 69.0 2 OPEN BRANCH FROM BUS 245614 TO BUS 245623 CKT 1 / 245614 05FREMNT C 69.0 245623 05HOLRAN 69.0 1 END
AEP_P2-2_#7725_05FREMCT 138_1	CONTINGENCY 'AEP_P2-2_#7725_05FREMCT 138_1' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 / 243008 05FREMCT 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 REMOVE SWSHUNT FROM BUS 243008 / 243008 05FREMCT 138 END
Base Case	

Contingency Name	Contingency Definition
AEP_P1-2_#11144-B	CONTINGENCY 'AEP_P1-2_#11144-B' OPEN BRANCH FROM BUS 945620 TO BUS 242939 CKT 1 / 945620 AF1-227 TAP 345 242939 05MARYSV 345 1 END
AEP_P4_#10134_05HOWARD 138_B	CONTINGENCY 'AEP_P4_#10134_05HOWARD 138_B' OPEN BRANCH FROM BUS 241111 TO BUS 243024 CKT 1 / 241111 02ASHLAND 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015 TAP 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243100 CKT 1 / 243024 05HOWARD 138 243100 05SHELGH 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243101 CKT 1 / 243024 05HOWARD 138 243101 05SHELNS 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243117 CKT 1 / 243024 05HOWARD 138 243117 05SULFRS 138 REMOVE SWSHUNT FROM BUS 243024 / 243024 05HOWARD 138 END
AEP_SUBT_P4_#1176_05FREMNT C 69.0_L	CONTINGENCY 'AEP_SUBT_P4_#1176_05FREMNT C 69.0_L' OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 OPEN BRANCH FROM BUS 245641 TO BUS 245614 CKT 1 / 245641 05BIRCHARDSS69.0 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 245645 TO BUS 245614 CKT 1 / 245645 05CLYDE 69.0 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 245611 TO BUS 245614 CKT 2 / 245611 05E FREMON 69.0 245614 05FREMNT C 69.0 2 OPEN BRANCH FROM BUS 245614 TO BUS 245623 CKT 1 / 245614 05FREMNT C 69.0 245623 05HOLRAN 69.0 1 OPEN BRANCH FROM BUS 245623 TO BUS 245625 CKT 1 / 245623 05HOLRAN 69.0 245625 05MAPLE GR 69.0 1 OPEN BRANCH FROM BUS 245625 TO BUS 245628 CKT 1 / 245625 05MAPLE GR 69.0 245628 05RIVERVIE 69.0 1 REMOVE SWSHUNT FROM BUS 245614 / 245614 05FREMNT C 69.0 END
AEP_P2-2_#9521_05CHATFL 138_2	CONTINGENCY 'AEP_P2-2_#9521_05CHATFL 138_2' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 2 / 242984 05CHATFL 138 245656 05CHATFIEL 69.0 2 END

Contingency Name	Contingency Definition
AEP_P1-2_#7709	CONTINGENCY 'AEP_P1-2_#7709' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 END
AEP_P4_#7725_05FREMCT 138_M	CONTINGENCY 'AEP_P4_#7725_05FREMCT 138_M' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 / 243008 05FREMCT 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 REMOVE SWSHUNT FROM BUS 243008 / 243008 05FREMCT 138 END
ATSI-P2-3-OEC-345-026	CONTINGENCY 'ATSI-P2-3-OEC-345-026' /* BEAVER 345KV BRK B-182 DISCONNECT BRANCH FROM BUS 238569 TO BUS 907060 CKT 1 /* 02BEAVER 345 X1- 027A TAP 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239171 CKT 1 /* 02BEAVER 345 02WLORG-2 14 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239172 CKT 1 /* 02BEAVER 345 02WLORG-3 14 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239173 CKT 1 /* 02BEAVER 345 02WLORG-4 14 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239174 CKT 1 /* 02BEAVER 345 02WLORG-5 14 REMOVE MACHINE 2 FROM BUS 239171 /* 02WLORG-2 14 REMOVE MACHINE 3 FROM BUS 239172 /* 02WLORG-3 14 REMOVE MACHINE 4 FROM BUS 239173 /* 02WLORG-4 14 REMOVE MACHINE 5 FROM BUS 239174 /* 02WLORG-5 14 DISCONNECT BUS 239171 /* 02WLORG-2 14 DISCONNECT BUS 239172 /* 02WLORG-3 14 DISCONNECT BUS 239173 /* 02WLORG-4 14 DISCONNECT BUS 239174 /* 02WLORG-5 14 END
ATSI-P2-3-OEC-345-023	CONTINGENCY 'ATSI-P2-3-OEC-345-023' /* BEAVER 345KV BRK B-121 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER 345 02CARLIL 345 END

12 Light Load Analysis

Light Load Studies (As applicable)

Not Applicable.

13 Short Circuit Analysis

The following Breakers are overdutied:

To be determined during later study phases.

14 Stability and Reactive Power Assessment

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

To be determined during later study phases.

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).

15 Secondary Point of Interconnection

AF2-375 will interconnect with the AEP transmission system at a new 138 kV switching station cut into the Ebersole – Fostoria Central 138 kV circuit #1.

To accommodate the interconnection on the AEP-owned Fostoria – Ebersole 138 kV circuit #1, a new three (3) circuit breaker 138 kV switching station physically configured as a ring-bus will be constructed (see Attachment 2). 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.

16 Summer Peak – Load Flow Analysis – Secondary POI

The Queue Project AF2-375 was evaluated as a 129.6 MW (Capacity 77.8 MW) injection tapping the Ebersole to Fostoria Central 138 kV line in the AEP area. Project AF2-375 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-375 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

16.1 Generation Deliverability

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

None

16.2 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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADIN G %	POST PROJE CT LOADIN G %	AC DC	MW IMPACT
98918572	238654	02DAV-BE	345.0	ATSI	239289	02HAYES	345.0	ATSI	1	ATSI-P2-3-OEC-345-026	breaker	1878.0	99.99	100.34	DC	14.21
95515923	243024	05HOWARD	138.0	AEP	241111	02ASHLAND	138.0	ATSI	1	AEP_P7-1_#10926	tower	245.0	99.44	100.8	DC	7.42

16.3 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 LOADIN G %	POST PROJE CT LOADIN G %	AC DC	MW IMPACT
98918543	238569	02BEAVER	345.0	ATSI	239725	02LAKEA VE	345.0	ATSI	2	ATSI-P2-3-OEC-345-023	breaker	1878.0	103.85	104.31	DC	19.1
95515853	242936	05FOSTOR	345.0	AEP	242935	05E LIMA	345.0	AEP	1	ATSI-P7-1-TE-345-029A	tower	1318.0	121.14	121.8	DC	20.13
95947779	242984	05CHATF L	138.0	AEP	932050	AC2-015 TAP	138.0	AEP	1	AEP_SUBT_P4_#1208_05HOWARD 69.0_U	breaker	167.0	146.55	148.54	DC	7.37
95947617	243008	05FREMCT	138.0	AEP	243009	05FRMN T	138.0	AEP	1	AEP_P2-2_#7118_05HOWARD 138_1-B	bus	251.0	139.69	141.74	DC	11.45
95947618	243008	05FREMCT	138.0	AEP	243009	05FRMN T	138.0	AEP	1	AEP_SUBT_P2-2_#1175_05FREMNT C 69.0_1	bus	251.0	128.72	130.35	DC	9.06
95947793	243008	05FREMCT	138.0	AEP	243009	05FRMN T	138.0	AEP	1	AEP_P4_#10134_05HOWARD 138_B	breaker	251.0	139.69	141.74	DC	11.45
95947794	243008	05FREMCT	138.0	AEP	243009	05FRMN T	138.0	AEP	1	AEP_P4_#10133_05HOWARD 138_H	breaker	251.0	139.73	141.78	DC	11.45
95947795	243008	05FREMCT	138.0	AEP	243009	05FRMN T	138.0	AEP	1	AEP_P2-2_#1176_05FREMNT C 69.0_L	breaker	251.0	129.44	131.06	DC	9.06
95947796	243008	05FREMCT	138.0	AEP	243009	05FRMN T	138.0	AEP	1	AEP_SUBT_P4_#2200_05FREMNT C 69.0_E	breaker	251.0	128.72	130.35	DC	9.06
95515017	243009	05FRMN T	138.0	AEP	239154	02W.FRE M	138.0	ATSI	1	AEP_P2-2_#7118_05HOWARD 138_1-B	bus	361.0	103.91	107.76	DC	13.91
95515235	243009	05FRMN T	138.0	AEP	239154	02W.FRE M	138.0	ATSI	1	AEP_P4_#10133_05HOWARD 138_H	breaker	361.0	103.91	107.76	DC	13.91
95515236	243009	05FRMN T	138.0	AEP	239154	02W.FRE M	138.0	ATSI	1	AEP_P4_#10134_05HOWARD 138_B	breaker	361.0	103.91	107.76	DC	13.91
95515262	243024	05HOWARD	138.0	AEP	241111	02ASHLAND	138.0	ATSI	1	AEP_P4_#7728_05FREMCT 138_C	breaker	245.0	100.64	101.85	DC	6.56

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 LOADIN G %	POST PROJE CT LOADIN G %	AC DC	MW IMPA CT
95515922	243024	05HOWARD	138.0	AEP	241111	02ASHLAND	138.0	ATSI	1	AEP_P7-1_#10927	tower	245.0	101.6	102.96	DC	7.42
95947592	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P2-2_#9521_05CHATFL138_2	bus	167.0	154.19	156.16	DC	7.31
95947769	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P4_#7112_05MELMOR138_C	breaker	167.0	164.75	166.53	DC	6.59
95947770	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P4_#10729_05CHATFL138_E	breaker	167.0	154.78	156.79	DC	7.48
95947771	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P4_#9521_05CHATFL138_F	breaker	167.0	154.19	156.16	DC	7.31
95947751	932050	AC2-015TAP	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_SUBT_P4_#1208_05HOWARD69.0_U	breaker	167.0	177.94	179.93	DC	7.37

16.4 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.

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 LOADIN G %	POST PROJE CT LOADIN G %	AC DC	MW IMPA CT
95515506	242935	05E LIMA	345.0	AEP	242945	05SW LIM	345.0	AEP	1	AEP_P1-2_#11144-B	operation	971.0	108.87	110.38	DC	14.71
95515463	242936	05FOSTOR	345.0	AEP	242935	05E LIMA	345.0	AEP	1	Base Case	operation	1025.0	115.71	116.46	DC	16.82
95515464	242936	05FOSTOR	345.0	AEP	242935	05E LIMA	345.0	AEP	1	AEP_P1-3_#5063_05SBERWI345_1-B	operation	1318.0	112.93	113.69	DC	21.83
95948032	242984	05CHATFL	138.0	AEP	932050	AC2-015TAP	138.0	AEP	1	AEP_P1-2_#7105	operation	167.0	137.46	139.39	DC	7.17
145165063	243006	05FOSTOR	138.0	AEP	939160	AE1-146TAP	138.0	AEP	2	AEP_P1-2_#7757-A	operation	245.0	96.34	105.06	DC	21.36
95947989	243039	05MELMOR	138.0	AEP	242984	05CHATFL	138.0	AEP	1	AEP_P1-2_#7105	operation	167.0	173.29	175.4	DC	7.82
95948018	243039	05MELMOR	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P1-2_#7709	operation	167.0	154.08	156.05	DC	7.28
95948001	932050	AC2-015TAP	138.0	AEP	243024	05HOWARD	138.0	AEP	1	AEP_P1-2_#7105	operation	167.0	170.63	172.56	DC	7.17
145164919	939160	AE1-146TAP	138.0	AEP	247172	05EBERSO	138.0	AEP	2	AEP_P1-2_#7757-A	operation	245.0	116.25	124.97	DC	21.36
95515486	945620	AF1-227TAP	345.0	AEP	242939	05MARYSV	345.0	AEP	1	Base Case	operation	897.0	111.07	112.54	DC	13.18
145164941	960840	AF2-375TAP	138.0	AEP	247172	05EBERSO	138.0	AEP	1	AEP_P1-2_#7761-A	operation	245.0	108.48	122.39	DC	34.07
145164943	960840	AF2-375TAP	138.0	AEP	247172	05EBERSO	138.0	AEP	1	Base Case	operation	167.0	85.13	109.38	DC	40.5

16.5 Flow Gate Details - Secondary POI

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".

16.5.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
98918572	238654	02DAV-BE	ATSI	239289	02HAYES	ATSI	1	ATSI-P2-3-OEC-345-026	breaker	1878.0	99.99	100.34	DC	14.21

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	4.5595	50/50	4.5595
238670	02DVBSG1 (Deactivation : 31/05/2020)	34.8835	50/50	34.8835
238885	02LEMOG1	5.5921	50/50	5.5921
238886	02LEMOG2	5.5921	50/50	5.5921
238887	02LEMOG3	5.5921	50/50	5.5921
238888	02LEMOG4	5.5921	50/50	5.5921
238979	02NAPMUN	5.2342	Adder	6.16
239276	02COLLW 11	-2.3427	Adder	-2.76
239293	02BS-PKR	0.3980	50/50	0.3980
239297	02CPPW41	-2.6392	Adder	-3.1
241902	Y1-069 GE	31.3699	50/50	31.3699
244357	05GRANGER EL	0.2809	Adder	0.33
915952	Y3-092 NFTWR	81.0900	Merchant Transmission	81.0900
923821	AB2-019 FTWR	2.2705	Merchant Transmission	2.2705
931951	AB1-107 1	46.1063	50/50	46.1063
931961	AB1-107 2	127.5179	50/50	127.5179
932791	AC2-103 C	11.8933	50/50	11.8933
932792	AC2-103 E	79.6074	50/50	79.6074
934461	AD1-070 C O1	3.4278	Adder	4.03
934462	AD1-070 E O1	16.0917	Adder	18.93
934761	AD1-103 C O1	19.9970	50/50	19.9970
934762	AD1-103 E O1	133.8260	50/50	133.8260
934891	AD1-118	14.1834	50/50	14.1834
936601	AD2-075	10.5268	Adder	12.38
938911	AE1-119	111.4410	50/50	111.4410
939161	AE1-146 C O1	7.3931	Adder	8.7
939162	AE1-146 E O1	3.4525	Adder	4.06
940841	AE2-072 C	8.3515	Adder	9.83
940842	AE2-072 E	5.5677	Adder	6.55
941781	AE2-181 C	3.9649	Adder	4.66
941782	AE2-181 E	2.6433	Adder	3.11
942661	AE2-282 C O1	6.0573	Adder	7.13
942662	AE2-282 E O1	3.1873	Adder	3.75
943951	AF1-063 C O1	1.7603	Adder	2.07
943952	AF1-063 E O1	0.9759	Adder	1.15
943961	AF1-064 C O1	4.7085	Adder	5.54
943962	AF1-064 E O1	2.3401	Adder	2.75
944551	AF1-120 C	3.6703	Adder	4.32
944552	AF1-120 E	1.8489	Adder	2.18
945401	AF1-205 C O1	3.3952	Adder	3.99
945402	AF1-205 E O1	2.2634	Adder	2.66

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945411	AF1-206 C O1	16.4749	Adder	19.38
945412	AF1-206 E O1	10.9832	Adder	12.92
945641	AF1-229 C	7.2045	Adder	8.48
945642	AF1-229 E	4.8030	Adder	5.65
950351	J466	2.4510	PJM External (MISO)	2.4510
950942	J325 E	0.3362	PJM External (MISO)	0.3362
952312	J646 E	0.1451	PJM External (MISO)	0.1451
952401	J752 C	1.2500	PJM External (MISO)	1.2500
952402	J752 E	6.7630	PJM External (MISO)	6.7630
952971	J793	119.5617	PJM External (MISO)	119.5617
953271	J701 C	0.6089	PJM External (MISO)	0.6089
953272	J701 E	3.2944	PJM External (MISO)	3.2944
953321	J799	19.1438	PJM External (MISO)	19.1438
953781	J833	10.1480	PJM External (MISO)	10.1480
953811	J839	8.8070	PJM External (MISO)	8.8070
954111	J875	13.0980	PJM External (MISO)	13.0980
955181	J996	7.7312	PJM External (MISO)	7.7312
955781	J1062	17.2095	PJM External (MISO)	17.2095
956161	J1103	1.5932	PJM External (MISO)	1.5932
956751	J1173	7.1888	PJM External (MISO)	7.1888
958321	AF2-126 C	2.9961	Adder	6.65
958322	AF2-126 E	1.4868	Adder	3.3
958331	AF2-127 C	1.2036	Adder	2.67
958332	AF2-127 E	0.6332	Adder	1.41
959181	AF2-209 C O2	3.6192	Adder	8.03
959182	AF2-209 E O2	1.6920	Adder	3.76
960301	AF2-321 C	6.0663	Adder	13.47
960302	AF2-321 E	4.0442	Adder	8.98
960841	AF2-375 C O2	3.8401	Adder	8.52
960842	AF2-375 E O2	2.5601	Adder	5.68
960951	AF2-386 C O2	0.4452	Adder	0.99
960952	AF2-386 E O2	0.6147	Adder	1.36
WEC	WEC	1.6717	Confirmed LTF	1.6717
LGEE	LGEE	2.0424	Confirmed LTF	2.0424
CPL	CPL	0.4035	Confirmed LTF	0.4035
CBM-W2	CBM-W2	29.6806	Confirmed LTF	29.6806
NY	NY	1.8653	Confirmed LTF	1.8653
CBM-W1	CBM-W1	100.5053	Confirmed LTF	100.5053
TVA	TVA	3.8346	Confirmed LTF	3.8346
O-066	O-066	19.1251	Confirmed LTF	19.1251
CBM-S2	CBM-S2	6.2886	Confirmed LTF	6.2886
CBM-S1	CBM-S1	24.6654	Confirmed LTF	24.6654
G-007	G-007	2.9370	Confirmed LTF	2.9370
MADISON	MADISON	2.1289	Confirmed LTF	2.1289
MEC	MEC	7.4047	Confirmed LTF	7.4047

16.5.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
95515922	243024	05HOWARD	AEP	241111	02ASHLAND	ATSI	1	AEP_P7-1_#10927	tower	245.0	101.6	102.96	DC	7.42

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247548	V4-010 C	3.5212	50/50	3.5212
247551	U4-028 C (Suspended)	2.1054	50/50	2.1054
247552	U4-029 C (Suspended)	2.1054	50/50	2.1054
247926	U1-059 E	2.1405	Adder	2.52
247940	U4-028 E (Suspended)	14.0897	50/50	14.0897
247941	U4-029 E (Suspended)	14.0897	50/50	14.0897
247942	W1-056 E	0.7873	Adder	0.93
247947	V4-010 E	23.5648	50/50	23.5648
925751	AC1-051 C	2.2454	50/50	2.2454
925752	AC1-051 E	15.0268	50/50	15.0268
932051	AC2-015 C	15.5397	50/50	15.5397
932052	AC2-015 E	18.4126	50/50	18.4126
934461	AD1-070 C O1	1.8495	Adder	2.18
934462	AD1-070 E O1	8.6822	Adder	10.21
937021	AD2-136 C O1	7.5793	50/50	7.5793
937022	AD2-136 E O1	50.7227	50/50	50.7227
937381	AD2-191 C (Withdrawn : 06/03/2020)	3.5791	50/50	3.5791
937382	AD2-191 E (Withdrawn : 06/03/2020)	23.9524	50/50	23.9524
939161	AE1-146 C O1	3.6733	Adder	4.32
939162	AE1-146 E O1	1.7154	Adder	2.02
941741	AE2-174 C	4.7197	50/50	4.7197
941742	AE2-174 E	22.0954	50/50	22.0954
960841	AF2-375 C O2	2.0048	Adder	4.45
960842	AF2-375 E O2	1.3365	Adder	2.97
WEC	WEC	0.1824	Confirmed LTF	0.1824
LGEE	LGEE	0.2094	Confirmed LTF	0.2094
CPL	CPL	0.0126	Confirmed LTF	0.0126
CBM-W2	CBM-W2	3.0712	Confirmed LTF	3.0712
NY	NY	0.1781	Confirmed LTF	0.1781
CBM-W1	CBM-W1	10.2832	Confirmed LTF	10.2832
TVA	TVA	0.3710	Confirmed LTF	0.3710
O-066	O-066	2.0294	Confirmed LTF	2.0294
CBM-S2	CBM-S2	0.4104	Confirmed LTF	0.4104
CBM-S1	CBM-S1	2.4112	Confirmed LTF	2.4112
G-007	G-007	0.3130	Confirmed LTF	0.3130
MADISON	MADISON	0.2540	Confirmed LTF	0.2540
MEC	MEC	0.7945	Confirmed LTF	0.7945

16.5.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
98918543	238569	02BEAVER	ATSI	239725	02LAKEAVE	ATSI	2	ATSI-P2-3-OEC-345-023	breaker	1878.0	103.85	104.31	DC	19.1

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	5.5203	50/50	5.5203
238670	02DVBSG1 (Deactivation : 31/05/2020)	30.9385	50/50	30.9385
238979	02NAPMUN	5.8692	Adder	6.9
239171	02WLORG-2	6.2588	50/50	6.2588
239172	02WLORG-3	6.3656	50/50	6.3656
239173	02WLORG-4	6.3656	50/50	6.3656
239174	02WLORG-5	6.3984	50/50	6.3984
239276	02COLLW 11	-3.2825	Adder	-3.86
239293	02BS-PKR	0.4819	50/50	0.4819
239297	02CPPW41	-3.7140	Adder	-4.37
241902	Y1-069 GE	31.6089	50/50	31.6089
244357	05GRANGER EL	0.3699	Adder	0.44
247548	V4-010 C	3.4613	Adder	4.07
247551	U4-028 C (Suspended)	1.6148	Adder	1.9
247552	U4-029 C (Suspended)	1.6148	Adder	1.9
247940	U4-028 E (Suspended)	10.8071	Adder	12.71
247941	U4-029 E (Suspended)	10.8071	Adder	12.71
247947	V4-010 E	23.1641	Adder	27.25
915952	Y3-092 NFTWR	111.1700	Merchant Transmission	111.1700
923821	AB2-019 FTWR	3.1128	Merchant Transmission	3.1128
925751	AC1-051 C	0.7882	Adder	0.93
925752	AC1-051 E	5.2747	Adder	6.21
931951	AB1-107 1	47.2190	Adder	55.55
931961	AB1-107 2	128.4895	50/50	128.4895
932051	AC2-015 C	5.4739	Adder	6.44
932052	AC2-015 E	6.4859	Adder	7.63
932791	AC2-103 C	14.3954	50/50	14.3954
932792	AC2-103 E	96.3550	50/50	96.3550
934252	AD1-052 E1	0.9741	Adder	1.15
934262	AD1-052 E2	0.9741	Adder	1.15
934461	AD1-070 C O1	4.6417	Adder	5.46
934462	AD1-070 E O1	21.7903	Adder	25.64
934761	AD1-103 C O1	24.2039	50/50	24.2039
934762	AD1-103 E O1	161.9799	50/50	161.9799
934891	AD1-118	12.3849	Adder	14.57
937021	AD2-136 C O1	5.8134	Adder	6.84
937022	AD2-136 E O1	38.9054	Adder	45.77
937381	AD2-191 C (Withdrawn : 06/03/2020)	2.7452	Adder	3.23

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
937382	AD2-191 E (Withdrawn : 06/03/2020)	18.3720	Adder	21.61
938911	AE1-119	97.3101	Adder	114.48
939161	AE1-146 C O1	9.8399	Adder	11.58
939162	AE1-146 E O1	4.5952	Adder	5.41
940841	AE2-072 C	9.6069	Adder	11.3
940842	AE2-072 E	6.4046	Adder	7.53
941741	AE2-174 C	4.6395	Adder	5.46
941742	AE2-174 E	21.7197	Adder	25.55
941761	AE2-176 C	15.7920	50/50	15.7920
941762	AE2-176 E	10.5280	50/50	10.5280
941781	AE2-181 C	4.4280	Adder	5.21
941782	AE2-181 E	2.9520	Adder	3.47
942661	AE2-282 C O1	6.7521	Adder	7.94
942662	AE2-282 E O1	3.5530	Adder	4.18
943951	AF1-063 C O1	1.9881	Adder	2.34
943952	AF1-063 E O1	1.1022	Adder	1.3
943961	AF1-064 C O1	5.5224	Adder	6.5
943962	AF1-064 E O1	2.7447	Adder	3.23
944551	AF1-120 C	4.0913	Adder	4.81
944552	AF1-120 E	2.0610	Adder	2.42
945401	AF1-205 C O1	3.8070	Adder	4.48
945402	AF1-205 E O1	2.5380	Adder	2.99
945411	AF1-206 C O1	18.3646	Adder	21.61
945412	AF1-206 E O1	12.2431	Adder	14.4
945641	AF1-229 C	8.4376	Adder	9.93
945642	AF1-229 E	5.6251	Adder	6.62
955781	J1062	17.1690	PJM External (MISO)	17.1690
957031	AF2-004 1	3.9284	50/50	3.9284
957041	AF2-004 2	3.9284	50/50	3.9284
957051	AF2-004 3	3.9284	50/50	3.9284
957061	AF2-004 4	3.9284	50/50	3.9284
957111	AF2-005	0.7134	Adder	1.58
958321	AF2-126 C	3.5140	Adder	7.8
958322	AF2-126 E	1.7439	Adder	3.87
958331	AF2-127 C	1.3594	Adder	3.02
958332	AF2-127 E	0.7152	Adder	1.59
960301	AF2-321 C	6.7971	Adder	15.09
960302	AF2-321 E	4.5314	Adder	10.06
960841	AF2-375 C O2	5.1636	Adder	11.46
960842	AF2-375 E O2	3.4424	Adder	7.64
960951	AF2-386 C O2	0.4977	Adder	1.1
960952	AF2-386 E O2	0.6873	Adder	1.53
WEC	WEC	1.8906	Confirmed LTF	1.8906
LGEE	LGEE	2.4109	Confirmed LTF	2.4109
CPLE	CPLE	0.5213	Confirmed LTF	0.5213
CBM-W2	CBM-W2	34.3816	Confirmed LTF	34.3816
NY	NY	2.3160	Confirmed LTF	2.3160
CBM-W1	CBM-W1	109.0372	Confirmed LTF	109.0372
TVA	TVA	4.5164	Confirmed LTF	4.5164
O-066	O-066	23.0832	Confirmed LTF	23.0832
CBM-S2	CBM-S2	7.7914	Confirmed LTF	7.7914
CBM-S1	CBM-S1	29.0702	Confirmed LTF	29.0702

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
G-007	G-007	3.5433	Confirmed LTF	3.5433
MADISON	MADISON	1.9616	Confirmed LTF	1.9616
MEC	MEC	8.4344	Confirmed LTF	8.4344

16.5.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
95515853	242936	05FOSTOR	AEP	242935	05E LIMA	AEP	1	ATSI-P7-1-TE-345-029A	tower	1318.0	121.14	121.8	DC	20.13

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	5.3099	50/50	5.3099
238670	02DVBSG1 (Deactivation : 31/05/2020)	23.5116	50/50	23.5116
238885	02LEMOG1	6.0712	50/50	6.0712
238886	02LEMOG2	6.0712	50/50	6.0712
238887	02LEMOG3	6.0712	50/50	6.0712
238888	02LEMOG4	6.0712	50/50	6.0712
238979	02NAPMUN	5.2701	Adder	6.2
239293	02BS-PKR	0.4635	50/50	0.4635
241902	Y1-069 GE	31.4894	50/50	31.4894
244357	05GRANGER EL	0.2415	Adder	0.28
247548	V4-010 C	3.4604	Adder	4.07
247549	V3-028 C	-1.0591	Adder	-1.25
247551	U4-028 C (Suspended)	1.6727	Adder	1.97
247552	U4-029 C (Suspended)	1.6727	Adder	1.97
247940	U4-028 E (Suspended)	11.1946	Adder	13.17
247941	U4-029 E (Suspended)	11.1946	Adder	13.17
247947	V4-010 E	23.1582	Adder	27.24
924791	AB2-131 C OP	3.1953	Adder	3.76
924792	AB2-131 E OP	5.2133	Adder	6.13
925131	AB2-170 C O1	-6.8838	Adder	-8.1
925751	AC1-051 C	0.7660	Adder	0.9
925752	AC1-051 E	5.1261	Adder	6.03
927181	AC1-212 C	-0.1288	Adder	-0.15
927183	AC1-212 BAT	1.5872	Merchant Transmission	1.5872
931951	AB1-107 1	53.4304	50/50	53.4304
931961	AB1-107 2	128.0037	50/50	128.0037
932051	AC2-015 C	5.3943	Adder	6.35
932052	AC2-015 E	6.3915	Adder	7.52
932791	AC2-103 C	8.0135	50/50	8.0135
932792	AC2-103 E	53.6379	50/50	53.6379
933721	AC2-195 C O1	2.9502	Adder	3.47
933722	AC2-195 E O1	1.7986	Adder	2.12
934252	AD1-052 E1	0.8498	Adder	1.0
934262	AD1-052 E2	0.8498	Adder	1.0
934461	AD1-070 C O1	6.4937	50/50	6.4937
934462	AD1-070 E O1	30.4842	50/50	30.4842
934761	AD1-103 C O1	13.4736	50/50	13.4736
934762	AD1-103 E O1	90.1693	50/50	90.1693
934891	AD1-118	15.3986	50/50	15.3986
936722	AD2-091 BAT	8.1970	Merchant Transmission	8.1970

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
936752	AD2-096 BAT	2.8820	Merchant Transmission	2.8820
937021	AD2-136 C O1	6.0219	Adder	7.08
937022	AD2-136 E O1	40.3004	Adder	47.41
937381	AD2-191 C (Withdrawn : 06/03/2020)	2.8437	Adder	3.35
937382	AD2-191 E (Withdrawn : 06/03/2020)	19.0307	Adder	22.39
938911	AE1-119	120.9890	50/50	120.9890
939161	AE1-146 C O1	8.4124	Adder	9.9
939162	AE1-146 E O1	3.9285	Adder	4.62
941741	AE2-174 C	4.6383	Adder	5.46
941742	AE2-174 E	21.7141	Adder	25.55
941761	AE2-176 C	9.7926	Adder	11.52
941762	AE2-176 E	6.5284	Adder	7.68
941781	AE2-181 C	3.6390	Adder	4.28
941782	AE2-181 E	2.4260	Adder	2.85
942042	AE2-216 BAT	9.0167	Merchant Transmission	9.0167
942661	AE2-282 C O1	5.7547	Adder	6.77
942662	AE2-282 E O1	3.0281	Adder	3.56
943011	AE2-324	0.9644	Adder	1.13
943961	AF1-064 C O1	6.1503	50/50	6.1503
943962	AF1-064 E O1	3.0567	50/50	3.0567
944551	AF1-120 C	3.4869	Adder	4.1
944552	AF1-120 E	1.7566	Adder	2.07
944571	AF1-122 C O1	1.7764	Adder	2.09
944572	AF1-122 E O1	2.4532	Adder	2.89
945401	AF1-205 C O1	3.4184	Adder	4.02
945402	AF1-205 E O1	2.2790	Adder	2.68
945411	AF1-206 C O1	15.6518	Adder	18.41
945412	AF1-206 E O1	10.4345	Adder	12.28
945623	AF1-227 BAT	9.1580	Merchant Transmission	9.1580
945641	AF1-229 C	17.1274	50/50	17.1274
945642	AF1-229 E	11.4182	50/50	11.4182
946203	AF1-285 BAT	2.9556	Merchant Transmission	2.9556
950311	G934 C	2.0763	PJM External (MISO)	2.0763
950312	G934 E	8.3052	PJM External (MISO)	8.3052
950351	J466	3.3606	PJM External (MISO)	3.3606
950791	J201 C	0.4014	PJM External (MISO)	0.4014
950792	J201 E	1.6056	PJM External (MISO)	1.6056
950871	J246 C	0.1060	PJM External (MISO)	0.1060
950872	J246 E	0.4238	PJM External (MISO)	0.4238
950942	J325 E	0.4626	PJM External (MISO)	0.4626
951531	J533 C	3.0272	PJM External (MISO)	3.0272
951532	J533 E	12.1088	PJM External (MISO)	12.1088
951571	J538 C	3.0615	PJM External (MISO)	3.0615
951572	J538 E	12.2460	PJM External (MISO)	12.2460
951941	J602 C	2.9787	PJM External (MISO)	2.9787
951942	J602 E	16.1153	PJM External (MISO)	16.1153
952201	J589 C	2.5107	PJM External (MISO)	2.5107
952202	J589 E	13.5833	PJM External (MISO)	13.5833
952312	J646 E	0.2014	PJM External (MISO)	0.2014
952401	J752 C	1.7094	PJM External (MISO)	1.7094
952402	J752 E	9.2486	PJM External (MISO)	9.2486

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
952611	J717 C	2.8035	PJM External (MISO)	2.8035
952612	J717 E	15.1675	PJM External (MISO)	15.1675
952761	J728 C	2.6072	PJM External (MISO)	2.6072
952762	J728 E	14.1244	PJM External (MISO)	14.1244
952881	J758	12.4160	PJM External (MISO)	12.4160
952971	J793	166.0035	PJM External (MISO)	166.0035
953071	J794 C	0.1653	PJM External (MISO)	0.1653
953072	J794 E	0.8941	PJM External (MISO)	0.8941
953271	J701 C	0.8320	PJM External (MISO)	0.8320
953272	J701 E	4.5016	PJM External (MISO)	4.5016
953291	J796	22.3489	PJM External (MISO)	22.3489
953321	J799	27.3218	PJM External (MISO)	27.3218
953361	J806	11.5237	PJM External (MISO)	11.5237
953771	J832	7.6630	PJM External (MISO)	7.6630
953781	J833	14.5530	PJM External (MISO)	14.5530
953811	J839	12.1900	PJM External (MISO)	12.1900
953941	J857	8.7178	PJM External (MISO)	8.7178
954111	J875	18.6060	PJM External (MISO)	18.6060
955071	J984 C	2.1594	PJM External (MISO)	2.1594
955072	J984 E	11.6826	PJM External (MISO)	11.6826
955121	J989	8.5008	PJM External (MISO)	8.5008
955181	J996	11.2720	PJM External (MISO)	11.2720
955261	J1005	18.7160	PJM External (MISO)	18.7160
955591	J1043 C	1.0693	PJM External (MISO)	1.0693
955592	J1043 E	18.9483	PJM External (MISO)	18.9483
955781	J1062	25.3650	PJM External (MISO)	25.3650
956011	J1088	14.0370	PJM External (MISO)	14.0370
956021	J1089	16.0820	PJM External (MISO)	16.0820
956031	J1090	8.9046	PJM External (MISO)	8.9046
956161	J1103	2.1770	PJM External (MISO)	2.1770
956741	J1172	5.1105	PJM External (MISO)	5.1105
956751	J1173	10.2680	PJM External (MISO)	10.2680
956801	J1178	5.8208	PJM External (MISO)	5.8208
957111	AF2-005	0.2221	Adder	0.49
958321	AF2-126 C	7.3840	50/50	7.3840
958322	AF2-126 E	3.6644	50/50	3.6644
958591	AF2-150 C O2	1.8092	Adder	4.02
958592	AF2-150 E O2	2.4985	Adder	5.55
960301	AF2-321 C	5.1526	Adder	11.44
960302	AF2-321 E	3.4350	Adder	7.62
960841	AF2-375 C O2	5.4410	Adder	12.08
960842	AF2-375 E O2	3.6273	Adder	8.05
960853	AF2-376 BAT	1.7381	Merchant Transmission	1.7381
960863	AF2-377 BAT	1.6782	Merchant Transmission	1.6782
960951	AF2-386 C O2	0.4013	Adder	0.89
960952	AF2-386 E O2	0.5542	Adder	1.23
NEWTON	NEWTON	1.5881	Confirmed LTF	1.5881
FARMERCITY	FARMERCITY	0.0669	Confirmed LTF	0.0669
G-007A	G-007A	0.4004	Confirmed LTF	0.4004
VFT	VFT	1.1094	Confirmed LTF	1.1094
CALDERWOOD	CALDERWOOD	0.6685	Confirmed LTF	0.6685
CBM-W1	CBM-W1	39.8193	Confirmed LTF	39.8193

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
PRAIRIE	PRAIRIE	3.5542	Confirmed LTF	3.5542
CHEOAH	CHEOAH	0.6687	Confirmed LTF	0.6687
EDWARDS	EDWARDS	0.3675	Confirmed LTF	0.3675
TILTON	TILTON	0.9047	Confirmed LTF	0.9047
MADISON	MADISON	3.5986	Confirmed LTF	3.5986
GIBSON	GIBSON	1.0030	Confirmed LTF	1.0030
BLUEG	BLUEG	3.5171	Confirmed LTF	3.5171
TRIMBLE	TRIMBLE	1.1347	Confirmed LTF	1.1347
CATAWBA	CATAWBA	0.3808	Confirmed LTF	0.3808

16.5.5 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 PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
95947779	242984	05CHATF L	AEP	932050	AC2-015 TAP	AEP	1	AEP_SUBT_P4_#1208_05HOWA RD 69.0_U	breaker	167.0	146.55	148.54	DC	7.37

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247548	V4-010 C	3.7060	50/50	3.7060
247551	U4-028 C (Suspended)	2.2005	50/50	2.2005
247552	U4-029 C (Suspended)	2.2005	50/50	2.2005
247940	U4-028 E (Suspended)	14.7265	50/50	14.7265
247941	U4-029 E (Suspended)	14.7265	50/50	14.7265
247947	V4-010 E	24.8020	50/50	24.8020
925751	AC1-051 C	2.3830	50/50	2.3830
925752	AC1-051 E	15.9476	50/50	15.9476
934252	AD1-052 E1	0.2602	Adder	0.31
934262	AD1-052 E2	0.2602	Adder	0.31
934461	AD1-070 C O1	1.8541	Adder	2.18
934462	AD1-070 E O1	8.7038	Adder	10.24
937021	AD2-136 C O1	7.9218	50/50	7.9218
937022	AD2-136 E O1	53.0154	50/50	53.0154
937381	AD2-191 C (Withdrawn : 06/03/2020)	3.7409	50/50	3.7409
937382	AD2-191 E (Withdrawn : 06/03/2020)	25.0350	50/50	25.0350
939161	AE1-146 C O1	3.6010	Adder	4.24
939162	AE1-146 E O1	1.6816	Adder	1.98
941741	AE2-174 C	4.9675	50/50	4.9675
941742	AE2-174 E	23.2554	50/50	23.2554
960841	AF2-375 C O2	1.9926	Adder	4.42
960842	AF2-375 E O2	1.3284	Adder	2.95
WEC	WEC	0.1263	Confirmed LTF	0.1263
LGEE	LGEE	0.0930	Confirmed LTF	0.0930
CBM-W2	CBM-W2	1.6871	Confirmed LTF	1.6871
NY	NY	0.1073	Confirmed LTF	0.1073
CBM-W1	CBM-W1	8.8070	Confirmed LTF	8.8070
TVA	TVA	0.1540	Confirmed LTF	0.1540
O-066	O-066	1.3306	Confirmed LTF	1.3306
CBM-S1	CBM-S1	1.0224	Confirmed LTF	1.0224
G-007	G-007	0.2059	Confirmed LTF	0.2059
MADISON	MADISON	0.3851	Confirmed LTF	0.3851
MEC	MEC	0.5180	Confirmed LTF	0.5180
CATAWBA	CATAWBA	0.0101	Confirmed LTF	0.0101

16.5.6 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 %	AC/D C	MW IMPACT
95947794	243008	05FREMC T	AEP	243009	05FRMNT	AEP	1	AEP_P4_#10133_05HOWARD 138_H	breaker	251.0	139.73	141.78	DC	11.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
244357	05GRANGER EL	0.1985	Adder	0.23
247548	V4-010 C	10.1278	50/50	10.1278
247551	U4-028 C (Suspended)	4.0352	50/50	4.0352
247552	U4-029 C (Suspended)	4.0352	50/50	4.0352
247926	U1-059 E	1.8732	Adder	2.2
247940	U4-028 E (Suspended)	27.0048	50/50	27.0048
247941	U4-029 E (Suspended)	27.0048	50/50	27.0048
247942	W1-056 E	0.6890	Adder	0.81
247947	V4-010 E	67.7782	50/50	67.7782
925751	AC1-051 C	2.0239	50/50	2.0239
925752	AC1-051 E	13.5443	50/50	13.5443
932051	AC2-015 C	16.1528	50/50	16.1528
932052	AC2-015 E	19.1391	50/50	19.1391
934252	AD1-052 E1	-0.6535	Adder	-0.77
934262	AD1-052 E2	-0.6535	Adder	-0.77
934461	AD1-070 C O1	2.8770	Adder	3.38
934462	AD1-070 E O1	13.5060	Adder	15.89
937021	AD2-136 C O1	14.5267	50/50	14.5267
937022	AD2-136 E O1	97.2173	50/50	97.2173
937381	AD2-191 C (Withdrawn : 06/03/2020)	6.8598	50/50	6.8598
937382	AD2-191 E (Withdrawn : 06/03/2020)	45.9082	50/50	45.9082
939161	AE1-146 C O1	5.6006	Adder	6.59
939162	AE1-146 E O1	2.6155	Adder	3.08
941741	AE2-174 C	13.5751	50/50	13.5751
941742	AE2-174 E	63.5518	50/50	63.5518
960841	AF2-375 C O2	3.0943	Adder	6.87
960842	AF2-375 E O2	2.0629	Adder	4.58
WEC	WEC	0.1118	Confirmed LTF	0.1118
LGEE	LGEE	0.2316	Confirmed LTF	0.2316
CPL	CPL	0.1217	Confirmed LTF	0.1217
CBM-W2	CBM-W2	2.8092	Confirmed LTF	2.8092
NY	NY	0.0824	Confirmed LTF	0.0824
CBM-W1	CBM-W1	1.5763	Confirmed LTF	1.5763
TVA	TVA	0.4382	Confirmed LTF	0.4382
O-066	O-066	0.6787	Confirmed LTF	0.6787
CBM-S2	CBM-S2	1.2600	Confirmed LTF	1.2600
CBM-S1	CBM-S1	2.8116	Confirmed LTF	2.8116
G-007	G-007	0.1040	Confirmed LTF	0.1040
MEC	MEC	0.5561	Confirmed LTF	0.5561

16.5.7 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 %	ACJD C	MW IMPACT
95515236	243009	05FRMNT	AEP	239154	02W.FRE M	ATSI	1	AEP_P4_#10134_05HOWA RD 138_B	breaker	361.0	103.91	107.76	DC	13.91

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
244357	05GRANGER EL	0.2413	Adder	0.28
247548	V4-010 C	12.0247	50/50	12.0247
247551	U4-028 C (Suspended)	4.8123	50/50	4.8123
247552	U4-029 C (Suspended)	4.8123	50/50	4.8123
247926	U1-059 E	2.3087	Adder	2.72
247940	U4-028 E (Suspended)	32.2057	50/50	32.2057
247941	U4-029 E (Suspended)	32.2057	50/50	32.2057
247942	W1-056 E	0.8492	Adder	1.0
247947	V4-010 E	80.4733	50/50	80.4733
925751	AC1-051 C	2.4338	50/50	2.4338
925752	AC1-051 E	16.2880	50/50	16.2880
932051	AC2-015 C	19.3080	50/50	19.3080
932052	AC2-015 E	22.8775	50/50	22.8775
934252	AD1-052 E1	-0.8029	Adder	-0.94
934262	AD1-052 E2	-0.8029	Adder	-0.94
934461	AD1-070 C O1	4.1126	50/50	4.1126
934462	AD1-070 E O1	19.3066	50/50	19.3066
937021	AD2-136 C O1	17.3244	50/50	17.3244
937022	AD2-136 E O1	115.9404	50/50	115.9404
937381	AD2-191 C (Withdrawn : 06/03/2020)	8.1810	50/50	8.1810
937382	AD2-191 E (Withdrawn : 06/03/2020)	54.7496	50/50	54.7496
939161	AE1-146 C O1	6.8063	Adder	8.01
939162	AE1-146 E O1	3.1785	Adder	3.74
941741	AE2-174 C	16.1178	50/50	16.1178
941742	AE2-174 E	75.4552	50/50	75.4552
960841	AF2-375 C O2	8.3468	50/50	8.3468
960842	AF2-375 E O2	5.5645	50/50	5.5645
WEC	WEC	0.1367	Confirmed LTF	0.1367
LGEE	LGEE	0.2835	Confirmed LTF	0.2835
CPL	CPL	0.1488	Confirmed LTF	0.1488
CBM-W2	CBM-W2	3.4398	Confirmed LTF	3.4398
NY	NY	0.1006	Confirmed LTF	0.1006
CBM-W1	CBM-W1	1.9140	Confirmed LTF	1.9140
TVA	TVA	0.5362	Confirmed LTF	0.5362
O-066	O-066	0.8400	Confirmed LTF	0.8400
CBM-S2	CBM-S2	1.5433	Confirmed LTF	1.5433
CBM-S1	CBM-S1	3.4421	Confirmed LTF	3.4421
G-007	G-007	0.1279	Confirmed LTF	0.1279
MEC	MEC	0.6801	Confirmed LTF	0.6801

16.5.8 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
95947769	243039	05MELMOR	AEP	243024	05HOWARD	AEP	1	AEP_P4_#7112_05MELMOR 138_C	breaker	167.0	164.75	166.53	DC	6.59

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247548	V4-010 C	3.9970	50/50	3.9970
247551	U4-028 C (Suspended)	2.5848	50/50	2.5848
247552	U4-029 C (Suspended)	2.5848	50/50	2.5848
247940	U4-028 E (Suspended)	17.2982	50/50	17.2982
247941	U4-029 E (Suspended)	17.2982	50/50	17.2982
247947	V4-010 E	26.7490	50/50	26.7490
934252	AD1-052 E1	0.2726	Adder	0.32
934262	AD1-052 E2	0.2726	Adder	0.32
934461	AD1-070 C O1	1.6604	Adder	1.95
934462	AD1-070 E O1	7.7944	Adder	9.17
937021	AD2-136 C O1	9.3052	50/50	9.3052
937022	AD2-136 E O1	62.2736	50/50	62.2736
937381	AD2-191 C (Withdrawn : 06/03/2020)	4.3941	50/50	4.3941
937382	AD2-191 E (Withdrawn : 06/03/2020)	29.4070	50/50	29.4070
941741	AE2-174 C	5.3575	50/50	5.3575
941742	AE2-174 E	25.0810	50/50	25.0810
960841	AF2-375 C O2	1.7803	Adder	3.95
960842	AF2-375 E O2	1.1868	Adder	2.63
WEC	WEC	0.0973	Confirmed LTF	0.0973
LGEE	LGEE	0.0411	Confirmed LTF	0.0411
CALDERWOOD	CALDERWOOD	0.0075	Confirmed LTF	0.0075
CBM-W2	CBM-W2	1.0319	Confirmed LTF	1.0319
NY	NY	0.0758	Confirmed LTF	0.0758
CBM-W1	CBM-W1	7.7937	Confirmed LTF	7.7937
TVA	TVA	0.0560	Confirmed LTF	0.0560
O-066	O-066	1.0147	Confirmed LTF	1.0147
CHEOAH	CHEOAH	0.0085	Confirmed LTF	0.0085
CBM-S1	CBM-S1	0.3919	Confirmed LTF	0.3919
G-007	G-007	0.1570	Confirmed LTF	0.1570
MADISON	MADISON	0.4254	Confirmed LTF	0.4254
MEC	MEC	0.3798	Confirmed LTF	0.3798
CATAWBA	CATAWBA	0.0248	Confirmed LTF	0.0248

16.5.9 Index 9

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
95947751	932050	AC2-015 TAP	AEP	243024	05HOWARD	AEP	1	AEP_SUBT_P4_#1208_05HOWARD 69.0_U	breaker	167.0	177.94	179.93	DC	7.37

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247548	V4-010 C	3.7060	50/50	3.7060
247551	U4-028 C (Suspended)	2.2005	50/50	2.2005
247552	U4-029 C (Suspended)	2.2005	50/50	2.2005
247940	U4-028 E (Suspended)	14.7265	50/50	14.7265
247941	U4-029 E (Suspended)	14.7265	50/50	14.7265
247947	V4-010 E	24.8020	50/50	24.8020
925751	AC1-051 C	2.3830	50/50	2.3830
925752	AC1-051 E	15.9476	50/50	15.9476
932051	AC2-015 C	23.9931	50/50	23.9931
932052	AC2-015 E	28.4288	50/50	28.4288
934252	AD1-052 E1	0.2602	Adder	0.31
934262	AD1-052 E2	0.2602	Adder	0.31
934461	AD1-070 C O1	1.8541	Adder	2.18
934462	AD1-070 E O1	8.7038	Adder	10.24
937021	AD2-136 C O1	7.9218	50/50	7.9218
937022	AD2-136 E O1	53.0154	50/50	53.0154
937381	AD2-191 C (Withdrawn : 06/03/2020)	3.7409	50/50	3.7409
937382	AD2-191 E (Withdrawn : 06/03/2020)	25.0350	50/50	25.0350
939161	AE1-146 C O1	3.6010	Adder	4.24
939162	AE1-146 E O1	1.6816	Adder	1.98
941741	AE2-174 C	4.9675	50/50	4.9675
941742	AE2-174 E	23.2554	50/50	23.2554
960841	AF2-375 C O2	1.9926	Adder	4.42
960842	AF2-375 E O2	1.3284	Adder	2.95
WEC	WEC	0.1263	Confirmed LTF	0.1263
LGEE	LGEE	0.0930	Confirmed LTF	0.0930
CBM-W2	CBM-W2	1.6871	Confirmed LTF	1.6871
NY	NY	0.1073	Confirmed LTF	0.1073
CBM-W1	CBM-W1	8.8070	Confirmed LTF	8.8070
TVA	TVA	0.1540	Confirmed LTF	0.1540
O-066	O-066	1.3306	Confirmed LTF	1.3306
CBM-S1	CBM-S1	1.0224	Confirmed LTF	1.0224
G-007	G-007	0.2059	Confirmed LTF	0.2059
MADISON	MADISON	0.3851	Confirmed LTF	0.3851
MEC	MEC	0.5180	Confirmed LTF	0.5180
CATAWBA	CATAWBA	0.0101	Confirmed LTF	0.0101

16.6 Contingency Descriptions - Secondary POI

Contingency Name	Contingency Definition
AEP_P1-2_#7105	CONTINGENCY 'AEP_P1-2_#7105' OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 END
AEP_SUBT_P4_#2200_05FREMNT C 69.0_E	CONTINGENCY 'AEP_SUBT_P4_#2200_05FREMNT C 69.0_E' OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 OPEN BRANCH FROM BUS 245645 TO BUS 245614 CKT 1 / 245645 05CLYDE 69.0 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 245611 TO BUS 245614 CKT 2 / 245611 05E FREMON 69.0 245614 05FREMNT C 69.0 2 OPEN BRANCH FROM BUS 245614 TO BUS 245623 CKT 1 / 245614 05FREMNT C 69.0 245623 05HOLRAN 69.0 1 END
AEP_P1-2_#7761-A	CONTINGENCY 'AEP_P1-2_#7761-A' OPEN BRANCH FROM BUS 247172 TO BUS 939160 CKT 2 / 247172 05EBERSO 138 939160 AE1-146 TAP 138 2 END
ATSI-P7-1-TE-345-029A	CONTINGENCY 'ATSI-P7-1-TE-345-029A' /* X1-027A - BEAVER & BEAVER - HAYES 345 DISCONNECT BRANCH FROM BUS 907060 TO BUS 238569 CKT 1 /* X1-027A_AT12 345 02BEAVER 345 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1 /* 02HAYES 345 02BEAVER 345 END

Contingency Name	Contingency Definition
AEP_P7-1_#10927	CONTINGENCY 'AEP_P7-1_#10927'
	OPEN BRANCH FROM BUS 242950 TO BUS 242955 CKT 1 / 242950 05ACADEM 138
	242955 05APPLY 138 1
	OPEN BRANCH FROM BUS 242950 TO BUS 246941 CKT 1 / 242950 05ACADEM 138
	246941 05MILL2Z 138 1
	OPEN BRANCH FROM BUS 242955 TO BUS 243061 CKT 1 / 242955 05APPLY 138
	243061 05NLEXTN 138 1
	OPEN BRANCH FROM BUS 247302 TO BUS 242962 CKT Z1 / 247302 05BLDBG8 138
	242962 05BLDBGZ 138 Z1
	OPEN BRANCH FROM BUS 242962 TO BUS 247278 CKT 1 / 242962 05BLDBGZ 138
	247278 05MILL1Z 138 1
	OPEN BRANCH FROM BUS 242962 TO BUS 243070 CKT 1 / 242962 05BLDBGZ 138
	243070 05OHIOCT 138 1
	OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138
	243050 05NBELVL 138 1
	OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138
	243061 05NLEXTN 138 1
	OPEN BRANCH FROM BUS 247278 TO BUS 243044 CKT Z1 / 247278 05MILL1Z 138
	243044 05MILLWO 138 Z1
	OPEN BRANCH FROM BUS 247278 TO BUS 243050 CKT 1 / 247278 05MILL1Z 138
	243050 05NBELVL 138 1
	OPEN BRANCH FROM BUS 246941 TO BUS 243044 CKT Z1 / 246941 05MILL2Z 138
	243044 05MILLWO 138 Z1
	OPEN BRANCH FROM BUS 246941 TO BUS 243160 CKT 1 / 246941 05MILL2Z 138
	243160 05WTRNWX 138 1
	OPEN BRANCH FROM BUS 243070 TO BUS 243160 CKT 1 / 243070 05OHIOCT 138
	243160 05WTRNWX 138 1
	OPEN BRANCH FROM BUS 243070 TO BUS 243160 CKT 1 / 243070 05OHIOCT 138
	243160 05WTRNWX 138 1
	OPEN BRANCH FROM BUS 243050 TO BUS 245567 CKT 1 / 243050 05NBELVL 138
	245567 05NBELLVL 69.0 1
	OPEN BRANCH FROM BUS 243160 TO BUS 245425 CKT 1 / 243160 05WTRNWX 138
	245425 05W TRINWX 12.0 1
	END

Contingency Name	Contingency Definition
AEP_SUBT_P4_#1208_05HOWARD 69.0_U	CONTINGENCY 'AEP_SUBT_P4_#1208_05HOWARD 69.0_U' OPEN BRANCH FROM BUS 245666 TO BUS 243024 CKT 1 / 245666 05HOWRD1EQ 999 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 245666 TO BUS 245663 CKT 1 / 245666 05HOWRD1EQ 999 245663 05HOWARD 69.0 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243101 CKT 1 / 243024 05HOWARD 138 243101 05SHELNS 138 1 OPEN BRANCH FROM BUS 245659 TO BUS 245663 CKT 1 / 245659 05E BUCYRU 69.0 245663 05HOWARD 69.0 1 OPEN BRANCH FROM BUS 245663 TO BUS 245678 CKT 1 / 245663 05HOWARD 69.0 245678 05NGALIOSS 69.0 1 OPEN BRANCH FROM BUS 245663 TO BUS 245679 CKT 1 / 245663 05HOWARD 69.0 245679 05WILLARD 69.0 1 OPEN BRANCH FROM BUS 245663 TO BUS 245657 CKT 1 / 245663 05HOWARD 69.0 245657 05WSHELBY 69.0 1 REMOVE SWSHUNT FROM BUS 245663 / 245663 05HOWARD 69.0 END
AEP_P1-3_#5063_05SBERWI 345_1-B	CONTINGENCY 'AEP_P1-3_#5063_05SBERWI 345_1-B' OPEN BRANCH FROM BUS 242917 TO BUS 242942 CKT 1 / 242917 05SBERW EQ 999 242942 05SBERWI 345 1 OPEN BRANCH FROM BUS 242917 TO BUS 243180 CKT 1 / 242917 05SBERW EQ 999 243180 05SBERWICK 69.0 1 OPEN BRANCH FROM BUS 242917 TO BUS 243199 CKT 1 / 242917 05SBERW EQ 999 243199 05SBERW1-L 12.0 1 OPEN BRANCH FROM BUS 945640 TO BUS 242942 CKT 1 / 945640 AF1-229 TAP 345 242942 05SBERWI 345 1 OPEN BRANCH FROM BUS 242936 TO BUS 242942 CKT 1 / 242936 05FOSTOR 345 242942 05SBERWI 345 1 END

Contingency Name	Contingency Definition
AEP_P4_#10133_05HOWARD 138_H	CONTINGENCY 'AEP_P4_#10133_05HOWARD 138_H' OPEN BRANCH FROM BUS 241111 TO BUS 243024 CKT 1 / 241111 02ASHLAND 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015 TAP 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243101 CKT 1 / 243024 05HOWARD 138 243101 05SHELNS 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243117 CKT 1 / 243024 05HOWARD 138 243117 05SULFRS 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243100 CKT 1 / 243024 05HOWARD 138 243100 05SHELGH 138 1 OPEN BRANCH FROM BUS 243050 TO BUS 245567 CKT 1 / 243050 05NBELVL 138 245567 05NBELLVIL 69.0 1 REMOVE SWSHUNT FROM BUS 243024 / 243024 05HOWARD 138 END
AEP_P4_#10729_05CHATFL 138_E	CONTINGENCY 'AEP_P4_#10729_05CHATFL 138_E' OPEN BRANCH FROM BUS 242984 TO BUS 932050 CKT 1 / 242984 05CHATFL 138 932050 AC2-015 TAP 138 1 OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 1 / 242984 05CHATFL 138 245656 05CHATFIEL 69.0 1 OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 2 / 242984 05CHATFL 138 245656 05CHATFIEL 69.0 2 END
AEP_P4_#7112_05MELMOR 138_C	CONTINGENCY 'AEP_P4_#7112_05MELMOR 138_C' OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8 138 243110 05STIFFI 138 1 OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8 138 243137 05W.END
AEP_P4_#9521_05CHATFL 138_F	CONTINGENCY 'AEP_P4_#9521_05CHATFL 138_F' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 2 / 242984 05CHATFL 138 245656 05CHATFIEL 69.0 2 END

Contingency Name	Contingency Definition
AEP_P2-2_#7118_05HOWARD 138_1-B	CONTINGENCY 'AEP_P2-2_#7118_05HOWARD 138_1-B' OPEN BRANCH FROM BUS 241111 TO BUS 243024 CKT 1 / 241111 02ASHLAND 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015 TAP 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243100 CKT 1 / 243024 05HOWARD 138 243100 05SHELGH 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243101 CKT 1 / 243024 05HOWARD 138 243101 05SHELNS 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243117 CKT 1 / 243024 05HOWARD 138 243117 05SULFRS 138 1 REMOVE SWSHUNT FROM BUS 243024 / 243024 05HOWARD 138 END
AEP_P7-1_#10926	CONTINGENCY 'AEP_P7-1_#10926' OPEN BRANCH FROM BUS 242950 TO BUS 242955 CKT 1 / 242950 05ACADEM 138 242955 05APPLY 138 1 OPEN BRANCH FROM BUS 242950 TO BUS 246941 CKT 1 / 242950 05ACADEM 138 246941 05MILL2Z 138 1 OPEN BRANCH FROM BUS 242955 TO BUS 243061 CKT 1 / 242955 05APPLY 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 247302 TO BUS 242962 CKT Z1 / 247302 05BLDBG8 138 242962 05BLDBGZ 138 Z1 OPEN BRANCH FROM BUS 242962 TO BUS 247278 CKT 1 / 242962 05BLDBGZ 138 247278 05MILL1Z 138 1 OPEN BRANCH FROM BUS 242962 TO BUS 243070 CKT 1 / 242962 05BLDBGZ 138 243070 05OHIOCT 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 247278 TO BUS 243044 CKT Z1 / 247278 05MILL1Z 138 243044 05MILLWO 138 Z1 OPEN BRANCH FROM BUS 247278 TO BUS 243050 CKT 1 / 247278 05MILL1Z 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 246941 TO BUS 243044 CKT Z1 / 246941 05MILL2Z 138 243044 05MILLWO 138 Z1 OPEN BRANCH FROM BUS 246941 TO BUS 243160 CKT 1 / 246941 05MILL2Z 138 243160 05WTRNWX 138 1 OPEN BRANCH FROM BUS 243070 TO BUS 243160 CKT 1 / 243070 05OHIOCT 138 243160 05WTRNWX 138 1 OPEN BRANCH FROM BUS 243070 TO BUS 243160 CKT 1 / 243070 05OHIOCT 138 243160 05WTRNWX 138 1 OPEN BRANCH FROM BUS 243160 TO BUS 245425 CKT 1 / 243160 05WTRNWX 138 245425 05W TRINWX 12.0 1 END

Contingency Name	Contingency Definition
AEP_P4_#7728_05FREMCT 138_C	CONTINGENCY 'AEP_P4_#7728_05FREMCT 138_C' OPEN BRANCH FROM BUS 245616 TO BUS 243009 CKT 1 / 245616 05FREMNTEQ 999 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 245616 TO BUS 245617 CKT 1 / 245616 05FREMNTEQ 999 245617 05FREMONT 69.0 1 OPEN BRANCH FROM BUS 245616 TO BUS 245618 CKT 1 / 245616 05FREMNTEQ 999 245618 05FREMONT- 12.0 1 OPEN BRANCH FROM BUS 239154 TO BUS 243009 CKT 1 / 239154 02W.FREM 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 / 243008 05FREMCT 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 REMOVE SWSHUNT FROM BUS 243008 / 243008 05FREMCT 138 END
AEP_SUBT_P2-2_#1175_05FREMNT C 69.0_1	CONTINGENCY 'AEP_SUBT_P2-2_#1175_05FREMNT C 69.0_1' OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 OPEN BRANCH FROM BUS 245645 TO BUS 245614 CKT 1 / 245645 05CLYDE 69.0 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 245611 TO BUS 245614 CKT 2 / 245611 05E FREMON 69.0 245614 05FREMNT C 69.0 2 OPEN BRANCH FROM BUS 245614 TO BUS 245623 CKT 1 / 245614 05FREMNT C 69.0 245623 05HOLRAN 69.0 1 END
Base Case	
AEP_P1-2_#11144-B	CONTINGENCY 'AEP_P1-2_#11144-B' OPEN BRANCH FROM BUS 945620 TO BUS 242939 CKT 1 / 945620 AF1-227 TAP 345 242939 05MARYSV 345 1 END
AEP_P1-2_#7757-A	CONTINGENCY 'AEP_P1-2_#7757-A' OPEN BRANCH FROM BUS 247172 TO BUS 960840 CKT 1 / 247172 05EBERSO 138 960840 AF2-375 TAP 138 1 END

Contingency Name	Contingency Definition
AEP_P4_#10134_05HOWARD 138_B	CONTINGENCY 'AEP_P4_#10134_05HOWARD 138_B' OPEN BRANCH FROM BUS 241111 TO BUS 243024 CKT 1 / 241111 02ASHLAND 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015 TAP 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243100 CKT 1 / 243024 05HOWARD 138 243100 05SHELGH 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243061 CKT 1 / 243024 05HOWARD 138 243061 05NLEXTN 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243101 CKT 1 / 243024 05HOWARD 138 243101 05SHELNS 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243117 CKT 1 / 243024 05HOWARD 138 243117 05SULFRS 138 REMOVE SWSHUNT FROM BUS 243024 / 243024 05HOWARD 138 END
AEP_SUBT_P4_#1176_05FREMNT C 69.0_L	CONTINGENCY 'AEP_SUBT_P4_#1176_05FREMNT C 69.0_L' OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 3 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 3 OPEN BRANCH FROM BUS 245641 TO BUS 245614 CKT 1 / 245641 05BIRCHARDSS69.0 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 245645 TO BUS 245614 CKT 1 / 245645 05CLYDE 69.0 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 245611 TO BUS 245614 CKT 2 / 245611 05E FREMON 69.0 245614 05FREMNT C 69.0 2 OPEN BRANCH FROM BUS 245614 TO BUS 245623 CKT 1 / 245614 05FREMNT C 69.0 245623 05HOLRAN 69.0 1 OPEN BRANCH FROM BUS 245623 TO BUS 245625 CKT 1 / 245623 05HOLRAN 69.0 245625 05MAPLE GR 69.0 1 OPEN BRANCH FROM BUS 245625 TO BUS 245628 CKT 1 / 245625 05MAPLE GR 69.0 245628 05RIVERVIE 69.0 1 REMOVE SWSHUNT FROM BUS 245614 / 245614 05FREMNT C 69.0 END
AEP_P2-2_#9521_05CHATFL 138_2	CONTINGENCY 'AEP_P2-2_#9521_05CHATFL 138_2' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 2 / 242984 05CHATFL 138 245656 05CHATFIEL 69.0 2 END
AEP_P1-2_#7709	CONTINGENCY 'AEP_P1-2_#7709' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 END

Contingency Name	Contingency Definition
ATSI-P2-3-OEC-345-026	CONTINGENCY 'ATSI-P2-3-OEC-345-026' /* BEAVER 345KV BRK B-182 DISCONNECT BRANCH FROM BUS 238569 TO BUS 907060 CKT 1 /* 02BEAVER 345 X1-027A TAP 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239171 CKT 1 /* 02BEAVER 345 02WLOG-2 14 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239172 CKT 1 /* 02BEAVER 345 02WLOG-3 14 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239173 CKT 1 /* 02BEAVER 345 02WLOG-4 14 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239174 CKT 1 /* 02BEAVER 345 02WLOG-5 14 REMOVE MACHINE 2 FROM BUS 239171 /* 02WLOG-2 14 REMOVE MACHINE 3 FROM BUS 239172 /* 02WLOG-3 14 REMOVE MACHINE 4 FROM BUS 239173 /* 02WLOG-4 14 REMOVE MACHINE 5 FROM BUS 239174 /* 02WLOG-5 14 DISCONNECT BUS 239171 /* 02WLOG-2 14 DISCONNECT BUS 239172 /* 02WLOG-3 14 DISCONNECT BUS 239173 /* 02WLOG-4 14 DISCONNECT BUS 239174 /* 02WLOG-5 14 END
ATSI-P2-3-OEC-345-023	CONTINGENCY 'ATSI-P2-3-OEC-345-023' /* BEAVER 345KV BRK B-121 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER 345 02CARLIL 345 END

17 Light Load Analysis

Light Load Studies (As applicable)

Not Applicable.

18 Short Circuit Analysis

The following Breakers are overdutied:

To be determined during later study phases.

19 Stability and Reactive Power Assessment

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

To be determined during later study phases.

20 Affected Systems

20.1 TVA

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

20.2 Duke Energy Progress

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

20.3 MISO

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

20.4 LG&E

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