Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-319

NAPOLEON MUNI 138 KV

99.6 MW Capacity / 166 MW Energy

January 2021

Table of Contents

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 AMPT.

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.

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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

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 an uprate to a planned/existing Solar generating facility located in Henry, Ohio. This project is an increase to the Interconnection Customer's AF1-205 project, which will share the same point of interconnection. The AG1-319 queue position is a 166 MW uprate (99.6 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 206 MW with 123.6 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this uprate project is November 01, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-319
Project Name	NAPOLEON MUNI 138 KV
State	Ohio
County	Henry
Transmission Owner	AMPT
MFO	206
MWE	166
MWC	99.6
Fuel	Solar
Basecase Study Year	2024

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

AG1-319 will interconnect with the AMPT transmission system at the Napoleon Muni 138 kV substation. AG1-319 is an uprate to AF1-205 and will share the same POI as AF1-205. If AF1-205 moves forward in the interconnection process it is understood AG1-319 will not incur any physical interconnection costs.

AMPT will comment on these results in the System Impact Study phase.

5 Cost Summary

The AG1-319 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$0
Total System Network Upgrade Costs (AMPT Identified)	$0[1]
Total System Network Upgrade Costs (ATSI Identified)	$157,000[2]
Total System Network Upgrade Costs (PJM Identified)	$447,582,886[3]
Total Costs	**$447,739,886**

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 2016-36, 2016-25 I.R.B. (6/20/2016). 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.

[1] AMPT to identify any impacts in later study phases.

[2] This project currently causes and contributes to overloads of the TO system (see Transmission Owner Analysis section below) and therefore has potential to have cost allocation for the system reinforcements listed in the report. This will be re-evaluated in the System Impact phase. The results may vary with queue customers withdrawing from the queue and other generators deactivating over time. If a customer is the first to cause the need for a project (causes loading to exceed 100% of rating), then the customer is responsible. If a customer contributes to a facility that is already overloaded by a prior queue, then they may receive cost allocation.

[3] This project currently causes and/or contributes to overloads of the Transmission System (see Summer Peak Load Flow Analysis section below) and therefore has potential to have cost allocation for the system reinforcements listed in the report. This will be re-evaluated in the System Impact phase. The results may vary with queue customers withdrawing from the queue and other generators deactivating over time. If a customer is the first to cause the need for a project (causes loading to exceed 100% of rating), then the customer is responsible. If a customer contributes to a facility that is already overloaded by a prior queue, then they may receive cost allocation.

6 Transmission Owner Scope of Work

The interconnection of the project at the Primary POI will be accomplished by expanding the Napoleon Muni 138kV station yard, extending the Napoleon Muni 138kV bus, installing two-138kV circuit breakers, associated disconnect switches and dead-end structure. The IC will be responsible for acquiring all easements, properties and permits that may be required to construct the associated attachment facilities. This scope will be accomplished by queue project AF1-205.

There are no additional physical interconnection costs associated with AG1-319. AMPT will comment on these results in the System Impact Study phase.

If the AF1-205 project withdraws from the interconnection queue, then the AG1-319 project will assume the scope of the physical interconnection identified in the AF1-205 System Impact Study report.

7 Schedule

Schedule to be determined based on the scope of interconnection facilities required by AF1-205. The schedule duration for AF1-205 is 14 months after signing of an Interconnection Construction Service Agreement and construction kickoff call to complete the installation.

If the customer is ultimately responsible for network upgrades, then the schedule for those upgrades will be refined in future study phases. The customer would need to wait for those upgrades to be completed prior to commercial operation unless determined deliverable by an interim deliverability study. The elapsed time to complete any network upgrades is provided in the System Reinforcements table of this report[1].

8 Transmission Owner Analysis[4]

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

8.1 Transmission Owner Identified Network Impacts to Distribution Facilities (ATSI)

Potential TO identified network impacts to Transmission Owner distribution facilities were as follows:

None.

8.2 Transmission Owner Identified Network Impacts to Sub-Regional Facilities (ATSI)

Potential TO identified network impacts to Transmission Owner Sub-Regional facilities were as follows:

Idx	Overloaded Element	Contingency	Rating [MVA]	Loading Before %	Loading After %	Contribution [MW]
74	239126 02STRY 69.0 240841 02ARCHBD 69.0 1	ATSI-P1-3-TE-138-012A[OP]	103	87.25%	113.30%	23.43
73	239126 02STRY 69.0 240841 02ARCHBD 69.0 1	ATSI-P1-2-TE-138-041[OP]	103	88.21%	110.97%	23.44

8.3 System Reinforcements on Distribution Facilities (ATSI)

None.

8.4 System Reinforcements on Sub-Regional Facilities (ATSI)

Idx	Facility	Upgrade ID	Upgrade Description	Cost
73,74	239126 02STRY 69.0 240841 02ARCHBD 69.0 1	TE-AG1-F-0004a	**ATSI** **TE-AG1-F-0004a:** Replace disconnect switch. Time Estimate: 12 Cost: $157,000 Ratings: 108.0/132.0/132.0 MVA	$157,000
			TOTAL COST	**$157,000**

[4] For TO Distribution Facilities that need upgrades, the TO has applied their cost allocation rules. For TO Sub-Regional Facilities in need of upgrades, PJM Cost Allocation Criteria has been applied.

9 Interconnection Customer Requirements

The IC will be required to comply with all AMPT interconnection requirements for generation interconnection customers which can be found in AMPT's "Transmission Facilities Interconnection Requirements" document located at: https://www.pjm.com/-/media/planning/plan-standards/private-ampt/ampt-interconnection-requirements.ashx

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

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

10.2 Meteorological Data Reporting Requirements

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

- Back Panel temperature (Fahrenheit) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter2) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Ambient air temperature (Fahrenheit) - (Accepted, not required)
- Wind speed (meters/second) - (Accepted, not required)
- Wind direction (decimal degrees from true north) - (Accepted, not required)

10.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all AMPT revenue metering requirements for generation interconnection customer which can be found in AMPT's "Transmission Facilities Interconnection Requirements" document located at: https://www.pjm.com/-/media/planning/plan-standards/private-ampt/ampt-interconnection-requirements.ashx

11 Summer Peak - Load Flow Analysis

The Queue Project AG1-319 was evaluated as a 166.0 MW (Capacity 99.6 MW) injection at the Northside Napoleon Muni 138 kV substation in the ATSI area. Project AG1-319 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-319 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)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
167933419	238979	02NAPMUN	138.0	ATSI	238962	02MIDWAY	138.0	ATSI	1	Base Case	single	161.0	82.32	126.6	DC	71.3
167933420	238979	02NAPMUN	138.0	ATSI	238962	02MIDWAY	138.0	ATSI	1	AEP_P1-2_#7097_4883-B	single	194.0	80.13	117.3	DC	72.11
164516117	241901	02LALLENDORF	345.0	ATSI	242936	05FOSTOR	345.0	AEP	1	AEP_P1-2_#770	single	1409.0	99.98	101.03	DC	14.79

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
165601070	238517	02LYONS	138.0	ATSI	239345	02SIL_AE+	138.0	ATSI	1	ATSI-P7-1-TE-138-016	tower	287.0	99.89	120.29	DC	58.56
167383872	238517	02LYONS	138.0	ATSI	239345	02SIL_AE+	138.0	ATSI	1	ATSI-P2-4-TE-138-015	breaker	287.0	99.1	119.63	DC	58.93
167141457	239127	02STRYKE	138.0	ATSI	960300	AF2-321 TAP	138.0	ATSI	1	ATSI-P2-4-TE-138-015	breaker	181.0	52.89	100.03	DC	85.33
165601116	239345	02SIL_AE+	138.0	ATSI	238531	02ALLNJ	138.0	ATSI	1	ATSI-P7-1-TE-138-016	tower	339.0	84.56	101.84	DC	58.56
167384030	239345	02SIL_AE+	138.0	ATSI	238531	02ALLNJ	138.0	ATSI	1	ATSI-P2-4-TE-138-015	breaker	339.0	83.9	101.28	DC	58.93

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
164515771	238569	02BEAVER	345.0	ATSI	239725	02LAKEAVE	345.0	ATSI	2	ATSI-P2-3-OEC-345-002	breaker	1878.0	103.61	104.35	DC	31.04
165601052	238712	02FAYET	138.0	ATSI	238517	02LYONS	138.0	ATSI	1	ATSI-P7-1-TE-138-016	tower	266.0	110.48	132.5	DC	58.56
167383811	238712	02FAYET	138.0	ATSI	238517	02LYONS	138.0	ATSI	1	ATSI-P2-4-TE-138-015	breaker	266.0	109.63	131.79	DC	58.93

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
165601083	238874	02LAKVEW	138.0	ATSI	238768	02GRNFLD	138.0	ATSI	1	ATSI-P7-1-OEC-345-004_NON	tower	385.0	115.33	116.61	DC	10.86
164515706	238889	02LEMOYN	345.0	ATSI	242936	05FOSTOR	345.0	AEP	1	ATSI-P2-3-TE-345-034T	breaker	1390.0	127.15	129.9	DC	38.04
164516032	238889	02LEMOYN	345.0	ATSI	242936	05FOSTOR	345.0	AEP	1	AEP_P1-2_#768	single	1390.0	110.65	112.27	DC	22.7
165600741	238979	02NAPMUN	138.0	ATSI	238962	02MIDWAY	138.0	ATSI	1	ATSI-P2-2-TE-138-023	bus	194.0	156.32	221.3	DC	126.07
165600742	238979	02NAPMUN	138.0	ATSI	238962	02MIDWAY	138.0	ATSI	1	ATSI-P2-2-TE-138-012	bus	194.0	125.05	186.99	DC	120.16
165600991	238979	02NAPMUN	138.0	ATSI	238962	02MIDWAY	138.0	ATSI	1	AEP_P7-1_#10983-B	tower	194.0	139.63	203.92	DC	124.71
165600992	238979	02NAPMUN	138.0	ATSI	238962	02MIDWAY	138.0	ATSI	1	AEP_P7-1_#10983-A	tower	194.0	123.12	187.41	DC	124.71
167383779	239060	02RDGVL	138.0	ATSI	239070	02RICHLD	138.0	ATSI	1	ATSI-P2-4-TE-138-015	breaker	194.0	102.93	146.91	DC	85.33
167383780	239060	02RDGVL	138.0	ATSI	239070	02RICHLD	138.0	ATSI	1	ATSI-P2-3-TE-138-013	breaker	194.0	102.11	146.33	DC	85.8
161700073	239070	02RICHLD	138.0	ATSI	243029	05LCKWRD	138.0	AEP	1	AEP_P7-1_#10984-B	tower	223.0	105.37	114.75	DC	20.92
165601021	239070	02RICHLD	138.0	ATSI	239165	02WAUSEO	138.0	ATSI	1	AEP_P7-1_#10983-B	tower	190.0	141.61	144.13	DC	10.57
161699801	239154	02W.FREM	138.0	ATSI	243009	05FRMNT	138.0	AEP	1	AEP_P2-2_#517_05FOSTOR 345_1	bus	361.0	124.5	125.7	DC	9.51
164515726	239154	02W.FREM	138.0	ATSI	243009	05FRMNT	138.0	AEP	1	AEP_P4_#517_05FOSTOR 345_A1	breaker	361.0	124.5	125.7	DC	9.51
161699871	239177	02WOODVI	138.0	ATSI	245422	05W.ENDFOS2	138.0	AEP	1	AEP_P2-2_#517_05FOSTOR 345_1	bus	185.0	103.05	105.43	DC	9.76
164515814	239177	02WOODVI	138.0	ATSI	245422	05W.ENDFOS2	138.0	AEP	1	AEP_P4_#517_05FOSTOR 345_A1	breaker	185.0	103.05	105.43	DC	9.76
165601036	239351	02EASTFAYT	138.0	ATSI	238712	02FAYET	138.0	ATSI	1	ATSI-P7-1-TE-138-016	tower	262.0	114.49	136.85	DC	58.56
161700082	256000	18ARGNTA	345.0	METC	243234	05TWIN B	345.0	AEP	1	AEP_P7-1_#10999	tower	1409.0	112.22	112.68	DC	14.25
161699817	940840	AE2-072 TAP	138.0	ATSI	242993	05E.LEIPSIC2	138.0	AEP	1	ATSI-P2-2-TE-138-005	bus	223.0	113.2	123.07	DC	22.02
161700025	940840	AE2-072 TAP	138.0	ATSI	242993	05E.LEIPSIC2	138.0	AEP	1	ATSI-P7-1-TE-138-016	tower	223.0	117.9	128.46	DC	23.55
164515743	940840	AE2-072 TAP	138.0	ATSI	242993	05E.LEIPSIC2	138.0	AEP	1	AEP_P4_#12461_05 S HICKSV 69.0_E	breaker	223.0	119.16	122.1	DC	14.54
167141221	960300	AF2-321 TAP	138.0	ATSI	239060	02RDGVL	138.0	ATSI	1	ATSI-P2-4-TE-138-015	breaker	181.0	113.86	161.0	DC	85.33
167141222	960300	AF2-321 TAP	138.0	ATSI	239060	02RDGVL	138.0	ATSI	1	ATSI-P2-3-TE-138-013	breaker	181.0	112.92	160.32	DC	85.8

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 PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
167933725	238517	02LYONS	138.0	ATSI	239345	02SIL_AE+	138.0	ATSI	1	ATSI-P1-3-TE-138-012A	operation	287.0	97.54	117.32	DC	56.76
167933648	238712	02FAYET	138.0	ATSI	238517	02LYONS	138.0	ATSI	1	ATSI-P1-3-TE-138-012A	operation	266.0	107.94	129.28	DC	56.76
164516031	238889	02LEMOYN	345.0	ATSI	242936	05FOSTOR	345.0	AEP	1	AEP_P1-2_#768	operation	1390.0	127.15	129.49	DC	37.83
167933417	238979	02NAPMUN	138.0	ATSI	238962	02MIDWAY	138.0	ATSI	1	Base Case	operation	161.0	126.54	200.35	DC	118.83
167933418	238979	02NAPMUN	138.0	ATSI	238962	02MIDWAY	138.0	ATSI	1	AEP_P1-2_#7097_4883-B	operation	194.0	121.26	183.21	DC	120.18
167933717	238979	02NAPMUN	138.0	ATSI	239127	02STRYKE	138.0	ATSI	1	ATSI-P1-3-TE-138-012A	operation	181.0	27.18	118.9	DC	166.0
167933718	238979	02NAPMUN	138.0	ATSI	239127	02STRYKE	138.0	ATSI	1	ATSI-P1-2-TE-138-041	operation	181.0	27.18	118.9	DC	166.0
167933558	239060	02RDGVL	138.0	ATSI	239070	02RICHLD	138.0	ATSI	1	ATSI-P1-3-TE-138-012A	operation	194.0	101.64	145.87	DC	85.8
164516119	239070	02RICHLD	138.0	ATSI	243029	05LCKWRD	138.0	AEP	1	AEP_P1-2_#7097_4883-B	operation	223.0	104.97	114.35	DC	20.93
167933613	239351	02EASTFAYT	138.0	ATSI	238712	02FAYET	138.0	ATSI	1	ATSI-P1-3-TE-138-012A	operation	262.0	111.96	133.62	DC	56.76
167933615	239351	02EASTFAYT	138.0	ATSI	238712	02FAYET	138.0	ATSI	1	Base Case	operation	221.0	97.95	101.28	DC	16.33
164516116	241901	02LALLENDORF	345.0	ATSI	242936	05FOSTOR	345.0	AEP	1	AEP_P1-2_#770	operation	1409.0	112.39	113.19	DC	24.66
168187663	242935	05E LIMA	345.0	AEP	242945	05SW LIM	345.0	AEP	1	AEP_P2-1_242939 05MARYSV 345 945620 AF1-227 TAP 345 1-A	operation	971.0	116.66	117.32	DC	14.23
168187780	242936	05FOSTOR	345.0	AEP	242935	05E LIMA	345.0	AEP	1	Base Case	operation	1025.0	110.5	111.47	DC	21.95
168187781	242936	05FOSTOR	345.0	AEP	242935	05E LIMA	345.0	AEP	1	AEP_P1-2_#2749_554-A	operation	1318.0	109.26	110.22	DC	27.91
164516170	907200	AD1-103 TAP	345.0	ATSI	238569	02BEAVER	345.0	ATSI	1	ATSI-P1-2-OEC-345-810	operation	1742.0	104.81	105.52	DC	27.32
164516089	940840	AE2-072 TAP	138.0	ATSI	242993	05E.LEIPSIC2	138.0	AEP	1	AEP_P1-2_#14793-A	operation	223.0	119.0	121.95	DC	14.56
164516094	940840	AE2-072 TAP	138.0	ATSI	242993	05E.LEIPSIC2	138.0	AEP	1	Base Case	operation	223.0	103.4	105.4	DC	9.88
167933485	960300	AF2-321 TAP	138.0	ATSI	239060	02RDGVL	138.0	ATSI	1	ATSI-P1-2-TE-138-041	operation	181.0	112.45	159.87	DC	85.83

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
164516117	2	02LALLENDORF 345.0 kV - 05FOSTOR 345.0 kV Ckt 1	**AEP** **AEPO0033a (498) : Sag Study will be required on 19.2 miles line between Fostoria and Lallendorf .The cost is expected to be 76,800.New Ratings after sag study : S/N: 1409MVA S/E: 1887MVA.Rebuild/Reconductor, cost : $ 38.4 million** **Project Type : FAC** **Cost : $76,800** **Time Estimate : Sag Study : 6 - 12 months** **ATSI** **Not a violation for ATSI portion**	$76,800
165601116,167384030	5	02SIL_AE+ 138.0 kV - 02ALLNJ 138.0 kV Ckt 1	**ATSI** **TE-AG1-F-0005 (960) : Reconductor 6.3 miles of transmission line from Allen Junction to Silica Tap with a conductor able to meet or exceed 196 MVA STE.** **Project Type : FAC** **Cost : $15,825,600** **Time Estimate : 42.0 Months**	$15,825,600
161700082	16	18ARGNTA 345.0 kV - 05TWIN B 345.0 kV Ckt 1	**AEP** **AEPI0013a : 1)A Sag Study will be required on the 51.4mile section of line to mitigate the overload . Depending on the sag study results, cost for this upgrade is expected to be between $205,600 (no remediations required just sag study)New Ratings after sag study S/E: 1888MVA and $102.8 million (complete line reconductor/rebuild required).** **Project Type : FAC** **Cost : $205,600** **Time Estimate : Sag Study : 6 - 12 months** **METC** **The external (i.e. Non-PJM) Transmission Owner, METC, will not evaluate this violation until the impact study phase.**	$205,600

ID	Idx	Facility	Upgrade Description	Cost
165601021	12	02RICHLD 138.0 kV - 02WAUSEO 138.0 kV Ckt 1	**ATSI** **TE-011A (939) : Reconductor the Richland-Wauseon 138 kV line. This project is dependant on the s1698 project Richland-Wauseon-Midway 138 kV Three-Terminal Elimination project (ISD 12/31/2020)** **Project Type : FAC** **Cost : $66,891,420** **Time Estimate : 36.0 Months** **TE-011B (940) : Reconductor the Richland-Wauseon 138 kV line. Replace the Wauseon Circuit Breaker B13416. This project is dependant on the s1698 project Richland-Wauseon-Midway 138 kV Three-Terminal Elimination project (ISD 12/31/2020)** **Project Type : FAC** **Cost : $83,926,586** **Time Estimate : 72.0 Months** **TE-011C (941) : Reconductor (3) existing sections of subconductor circular with a conductor about to meet or exceed 273 MVA STE. This project is dependant on the s1698 project Richland-Wauseon-Midway 138 kV Three-Terminal Elimination project (ISD 12/31/2020)** **Project Type : FAC** **Cost : $376,800** **Time Estimate : 12.0 Months**	$151,194,806
167141221,167141222	18	AF2-321 TAP 138.0 kV - 02RDGVL 138.0 kV Ckt 1	**ATSI** **TE-020A (945) : Reconductor the line from Stryker 138 kV substation to the new 3 breaker ring for the AF2-321 gen queue project of the Richland-Stryker 138 kV line. Upgrade the existing substation conductor at Stryker 138 kV. Reconductor the existing line drop at Stryker 138 kV. Reconductor the existing mixed transmission line conductor.** **Project Type : Facility** **Cost : $7,099,054** **Time Estimate : 30.0 Months** **TE-020B (946) : Reconductor the line from Stryker 138 kV substation to the new 3 breaker ring for the AF2-321 gen queue project of the Richland-Stryker 138 kV line. Reconductor the existing substation conductor at Stryker 138 kV. Reconductor the existing line drop at Stryker 138 kV. Reconductor the existing mixed transmission line conductor. Reconductor the existing transmission line conductor.** **Project Type : Facility** **Cost : $7,099,054** **Time Estimate : 30.0 Months**	$14,198,108
167383811,165601052	7	02FAYET 138.0 kV - 02LYONS 138.0 kV Ckt 1	**ATSI** **TE-AG1-F-0001 (954) :** **1) Reconductor (1) existing section of subconductor circular with a conductor about to meet or exceed 351 MVA STE.** **2) Replace (1) switcher at Lyons.** **Project Type : FAC** **Cost : $314,000** **Time Estimate : 12.0 Months**	$314,000

ID	Idx	Facility	Upgrade Description	Cost
165601070,167383872	3	02LYONS 138.0 kV - 02SIL_AE+ 138.0 kV Ckt 1	**ATSI** **TE-AG1-F-0009 (936) :** **1) Reconductor approx. 17.6 miles of transmission line from Silica Tap to Lyons.** **2) Reconductor existing section of transmission line at Lyons.** **Project Type : FAC** **Cost : $44,211,200** **Time Estimate : 60.0 Months**	$44,211,200
161700073	11	02RICHLD 138.0 kV - 05LCKWRD 138.0 kV Ckt 1	**AEP** **AEPO0048a (588) : 1) A sag study will be required on the 0.06 miles of ACSR ~ 636 ~ 26/7 ~ GROSBEAK - Conductor Section 1 to mitigate the overload. Depending on the sag study results, the cost for this upgrade is expected to be between $20,000 (no remediation required, just sag study) and $4.6 million (complete line reconductor/rebuild). New rating after sag study: S/N:223 S/E: 310. 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 : 6-12 months** **ATSI** **TE-AG1-F-0004 (959) : Reconductor 10.87 miles of transmission line from Lockwood Road to Richland with a conductor able to meet or exceed 232 MVA STE.** **Project Type : FAC** **Cost : $27,305,440** **Time Estimate : 54.0 Months**	$27,325,440
164516032,164515706	9	02LEMOYN 345.0 kV - 05FOSTOR 345.0 kV Ckt 1	**AEP** **AEPO0032a (497) : Sag study is required on 19.5 mile double circuit line between Forstoria Central and Lemoyn . The cost is expected to be 78,000.New ratings after sag Mitigation S/N: 1409 MVA , S/E: 1887MVA. Rebuild/Recondcutor cost: $29.2 million.** **Project Type : FAC** **Cost : $78,000** **Time Estimate : Sag Study : 6 - 12 months** **ATSI** **Not a violation for ATSI portion**	$78,000
164515771	6	02BEAVER 345.0 kV - 02LAKEAVE 345.0 kV Ckt 2	**ATSI** **N6186/OEC-001A-R1 (927) : Reconductor the existing Beaver-Lake Ave #2 345 kV line. Reconductor substation conductor, line drop and switches at both terminals. The expected rating after the project is 2488MVA/SN 2864MVA/SE.** **Project Type : Facility** **Cost : $51,400,000** **Time Estimate : 48.0 Months**	$51,400,000

ID	Idx	Facility	Upgrade Description	Cost
165601083	8	02LAKVEW 138.0 kV - 02GRNFLD 138.0 kV Ckt 1	ATSI OEC-011B-R1 (929) : Reconductor roughly 13.58 miles of the Greenfield-Lakeview 138 kV Line. Replace two line switches. Upgrade substation conductor at Greenfield and upgrade relaying for B-242. Project Type : Facility Cost : $52,740,000 Time Estimate : 54.0 Months	$52,740,000
161699801,164515726	13	02W.FREM 138.0 kV - 05FRMNT 138.0 kV Ckt 1	AEP AEPO0026b (474) : Replace 1200 A Switch at Fremont Project Type : FAC Cost : $200,000 Time Estimate : 12-18 months AEPO0026d (476) : Replace three Sub Cond 1590 AAC 61 Str at Fremont Project Type : FAC Cost : $300,000 Time Estimate : 12-18 months AEPO0026f (478) : Rebuild 7 miles of 138 kV line between Fremont Center and First Energy's West Fremont station with a bundled 795 ACSR conductor (Replacing ACSR ~ 1033.5 ~ 45/7 ~ ORTOLAN conductor). First Energy will need to be consulted due to the fact that they own a portion of the line conductor that limits the branch. Project Type : FAC Cost : $10,500,000 Time Estimate : 24-36 months ATSI TE-012A (942) : For the Fremont-West Fremont 138 kV Line, reconductor the line drop at West Fremont. Reconductor the existing section of the Fremont-West Fremont 138 kV Line that is limiting. AEP would need to replace their section of limiting conductor and provide estimates for their replacement. Project Type : FAC Cost : $2,212,758 Time Estimate : 18.0 Months	$13,212,758
165600742,165600741,167933420,165600991,167933419,165600992	1	02NAPMUN 138.0 kV - 02MIDWAY 138.0 kV Ckt 1	ATSI TE-AG1-F-0002a (955) : Reconductor 10.16 miles of transmission line from Midway to Napoleon Municipal to meet or exceed 430 MVA STE. Project Type : FAC Cost : $25,521,920 Time Estimate : 54.0 Months TE-AG1-F-0002b (956) : 1) External Rating: AMP/ Napoleon Munical to upgrade equipment as necessary to meet or exceed rating of 430 MVA STE. 2) Reconductor (1) existing section of subconductor circular at Midway with a conductor able to meet or exceed 430 MVA STE. Project Type : FAC Cost : $439,600 Time Estimate : 12.0 Months	$25,961,520

ID	Idx	Facility	Upgrade Description	Cost
167383780,167383779	10	02RDGVL 138.0 kV - 02RICHLD 138.0 kV Ckt 1	**ATSI** **TE-AG1-F-0003a (957) : Reconductor section of 8.5 miles of transmission line from Richland to Ridgeville Tap to meet or exceed 286 MVA STE.** **Project Type : FAC** **Cost : $21,352,000** **Time Estimate : 48.0 Months** **TE-AG1-F-0003b (958) :** **1) Reconductor section of 8.5 miles of transmission line from Richland to Ridgeville Tap with a conductor able to meet or exceed 286 MVA STE.** **2) Reconductor existing section transmission line at Ridgeville Tap with a conductor able to meet or exceed 286 MVA STE.** **Project Type : FAC** **Cost : $21,603,200** **Time Estimate : 48.0 Months**	$42,955,200
165601036	15	02EASTFAYT 138.0 kV - 02FAYET 138.0 kV Ckt 1	**ATSI** **TE-AG1-F-0006a (961) : Reconductor (2) existing sections of subconductor circular with a conductor able to meet or exceed 359 MVA STE.** **Project Type : FAC** **Cost : $125,600** **Time Estimate : 12.0 Months** **TE-AG1-F-0006b (962) : Reconductor 0.2 miles of transmission line from Fayette to East Fayette and the existing section at Fayette with a conductor able to meet or exceed 359 MVA STE.** **Project Type : FAC** **Cost : $502,400** **Time Estimate : 24.0 Months**	$628,000
167141457	4	02STRYKE 138.0 kV - AF2-321 TAP 138.0 kV Ckt 1	**ATSI** **TE-020A (945) : Reconductor the line from Stryker 138 kV substation to the new 3 breaker ring for the AF2-321 gen queue project of the Richland-Stryker 138 kV line. Upgrade the existing substation conductor at Stryker 138 kV. Reconductor the existing line drop at Stryker 138 kV. Reconductor the existing mixed transmission line conductor.** **Project Type : Facility** **Cost : $7,099,054** **Time Estimate : 30.0 Months**	$7,099,054

ID	Idx	Facility	Upgrade Description	Cost
161699871,164515814	14	02WOODVI 138.0 kV - 05W.END FOS2 138.0 kV Ckt 1	**AEP** **AEPO0049a (589) : A Sag Study will be required on the 22.75 miles ofACSR ~ 477 ~ 26/7 ~ HAWK- Conductor to mitigate the overload. Depending on the sag study results, the cost for this upgrade is expected to be between $40,000 (no remediations required, just sag study) and 34.12million (complete line reconductor/rebuild). New rating after sag study: S/N: 185 S/E: 257. 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 : $91,000** **Time Estimate : 6-12 months** **ATSI** **Not a violation for ATSI portion**	$91,000
161700025,161699817,164515743	17	AE2-072 TAP 138.0 kV - 05E.LPSC 138.0 kV Ckt 1	**AEP** **AEPO0043a (522) : Perform Sag Study on 10.2 miles of line with ACSR " 636 " 26/7 " GROSBEAK-Conductor to mitigate the overload. Depending on sag study results, the cost for this upgrade is expected to be between $40,800 (no remediations required, just sag study) and $ 15.3 million (complete line reconductor/rebuild). New rating after sag study: S/N: 223 S/E: 310. 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 : CON** **Cost : $40,800** **Time Estimate : 6-12 months** **AEPO0043b (523) : An engineering study will need to be conducted to determine if the E Leipsic Relay Thermal limits 1997 Amps settings can be adjusted to mitigate the overload, Estimated Cost $25,000. New relay packages will be required if the settings cannot be adjusted. Estimated Cost: $600,000.** **Project Type : Fac** **Cost : $25,000** **Time Estimate : 12-18 months** **ATSI** **Not a violation for ATSI portion**	$65,800
			TOTAL COST	**$447,582,886**

11.6 Flow Gate Details

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

11.6.1 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
165600741	238979	02NAPMUN	ATSI	238962	02MIDWAY	ATSI	1	ATSI-P2-2-TE-138-023	bus	194.0	156.32	221.3	DC	126.07

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	28.1008	50/50	28.1008
239064	02RICHG1	0.2635	50/50	0.2635
239065	02RICHG2&3	0.5186	50/50	0.5186
239067	02RICHG4	2.8667	50/50	2.8667
239068	02RICHG5	2.8670	50/50	2.8670
239069	02RICHG6	2.8670	50/50	2.8670
239202	02STRYCT	0.8565	50/50	0.8565
940841	AE2-072 C	6.9952	Adder	8.23
940842	AE2-072 E	4.6634	Adder	5.49
941781	AE2-181 C	11.5560	50/50	11.5560
941782	AE2-181 E	7.7040	50/50	7.7040
942661	AE2-282 C	18.8015	50/50	18.8015
942662	AE2-282 E	9.8933	50/50	9.8933
943951	AF1-063 C O1	1.9914	50/50	1.9914
943952	AF1-063 E O1	1.1040	50/50	1.1040
944551	AF1-120 C	11.3922	50/50	11.3922
944552	AF1-120 E	5.7390	50/50	5.7390
945401	AF1-205 C	18.2275	50/50	18.2275
945402	AF1-205 E	12.1517	50/50	12.1517
945411	AF1-206 C O1	51.1366	50/50	51.1366
945412	AF1-206 E O1	34.0911	50/50	34.0911
958331	AF2-127 C	2.5692	50/50	2.5692
958332	AF2-127 E	1.3517	50/50	1.3517
960301	AF2-321 C	35.9240	50/50	35.9240
960302	AF2-321 E	23.9494	50/50	23.9494
962121	AG1-056 C	13.1074	50/50	13.1074
962122	AG1-056 E	8.7383	50/50	8.7383
964561	AG1-319 C	75.6442	50/50	75.6442
964562	AG1-319 E	50.4295	50/50	50.4295
WEC	WEC	0.0781	Confirmed LTF	0.0781
LGEE	LGEE	0.1162	Confirmed LTF	0.1162
CPLE	CPLE	0.0218	Confirmed LTF	0.0218
CBM-W2	CBM-W2	1.6218	Confirmed LTF	1.6218
NY	NY	0.0763	Confirmed LTF	0.0763
TVA	TVA	0.1932	Confirmed LTF	0.1932
O-066	O-066	0.7807	Confirmed LTF	0.7807
SIGE	SIGE	0.0342	Confirmed LTF	0.0342
CBM-S2	CBM-S2	0.5638	Confirmed LTF	0.5638
CBM-S1	CBM-S1	0.0555	Confirmed LTF	0.0555
G-007	G-007	0.1218	Confirmed LTF	0.1218
MEC	MEC	0.3559	Confirmed LTF	0.3559

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LAGN	LAGN	0.2660	Confirmed LTF	0.2660

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
164516117	241901	02LALLENDORF	ATSI	242936	05FOSTOR	AEP	1	AEP_P1-2_#770	single	1409.0	99.98	101.03	DC	14.79

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	4.7288	80/20	4.7288
238572	02BEAVGB	0.6730	80/20	0.6730
238601	02FRMENG 1	2.6601	80/20	2.6601
238602	02FRMENG 2	2.6038	80/20	2.6038
238603	02FRMENG 3	5.6988	80/20	5.6988
238670	**02DVBSG1 (Deactivation : 31/05/2020)**	**22.5467**	**80/20**	**22.5467**
238885	02LEMOG1	4.4418	80/20	4.4418
238886	02LEMOG2	4.4418	80/20	4.4418
238887	02LEMOG3	4.4418	80/20	4.4418
238888	02LEMOG4	4.4418	80/20	4.4418
238979	02NAPMUN	5.4956	80/20	5.4956
239171	02WLORG-2	1.1440	80/20	1.1440
239172	02WLORG-3	1.1805	80/20	1.1805
239173	02WLORG-4	1.1546	80/20	1.1546
239174	02WLORG-5	1.1607	80/20	1.1607
239175	02WLORG-6	1.0036	80/20	1.0036
239202	02STRYCT	0.2540	80/20	0.2540
239293	02BS-PKR	0.4625	80/20	0.4625
240624	02GALON M2	-3.5013	Adder	-4.12
240968	02BG2 GEN	1.1355	80/20	1.1355
240969	02BG4 G1	0.2888	80/20	0.2888
240973	02BG6 AMPO	4.4696	80/20	4.4696
240975	02PGE GEN	5.8856	80/20	5.8856
241898	02Y1-069_1A	11.8718	80/20	11.8718
241899	02Y1-069_1B	11.8718	80/20	11.8718
241900	02Y1-069_1S	15.4470	80/20	15.4470
241912	02EL_AA1-006	0.0378	80/20	0.0378
241946	**AB1-107 CT1 (Suspended)**	**59.8398**	**80/20**	**59.8398**
241947	**AB1-107 CT2 (Suspended)**	**82.5713**	**80/20**	**82.5713**
241948	**AB1-107 ST1 (Suspended)**	**92.9865**	**80/20**	**92.9865**
932791	AC2-103 C	5.7795	80/20	5.7795
934764	AD1-103 C1	2.9362	80/20	2.9362
934768	AD1-103 C2	3.8450	80/20	3.8450
934769	AD1-103 C3	2.9362	80/20	2.9362
934891	AD1-118	12.3172	80/20	12.3172
938911	AE1-119	96.7780	80/20	96.7780
941761	AE2-176 C	8.1870	80/20	8.1870
941781	AE2-181 C	3.9619	80/20	3.9619
942661	AE2-282 C	6.3875	80/20	6.3875
943961	AF1-064 C O1	4.9025	80/20	4.9025
944551	AF1-120 C	3.8703	80/20	3.8703

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945401	AF1-205 C	3.5647	80/20	3.5647
945411	AF1-206 C O1	17.3727	80/20	17.3727
946141	AF1-279 C	5.9586	Adder	7.01
950351	J466	3.6663	PJM External (MISO)	3.6663
950791	J201 C	0.4381	PJM External (MISO)	0.4381
950871	J246 C	0.1430	PJM External (MISO)	0.1430
952201	J589 C	2.8167	PJM External (MISO)	2.8167
952401	J752 C	1.8656	PJM External (MISO)	1.8656
952611	J717 C	3.0735	PJM External (MISO)	3.0735
952761	J728 C	2.8583	PJM External (MISO)	2.8583
952881	J758	13.0480	PJM External (MISO)	13.0480
952971	J793	181.1140	PJM External (MISO)	181.1140
953071	J794 C	0.1845	PJM External (MISO)	0.1845
953271	J701 C	0.9141	PJM External (MISO)	0.9141
953291	J796	24.4115	PJM External (MISO)	24.4115
953321	J799	28.2820	PJM External (MISO)	28.2820
953361	J806	11.9796	PJM External (MISO)	11.9796
953771	J832	8.3460	PJM External (MISO)	8.3460
953781	J833	14.8210	PJM External (MISO)	14.8210
953941	J857	9.5099	PJM External (MISO)	9.5099
954111	J875	18.4635	PJM External (MISO)	18.4635
955071	J984 C	2.3768	PJM External (MISO)	2.3768
955181	J996	10.6984	PJM External (MISO)	10.6984
955591	J1043 C	1.2760	PJM External (MISO)	1.2760
955781	J1062	21.6330	PJM External (MISO)	21.6330
955861	J1071	5.3600	PJM External (MISO)	5.3600
956011	J1088	15.2160	PJM External (MISO)	15.2160
956021	J1089	17.4573	PJM External (MISO)	17.4573
956031	J1090	9.1917	PJM External (MISO)	9.1917
956741	J1172	5.5630	PJM External (MISO)	5.5630
956801	J1178	6.0729	PJM External (MISO)	6.0729
957031	AF2-004 1	0.7965	80/20	0.7965
957041	AF2-004 2	0.7965	80/20	0.7965
957051	AF2-004 3	0.7965	80/20	0.7965
957061	AF2-004 4	0.7965	80/20	0.7965
957111	AF2-005	0.5677	Adder	0.67
958321	AF2-126 C	4.9905	80/20	4.9905
960301	AF2-321 C	10.6782	80/20	10.6782
962121	AG1-056 C	3.8961	80/20	3.8961
963501	AG1-199	52.4100	80/20	52.4100
964561	AG1-319 C	14.7936	80/20	14.7936
965571	AG1-425	2.1832	80/20	2.1832
966311	AG1-500 C	37.2200	80/20	37.2200
966321	AG1-501 C	0.3761	Adder	0.83
G-007A	G-007A	0.0911	Confirmed LTF	0.0911
VFT	VFT	0.2838	Confirmed LTF	0.2838
CALDERWOOD	CALDERWOOD	0.7097	Confirmed LTF	0.7097
PRAIRIE	PRAIRIE	2.4203	Confirmed LTF	2.4203
CHEOAH	CHEOAH	0.7127	Confirmed LTF	0.7127
CBM-N	CBM-N	0.0720	Confirmed LTF	0.0720
COTTONWOOD	COTTONWOOD	2.4024	Confirmed LTF	2.4024
HAMLET	HAMLET	0.7144	Confirmed LTF	0.7144

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
GIBSON	GIBSON	0.7595	Confirmed LTF	0.7595
BLUEG	BLUEG	3.1595	Confirmed LTF	3.1595
TRIMBLE	TRIMBLE	1.0240	Confirmed LTF	1.0240
CATAWBA	CATAWBA	0.4617	Confirmed LTF	0.4617
CBM-W1	CBM-W1	56.6268	Confirmed LTF	56.6268

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
165601070	238517	02LYONS	ATSI	239345	02SIL_AE+	ATSI	1	ATSI-P7-1-TE-138-016	tower	287.0	99.89	120.29	DC	58.56

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	13.0536	50/50	13.0536
239064	02RICHG1	0.2401	50/50	0.2401
239065	02RICHG2&3	0.4730	50/50	0.4730
239067	02RICHG4	2.6115	50/50	2.6115
239068	02RICHG5	2.6117	50/50	2.6117
239069	02RICHG6	2.6117	50/50	2.6117
239202	02STRYCT	0.7015	50/50	0.7015
940841	AE2-072 C	6.3908	Adder	7.52
940842	AE2-072 E	4.2605	Adder	5.01
941781	AE2-181 C	11.7315	50/50	11.7315
941782	AE2-181 E	7.8210	50/50	7.8210
942661	AE2-282 C	24.4716	50/50	24.4716
942662	AE2-282 E	12.8769	50/50	12.8769
943951	AF1-063 C O1	1.5403	Adder	1.81
943952	AF1-063 E O1	0.8539	Adder	1.0
944551	AF1-120 C	14.8279	50/50	14.8279
944552	AF1-120 E	7.4697	50/50	7.4697
945401	AF1-205 C	8.4672	50/50	8.4672
945402	AF1-205 E	5.6448	50/50	5.6448
945411	AF1-206 C O1	66.5583	50/50	66.5583
945412	AF1-206 E O1	44.3722	50/50	44.3722
958331	AF2-127 C	1.9872	Adder	2.34
958332	AF2-127 E	1.0455	Adder	1.23
960301	AF2-321 C	29.2552	50/50	29.2552
960302	AF2-321 E	19.5034	50/50	19.5034
962121	AG1-056 C	10.6742	50/50	10.6742
962122	AG1-056 E	7.1161	50/50	7.1161
964561	AG1-319 C	35.1389	50/50	35.1389
964562	AG1-319 E	23.4259	50/50	23.4259
WEC	WEC	0.0589	Confirmed LTF	0.0589
LGEE	LGEE	0.0961	Confirmed LTF	0.0961
CPLE	CPLE	0.0184	Confirmed LTF	0.0184
CBM-W2	CBM-W2	1.2902	Confirmed LTF	1.2902
NY	NY	0.0625	Confirmed LTF	0.0625
TVA	TVA	0.1554	Confirmed LTF	0.1554
O-066	O-066	0.6394	Confirmed LTF	0.6394
SIGE	SIGE	0.0279	Confirmed LTF	0.0279
CBM-S2	CBM-S2	0.4698	Confirmed LTF	0.4698
CBM-S1	CBM-S1	0.0452	Confirmed LTF	0.0452
G-007	G-007	0.0987	Confirmed LTF	0.0987
MEC	MEC	0.2717	Confirmed LTF	0.2717

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LAGN	LAGN	0.2118	Confirmed LTF	0.2118

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
167141457	239127	02STRYKE	ATSI	960300	AF2-321 TAP	ATSI	1	ATSI-P2-4-TE-138-015	breaker	181.0	52.89	100.03	DC	85.33

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	19.0187	50/50	19.0187
239202	02STRYCT	1.0051	50/50	1.0051
941781	AE2-181 C	11.8150	50/50	11.8150
941782	AE2-181 E	7.8767	50/50	7.8767
942661	AE2-282 C	15.1464	50/50	15.1464
942662	AE2-282 E	7.9700	50/50	7.9700
944551	AF1-120 C	9.1775	50/50	9.1775
944552	AF1-120 E	4.6233	50/50	4.6233
945401	AF1-205 C	12.3365	50/50	12.3365
945402	AF1-205 E	8.2243	50/50	8.2243
945411	AF1-206 C O1	41.1954	50/50	41.1954
945412	AF1-206 E O1	27.4636	50/50	27.4636
964561	AG1-319 C	51.1964	50/50	51.1964
964562	AG1-319 E	34.1309	50/50	34.1309
G-007A	G-007A	0.2541	Confirmed LTF	0.2541
VFT	VFT	0.6837	Confirmed LTF	0.6837
CALDERWOOD	CALDERWOOD	0.0527	Confirmed LTF	0.0527
PRAIRIE	PRAIRIE	0.4985	Confirmed LTF	0.4985
CHEOAH	CHEOAH	0.0526	Confirmed LTF	0.0526
CBM-N	CBM-N	0.1296	Confirmed LTF	0.1296
COTTONWOOD	COTTONWOOD	0.3108	Confirmed LTF	0.3108
HAMLET	HAMLET	0.0271	Confirmed LTF	0.0271
GIBSON	GIBSON	0.1201	Confirmed LTF	0.1201
BLUEG	BLUEG	0.3281	Confirmed LTF	0.3281
TRIMBLE	TRIMBLE	0.1052	Confirmed LTF	0.1052
CATAWBA	CATAWBA	0.0210	Confirmed LTF	0.0210
CBM-W1	CBM-W1	1.8927	Confirmed LTF	1.8927

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
167384030	239345	02SIL_AE+	ATSI	238531	02ALLNJ	ATSI	1	ATSI-P2-4-TE-138-015	breaker	339.0	83.9	101.28	DC	58.93

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	13.1346	50/50	13.1346
239064	02RICHG1	0.2459	50/50	0.2459
239065	02RICHG2&3	0.4850	50/50	0.4850
239067	02RICHG4	2.6747	50/50	2.6747
239068	02RICHG5	2.6750	50/50	2.6750
239069	02RICHG6	2.6750	50/50	2.6750
239202	02STRYCT	0.7058	50/50	0.7058
940841	AE2-072 C	6.5530	Adder	7.71
940842	AE2-072 E	4.3687	Adder	5.14
941781	AE2-181 C	11.7856	50/50	11.7856
941782	AE2-181 E	7.8571	50/50	7.8571
942661	AE2-282 C	24.5340	50/50	24.5340
942662	AE2-282 E	12.9097	50/50	12.9097
943951	AF1-063 C O1	1.5775	Adder	1.86
943952	AF1-063 E O1	0.8746	Adder	1.03
944551	AF1-120 C	14.8657	50/50	14.8657
944552	AF1-120 E	7.4887	50/50	7.4887
945401	AF1-205 C	8.5198	50/50	8.5198
945402	AF1-205 E	5.6798	50/50	5.6798
945411	AF1-206 C O1	66.7279	50/50	66.7279
945412	AF1-206 E O1	44.4853	50/50	44.4853
958331	AF2-127 C	2.0352	Adder	2.39
958332	AF2-127 E	1.0707	Adder	1.26
960301	AF2-321 C	29.4612	50/50	29.4612
960302	AF2-321 E	19.6408	50/50	19.6408
962121	AG1-056 C	10.7493	50/50	10.7493
962122	AG1-056 E	7.1662	50/50	7.1662
964561	AG1-319 C	35.3570	50/50	35.3570
964562	AG1-319 E	23.5713	50/50	23.5713
WEC	WEC	0.0599	Confirmed LTF	0.0599
LGEE	LGEE	0.0980	Confirmed LTF	0.0980
CPLE	CPLE	0.0191	Confirmed LTF	0.0191
CBM-W2	CBM-W2	1.3171	Confirmed LTF	1.3171
NY	NY	0.0636	Confirmed LTF	0.0636
TVA	TVA	0.1582	Confirmed LTF	0.1582
O-066	O-066	0.6528	Confirmed LTF	0.6528
SIGE	SIGE	0.0285	Confirmed LTF	0.0285
CBM-S2	CBM-S2	0.4802	Confirmed LTF	0.4802
CBM-S1	CBM-S1	0.0460	Confirmed LTF	0.0460
G-007	G-007	0.1008	Confirmed LTF	0.1008
MEC	MEC	0.2765	Confirmed LTF	0.2765

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LAGN	LAGN	0.2153	Confirmed LTF	0.2153

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
164515771	238569	02BEAVER	ATSI	239725	02LAKEAVE	ATSI	2	ATSI-P2-3-OEC-345-002	breaker	1878.0	103.61	104.35	DC	31.04

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	4.4780	50/50	4.4780
238670	**02DVBSG1 (Deactivation : 31/05/2020)**	**31.4213**	**50/50**	**31.4213**
238979	02NAPMUN	5.8799	Adder	6.92
239171	02WLORG-2	5.6374	50/50	5.6374
239172	02WLORG-3	5.8175	50/50	5.8175
239173	02WLORG-4	5.6899	50/50	5.6899
239174	02WLORG-5	5.7200	50/50	5.7200
239276	02COLLW 11	-3.2143	Adder	-3.78
239293	02BS-PKR	0.4379	50/50	0.4379
239297	02CPPW41	-3.8730	Adder	-4.56
240968	02BG2 GEN	1.1982	Adder	1.41
240969	02BG4 G1	0.3015	Adder	0.35
240973	02BG6 AMPO	4.6848	Adder	5.51
240975	02PGE GEN	6.1865	Adder	7.28
240997	02BG10	3.3492	Adder	3.94
241898	02Y1-069_1A	8.5845	50/50	8.5845
241899	02Y1-069_1B	8.5845	50/50	8.5845
241900	02Y1-069_1S	11.1698	50/50	11.1698
241946	**AB1-107 CT1 (Suspended)**	**48.6073**	**Adder**	**57.19**
241947	**AB1-107 CT2 (Suspended)**	**59.7077**	**50/50**	**59.7077**
241948	**AB1-107 ST1 (Suspended)**	**67.2390**	**50/50**	**67.2390**
244357	05GRANGER EL	0.3700	Adder	0.44
247548	V4-010 C	3.4626	Adder	4.07
247551	**U4-028 C (Suspended)**	**1.6154**	**Adder**	**1.9**
247552	**U4-029 C (Suspended)**	**1.6154**	**Adder**	**1.9**
247940	**U4-028 E (Suspended)**	**10.8108**	**Adder**	**12.72**
247941	**U4-029 E (Suspended)**	**10.8108**	**Adder**	**12.72**
247947	V4-010 E	23.1730	Adder	27.26
925753	**AC1-051 C (Withdrawn : 01/12/2021)**	**0.7878**	**Adder**	**0.93**
925754	**AC1-051 E (Withdrawn : 01/12/2021)**	**5.2720**	**Adder**	**6.2**
932055	AC2-015 C	5.4653	Adder	6.43
932056	AC2-015 E	6.4757	Adder	7.62
932791	AC2-103 C	14.3915	50/50	14.3915
932792	AC2-103 E	96.3291	50/50	96.3291
934461	AD1-070 C O1	4.6472	Adder	5.47
934462	AD1-070 E O1	21.8161	Adder	25.67
934764	AD1-103 C1	7.3114	50/50	7.3114

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
934768	AD1-103 C2	9.5745	50/50	9.5745
934769	AD1-103 C3	7.3114	50/50	7.3114
934891	AD1-118	12.3986	Adder	14.59
937021	AD2-136 C O1	5.8154	Adder	6.84
937022	AD2-136 E O1	38.9187	Adder	45.79
938911	AE1-119	97.4176	Adder	114.61
939161	AE1-146 C O1	9.8503	Adder	11.59
939162	AE1-146 E O1	4.6000	Adder	5.41
940841	AE2-072 C	9.6849	Adder	11.39
940842	AE2-072 E	6.4566	Adder	7.6
941741	AE2-174 C	4.6413	Adder	5.46
941742	AE2-174 E	21.7280	Adder	25.56
941761	AE2-176 C	15.9532	50/50	15.9532
941762	AE2-176 E	6.3813	50/50	6.3813
941781	AE2-181 C	4.4335	Adder	5.22
941782	AE2-181 E	2.9557	Adder	3.48
942661	AE2-282 C	6.7745	Adder	7.97
942662	AE2-282 E	3.5647	Adder	4.19
943951	AF1-063 C O1	2.0045	Adder	2.36
943952	AF1-063 E O1	1.1113	Adder	1.31
943961	AF1-064 C O1	5.3368	Adder	6.28
943962	AF1-064 E O1	2.6524	Adder	3.12
944551	AF1-120 C	4.1048	Adder	4.83
944552	AF1-120 E	2.0679	Adder	2.43
945401	AF1-205 C	3.8140	Adder	4.49
945402	AF1-205 E	2.5427	Adder	2.99
945411	AF1-206 C O1	18.4255	Adder	21.68
945412	AF1-206 E O1	12.2837	Adder	14.45
945641	AF1-229 C	8.4413	Adder	9.93
945642	AF1-229 E	5.6275	Adder	6.62
957031	AF2-004 1	3.9253	50/50	3.9253
957041	AF2-004 2	3.9253	50/50	3.9253
957051	AF2-004 3	3.9253	50/50	3.9253
957061	AF2-004 4	3.9253	50/50	3.9253
957111	AF2-005	1.2570	Adder	1.48
958321	AF2-126 C	5.4326	Adder	6.39
958322	AF2-126 E	2.7163	Adder	3.2
958331	AF2-127 C	2.5862	Adder	3.04
958332	AF2-127 E	1.3606	Adder	1.6
960301	AF2-321 C	12.8867	Adder	15.16
960302	AF2-321 E	8.5911	Adder	10.11
960841	AF2-375 C	9.7538	Adder	11.48
960842	AF2-375 E	6.5025	Adder	7.65
962121	AG1-056 C	2.4920	Adder	5.53
962122	AG1-056 E	1.6613	Adder	3.69
962281	AG1-076 C O1	5.6102	Adder	12.45
962282	AG1-076 E O1	8.4153	Adder	18.68
963501	AG1-199	26.1488	Adder	58.04
964561	AG1-319 C	8.3889	Adder	18.62
964562	AG1-319 E	5.5926	Adder	12.41
964941	AG1-358 C	1.8824	Adder	4.18
964942	AG1-358 E	1.2549	Adder	2.79

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
965571	AG1-425	4.2542	50/50	4.2542
966311	AG1-500 C	183.4170	50/50	183.4170
966312	AG1-500 E	9.9440	50/50	9.9440
966321	AG1-501 C	0.8327	Adder	1.85
966322	AG1-501 E	0.1083	Adder	0.24
999763	AD1-103 E1	48.9304	50/50	48.9304
999764	AD1-103 E2	64.0755	50/50	64.0755
999765	AD1-103 E3	48.9304	50/50	48.9304
WEC	WEC	1.8938	Confirmed LTF	1.8938
LGEE	LGEE	2.6766	Confirmed LTF	2.6766
CPLE	CPLE	0.5883	Confirmed LTF	0.5883
CBM-W2	CBM-W2	37.6141	Confirmed LTF	37.6141
NY	NY	2.3198	Confirmed LTF	2.3198
TVA	TVA	4.6522	Confirmed LTF	4.6522
O-066	O-066	22.8012	Confirmed LTF	22.8012
SIGE	SIGE	0.8399	Confirmed LTF	0.8399
CBM-S2	CBM-S2	14.8561	Confirmed LTF	14.8561
CBM-S1	CBM-S1	1.3277	Confirmed LTF	1.3277
G-007	G-007	3.5301	Confirmed LTF	3.5301
MEC	MEC	8.5091	Confirmed LTF	8.5091
LAGN	LAGN	6.3630	Confirmed LTF	6.3630
CBM-W1	CBM-W1	120.5299	Confirmed LTF	120.5299

11.6.7 Index 7

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
165601052	238712	02FAYET	ATSI	238517	02LYONS	ATSI	1	ATSI-P7-1-TE-138-016	tower	266.0	110.48	132.5	DC	58.56

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	13.0536	50/50	13.0536
239064	02RICHG1	0.2401	50/50	0.2401
239065	02RICHG2&3	0.4730	50/50	0.4730
239067	02RICHG4	2.6115	50/50	2.6115
239068	02RICHG5	2.6117	50/50	2.6117
239069	02RICHG6	2.6117	50/50	2.6117
239202	02STRYCT	0.7015	50/50	0.7015
940841	AE2-072 C	6.3908	Adder	7.52
940842	AE2-072 E	4.2605	Adder	5.01
941781	AE2-181 C	11.7315	50/50	11.7315
941782	AE2-181 E	7.8210	50/50	7.8210
942661	AE2-282 C	24.4716	50/50	24.4716
942662	AE2-282 E	12.8769	50/50	12.8769
943951	AF1-063 C O1	1.5403	Adder	1.81
943952	AF1-063 E O1	0.8539	Adder	1.0
944551	AF1-120 C	14.8279	50/50	14.8279
944552	AF1-120 E	7.4697	50/50	7.4697
945401	AF1-205 C	8.4672	50/50	8.4672
945402	AF1-205 E	5.6448	50/50	5.6448
945411	AF1-206 C O1	66.5583	50/50	66.5583
945412	AF1-206 E O1	44.3722	50/50	44.3722
958331	AF2-127 C	1.9872	Adder	2.34
958332	AF2-127 E	1.0455	Adder	1.23
960301	AF2-321 C	29.2552	50/50	29.2552
960302	AF2-321 E	19.5034	50/50	19.5034
962121	AG1-056 C	10.6742	50/50	10.6742
962122	AG1-056 E	7.1161	50/50	7.1161
964561	AG1-319 C	35.1389	50/50	35.1389
964562	AG1-319 E	23.4259	50/50	23.4259
WEC	WEC	0.0589	Confirmed LTF	0.0589
LGEE	LGEE	0.0961	Confirmed LTF	0.0961
CPLE	CPLE	0.0184	Confirmed LTF	0.0184
CBM-W2	CBM-W2	1.2902	Confirmed LTF	1.2902
NY	NY	0.0625	Confirmed LTF	0.0625
TVA	TVA	0.1554	Confirmed LTF	0.1554
O-066	O-066	0.6394	Confirmed LTF	0.6394
SIGE	SIGE	0.0279	Confirmed LTF	0.0279
CBM-S2	CBM-S2	0.4698	Confirmed LTF	0.4698
CBM-S1	CBM-S1	0.0452	Confirmed LTF	0.0452
G-007	G-007	0.0987	Confirmed LTF	0.0987
MEC	MEC	0.2717	Confirmed LTF	0.2717

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LAGN	LAGN	0.2118	Confirmed LTF	0.2118

11.6.8 Index 8

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
165601083	238874	02LAKVEW	ATSI	238768	02GRNFLD	ATSI	1	ATSI-P7-1-OEC-345-004_NON	tower	385.0	115.33	116.61	DC	10.86

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238601	02FRMENG 1	2.7714	50/50	2.7714
238602	02FRMENG 2	2.7127	50/50	2.7127
238603	02FRMENG 3	5.9373	50/50	5.9373
238979	02NAPMUN	2.0568	Adder	2.42
240968	02BG2 GEN	0.4496	Adder	0.53
240969	02BG4 G1	0.1149	Adder	0.14
240973	02BG6 AMPO	1.7736	Adder	2.09
240975	02PGE GEN	2.3304	Adder	2.74
240997	02BG10	1.2760	Adder	1.5
241946	**AB1-107 CT1 (Suspended)**	**21.3959**	**Adder**	**25.17**
241947	**AB1-107 CT2 (Suspended)**	**15.7956**	**Adder**	**18.58**
241948	**AB1-107 ST1 (Suspended)**	**17.7879**	**Adder**	**20.93**
247548	V4-010 C	1.4674	Adder	1.73
247551	**U4-028 C (Suspended)**	**0.6282**	**Adder**	**0.74**
247552	**U4-029 C (Suspended)**	**0.6282**	**Adder**	**0.74**
247940	**U4-028 E (Suspended)**	**4.2041**	**Adder**	**4.95**
247941	**U4-029 E (Suspended)**	**4.2041**	**Adder**	**4.95**
247947	V4-010 E	9.8206	Adder	11.55
934461	AD1-070 C O1	1.5936	Adder	1.87
934462	AD1-070 E O1	7.4813	Adder	8.8
934891	AD1-118	3.7283	Adder	4.39
937021	AD2-136 C O1	2.2615	Adder	2.66
937022	AD2-136 E O1	15.1346	Adder	17.81
938911	AE1-119	29.2936	Adder	34.46
941741	AE2-174 C	1.9669	Adder	2.31
941742	AE2-174 E	9.2082	Adder	10.83
941781	AE2-181 C	1.5571	Adder	1.83
941782	AE2-181 E	1.0381	Adder	1.22
942661	AE2-282 C	2.3994	Adder	2.82
942662	AE2-282 E	1.2625	Adder	1.49
943961	AF1-064 C O1	1.9501	Adder	2.29
943962	AF1-064 E O1	0.9692	Adder	1.14
944551	AF1-120 C	1.4538	Adder	1.71
944552	AF1-120 E	0.7324	Adder	0.86
945401	AF1-205 C	1.3342	Adder	1.57
945402	AF1-205 E	0.8894	Adder	1.05
945411	AF1-206 C O1	6.5258	Adder	7.68
945412	AF1-206 E O1	4.3505	Adder	5.12
958321	AF2-126 C	1.9851	Adder	2.34
958322	AF2-126 E	0.9926	Adder	1.17
960301	AF2-321 C	4.5001	Adder	5.29

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960302	AF2-321 E	3.0001	Adder	3.53
960841	AF2-375 C	3.3306	Adder	3.92
960842	AF2-375 E	2.2204	Adder	2.61
962121	AG1-056 C	0.8702	Adder	1.93
962122	AG1-056 E	0.5802	Adder	1.29
962281	AG1-076 C O1	1.9239	Adder	4.27
962282	AG1-076 E O1	2.8858	Adder	6.41
963501	AG1-199	8.6374	Adder	19.17
964561	AG1-319 C	2.9345	Adder	6.51
964562	AG1-319 E	1.9563	Adder	4.34
WEC	WEC	0.5818	Confirmed LTF	0.5818
LGEE	LGEE	0.8017	Confirmed LTF	0.8017
CPLE	CPLE	0.1679	Confirmed LTF	0.1679
CBM-W2	CBM-W2	11.3882	Confirmed LTF	11.3882
NY	NY	0.6548	Confirmed LTF	0.6548
TVA	TVA	1.3958	Confirmed LTF	1.3958
O-066	O-066	6.6021	Confirmed LTF	6.6021
SIGE	SIGE	0.2493	Confirmed LTF	0.2493
CBM-S2	CBM-S2	4.3222	Confirmed LTF	4.3222
CBM-S1	CBM-S1	0.3979	Confirmed LTF	0.3979
G-007	G-007	1.0227	Confirmed LTF	1.0227
MEC	MEC	2.6028	Confirmed LTF	2.6028
LAGN	LAGN	1.9198	Confirmed LTF	1.9198
CBM-W1	CBM-W1	37.5736	Confirmed LTF	37.5736

11.6.9 Index 9

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
164515706	238889	02LEMOYN	ATSI	242936	05FOSTOR	AEP	1	ATSI-P2-3-TE-345-034T	breaker	1390.0	127.15	129.9	DC	38.04

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238564	02BAYSG1	4.9108	50/50	4.9108
238670	**02DVBSG1 (Deactivation : 31/05/2020)**	**27.0881**	**50/50**	**27.0881**
238885	02LEMOG1	8.4367	50/50	8.4367
238886	02LEMOG2	8.4367	50/50	8.4367
238887	02LEMOG3	8.4367	50/50	8.4367
238888	02LEMOG4	8.4367	50/50	8.4367
238979	02NAPMUN	8.4778	50/50	8.4778
240624	02GALON M2	-4.1426	Adder	-4.87
240968	02BG2 GEN	1.7009	50/50	1.7009
240969	02BG4 G1	0.4256	50/50	0.4256
240973	02BG6 AMPO	6.6427	50/50	6.6427
240975	02PGE GEN	8.7979	50/50	8.7979
240997	02BG10	4.7306	50/50	4.7306
241898	02Y1-069_1A	9.3337	50/50	9.3337
241899	02Y1-069_1B	9.3337	50/50	9.3337
241900	02Y1-069_1S	12.1446	50/50	12.1446
241946	**AB1-107 CT1 (Suspended)**	**63.2647**	**50/50**	**63.2647**
241947	**AB1-107 CT2 (Suspended)**	**64.9181**	**50/50**	**64.9181**
241948	**AB1-107 ST1 (Suspended)**	**73.1066**	**50/50**	**73.1066**
244357	05GRANGER EL	-0.4457	Adder	-0.52
927185	**AC1-212 BAT (Withdrawn : 12/16/2020)**	**1.3707**	**Merchant Transmission**	**1.3707**
932791	AC2-103 C	5.9169	Adder	6.96
932792	AC2-103 E	39.6048	Adder	46.59
934764	AD1-103 C1	3.0060	Adder	3.54
934768	AD1-103 C2	3.9365	Adder	4.63
934769	AD1-103 C3	3.0060	Adder	3.54
934891	AD1-118	23.3954	50/50	23.3954
936722	AD2-091 BAT	5.6460	Merchant Transmission	5.6460
938911	AE1-119	183.8210	50/50	183.8210
941761	AE2-176 C	8.7114	Adder	10.25
941762	AE2-176 E	3.4846	Adder	4.1
941781	AE2-181 C	5.0037	Adder	5.89
941782	AE2-181 E	3.3358	Adder	3.92
942042	AE2-216 BAT	6.2106	Merchant Transmission	6.2106
942661	AE2-282 C	7.8380	Adder	9.22
942662	AE2-282 E	4.1243	Adder	4.85
943012	AE2-324 BAT	2.2460	Merchant Transmission	2.2460
943951	AF1-063 C O1	1.1397	Adder	1.34
943952	AF1-063 E O1	0.6318	Adder	0.74

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943961	AF1-064 C O1	6.2963	Adder	7.41
943962	AF1-064 E O1	3.1293	Adder	3.68
944551	AF1-120 C	4.7492	Adder	5.59
944552	AF1-120 E	2.3925	Adder	2.81
945401	AF1-205 C	5.4991	50/50	5.4991
945402	AF1-205 E	3.6661	50/50	3.6661
945411	AF1-206 C O1	21.3180	Adder	25.08
945412	AF1-206 E O1	14.2120	Adder	16.72
945623	AF1-227 BAT	7.7050	Merchant Transmission	7.7050
946052	AF1-270 BAT	4.3040	Merchant Transmission	4.3040
946141	AF1-279 C	7.2484	Adder	8.53
946142	AF1-279 E	4.8323	Adder	5.69
946203	AF1-285 BAT	2.0982	Merchant Transmission	2.0982
950351	J466	3.8385	PJM External (MISO)	3.8385
950791	J201 C	0.4637	PJM External (MISO)	0.4637
950792	J201 E	1.8549	PJM External (MISO)	1.8549
950871	J246 C	0.1521	PJM External (MISO)	0.1521
950872	J246 E	0.6082	PJM External (MISO)	0.6082
950942	J325 E	0.5270	PJM External (MISO)	0.5270
952201	J589 C	3.0202	PJM External (MISO)	3.0202
952202	J589 E	16.3398	PJM External (MISO)	16.3398
952312	J646 E	0.2269	PJM External (MISO)	0.2269
952401	J752 C	1.9562	PJM External (MISO)	1.9562
952402	J752 E	10.5838	PJM External (MISO)	10.5838
952611	J717 C	3.2723	PJM External (MISO)	3.2723
952612	J717 E	17.7042	PJM External (MISO)	17.7042
952761	J728 C	3.0432	PJM External (MISO)	3.0432
952762	J728 E	16.4866	PJM External (MISO)	16.4866
952881	J758	15.6880	PJM External (MISO)	15.6880
952971	J793	187.6050	PJM External (MISO)	187.6050
953071	J794 C	0.1971	PJM External (MISO)	0.1971
953072	J794 E	1.0662	PJM External (MISO)	1.0662
953271	J701 C	0.9586	PJM External (MISO)	0.9586
953272	J701 E	5.1860	PJM External (MISO)	5.1860
953291	J796	25.9578	PJM External (MISO)	25.9578
953321	J799	32.1886	PJM External (MISO)	32.1886
953361	J806	14.4143	PJM External (MISO)	14.4143
953771	J832	8.9910	PJM External (MISO)	8.9910
953781	J833	17.4120	PJM External (MISO)	17.4120
953941	J857	11.5179	PJM External (MISO)	11.5179
954111	J875	23.2755	PJM External (MISO)	23.2755
955071	J984 C	2.5768	PJM External (MISO)	2.5768
955072	J984 E	13.9412	PJM External (MISO)	13.9412
955181	J996	14.4904	PJM External (MISO)	14.4904
955591	J1043 C	1.4040	PJM External (MISO)	1.4040
955592	J1043 E	24.8789	PJM External (MISO)	24.8789
955781	J1062	35.4495	PJM External (MISO)	35.4495
956011	J1088	16.4520	PJM External (MISO)	16.4520
956021	J1089	18.7969	PJM External (MISO)	18.7969
956031	J1090	10.9260	PJM External (MISO)	10.9260
956741	J1172	5.9040	PJM External (MISO)	5.9040
956801	J1178	7.1260	PJM External (MISO)	7.1260

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957031	AF2-004 1	0.8201	Adder	0.96
957041	AF2-004 2	0.8201	Adder	0.96
957051	AF2-004 3	0.8201	Adder	0.96
957061	AF2-004 4	0.8201	Adder	0.96
957111	AF2-005	0.6911	Adder	0.81
958321	AF2-126 C	6.4094	Adder	7.54
958322	AF2-126 E	3.2047	Adder	3.77
958331	AF2-127 C	1.4703	Adder	1.73
958332	AF2-127 E	0.7735	Adder	0.91
960301	AF2-321 C	13.7555	Adder	16.18
960302	AF2-321 E	9.1703	Adder	10.79
962121	AG1-056 C	2.6600	Adder	5.9
962122	AG1-056 E	1.7733	Adder	3.94
963501	AG1-199	76.7880	50/50	76.7880
964561	AG1-319 C	22.8213	50/50	22.8213
964562	AG1-319 E	15.2142	50/50	15.2142
964602	AG1-323 BAT	1.7074	Merchant Transmission	1.7074
965432	AG1-411 BAT	4.4287	Merchant Transmission	4.4287
965571	AG1-425	1.2312	Adder	2.73
966132	AG1-482 BAT	1.0680	Merchant Transmission	1.0680
966311	AG1-500 C	20.3104	Adder	45.08
966312	AG1-500 E	1.1011	Adder	2.44
966321	AG1-501 C	0.4578	Adder	1.02
966322	AG1-501 E	0.0595	Adder	0.13
999763	AD1-103 E1	20.1173	Adder	23.67
999764	AD1-103 E2	26.3441	Adder	30.99
999765	AD1-103 E3	20.1173	Adder	23.67
G-007A	G-007A	0.2350	Confirmed LTF	0.2350
VFT	VFT	0.6837	Confirmed LTF	0.6837
CALDERWOOD	CALDERWOOD	0.8598	Confirmed LTF	0.8598
PRAIRIE	PRAIRIE	3.1228	Confirmed LTF	3.1228
CHEOAH	CHEOAH	0.8629	Confirmed LTF	0.8629
CBM-N	CBM-N	0.1500	Confirmed LTF	0.1500
COTTONWOOD	COTTONWOOD	2.9904	Confirmed LTF	2.9904
HAMLET	HAMLET	0.8518	Confirmed LTF	0.8518
GIBSON	GIBSON	0.9451	Confirmed LTF	0.9451
BLUEG	BLUEG	3.8504	Confirmed LTF	3.8504
TRIMBLE	TRIMBLE	1.2471	Confirmed LTF	1.2471
CATAWBA	CATAWBA	0.5527	Confirmed LTF	0.5527
CBM-W1	CBM-W1	55.1266	Confirmed LTF	55.1266

11.6.10 Index 10

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
167383780	239060	02RDGVL	ATSI	239070	02RICHLD	ATSI	1	ATSI-P2-3-TE-138-013	breaker	194.0	102.11	146.33	DC	85.8

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	19.1231	50/50	19.1231
239202	02STRYCT	1.0107	50/50	1.0107
941781	AE2-181 C	11.8899	50/50	11.8899
941782	AE2-181 E	7.9266	50/50	7.9266
942661	AE2-282 C	15.2280	50/50	15.2280
942662	AE2-282 E	8.0129	50/50	8.0129
944551	AF1-120 C	9.2270	50/50	9.2270
944552	AF1-120 E	4.6482	50/50	4.6482
945401	AF1-205 C	12.4042	50/50	12.4042
945402	AF1-205 E	8.2694	50/50	8.2694
945411	AF1-206 C O1	41.4175	50/50	41.4175
945412	AF1-206 E O1	27.6116	50/50	27.6116
960301	AF2-321 C	49.0371	50/50	49.0371
960302	AF2-321 E	32.6914	50/50	32.6914
962121	AG1-056 C	17.8919	50/50	17.8919
962122	AG1-056 E	11.9280	50/50	11.9280
964561	AG1-319 C	51.4773	50/50	51.4773
964562	AG1-319 E	34.3182	50/50	34.3182
G-007A	G-007A	0.2469	Confirmed LTF	0.2469
VFT	VFT	0.6644	Confirmed LTF	0.6644
CALDERWOOD	CALDERWOOD	0.0522	Confirmed LTF	0.0522
PRAIRIE	PRAIRIE	0.4908	Confirmed LTF	0.4908
CHEOAH	CHEOAH	0.0521	Confirmed LTF	0.0521
CBM-N	CBM-N	0.1248	Confirmed LTF	0.1248
COTTONWOOD	COTTONWOOD	0.3066	Confirmed LTF	0.3066
HAMLET	HAMLET	0.0271	Confirmed LTF	0.0271
GIBSON	GIBSON	0.1179	Confirmed LTF	0.1179
BLUEG	BLUEG	0.3229	Confirmed LTF	0.3229
TRIMBLE	TRIMBLE	0.1030	Confirmed LTF	0.1030
CATAWBA	CATAWBA	0.0210	Confirmed LTF	0.0210
CBM-W1	CBM-W1	1.8366	Confirmed LTF	1.8366

11.6.11 Index 11

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
161700073	239070	02RICHLD	ATSI	243029	05LCKWRD	AEP	1	AEP_P7-1_#10984-B	tower	223.0	105.37	114.75	DC	20.92

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	4.6638	50/50	4.6638
239064	02RICHG1	0.6303	50/50	0.6303
239065	02RICHG2&3	1.2554	50/50	1.2554
239067	02RICHG4	6.8564	50/50	6.8564
239068	02RICHG5	6.8569	50/50	6.8569
239069	02RICHG6	6.8569	50/50	6.8569
239202	02STRYCT	0.3980	50/50	0.3980
240968	02BG2 GEN	0.4781	Adder	0.56
240969	02BG4 G1	0.1097	Adder	0.13
240973	02BG6 AMPO	1.7231	Adder	2.03
240975	02PGE GEN	2.2924	Adder	2.7
240997	02BG10	1.2199	Adder	1.44
940841	AE2-072 C	32.5341	50/50	32.5341
940842	AE2-072 E	21.6894	50/50	21.6894
941781	AE2-181 C	5.1965	50/50	5.1965
941782	AE2-181 E	3.4643	50/50	3.4643
942661	AE2-282 C	6.5411	50/50	6.5411
942662	AE2-282 E	3.4419	50/50	3.4419
943793	AF1-047 BAT	3.3968	Merchant Transmission	3.3968
943961	AF1-064 C O1	4.1002	50/50	4.1002
943962	AF1-064 E O1	2.0378	50/50	2.0378
944551	AF1-120 C	3.9634	50/50	3.9634
944552	AF1-120 E	1.9966	50/50	1.9966
945401	AF1-205 C	3.0252	50/50	3.0252
945402	AF1-205 E	2.0168	50/50	2.0168
945411	AF1-206 C O1	17.7906	50/50	17.7906
945412	AF1-206 E O1	11.8604	50/50	11.8604
958321	AF2-126 C	4.1738	50/50	4.1738
958322	AF2-126 E	2.0869	50/50	2.0869
960301	AF2-321 C	19.3646	50/50	19.3646
960302	AF2-321 E	12.9097	50/50	12.9097
962121	AG1-056 C	7.0655	50/50	7.0655
962122	AG1-056 E	4.7103	50/50	4.7103
964561	AG1-319 C	12.5546	50/50	12.5546
964562	AG1-319 E	8.3697	50/50	8.3697
G-007A	G-007A	0.4915	Confirmed LTF	0.4915
VFT	VFT	1.3287	Confirmed LTF	1.3287
CALDERWOOD	CALDERWOOD	0.2435	Confirmed LTF	0.2435
PRAIRIE	PRAIRIE	2.2420	Confirmed LTF	2.2420
CHEOAH	CHEOAH	0.2422	Confirmed LTF	0.2422
CBM-N	CBM-N	0.2520	Confirmed LTF	0.2520

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
COTTONWOOD	COTTONWOOD	1.4196	Confirmed LTF	1.4196
HAMLET	HAMLET	0.1617	Confirmed LTF	0.1617
GIBSON	GIBSON	0.5007	Confirmed LTF	0.5007
BLUEG	BLUEG	1.3124	Confirmed LTF	1.3124
TRIMBLE	TRIMBLE	0.4185	Confirmed LTF	0.4185
CATAWBA	CATAWBA	0.1138	Confirmed LTF	0.1138

11.6.12 Index 12

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
165601021	239070	02RICHLD	ATSI	239165	02WAUSEO	ATSI	1	AEP_P7-1_#10983-B	tower	190.0	141.61	144.13	DC	10.57

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	2.0034	Adder	2.36
239064	02RICHG1	0.7415	50/50	0.7415
239065	02RICHG2&3	1.4754	50/50	1.4754
239067	02RICHG4	8.0659	50/50	8.0659
239068	02RICHG5	8.0666	50/50	8.0666
239069	02RICHG6	8.0666	50/50	8.0666
239202	02STRYCT	0.3245	50/50	0.3245
940841	AE2-072 C	38.2554	50/50	38.2554
940842	AE2-072 E	25.5036	50/50	25.5036
941781	AE2-181 C	3.4457	50/50	3.4457
941782	AE2-181 E	2.2971	50/50	2.2971
942661	AE2-282 C	4.7675	50/50	4.7675
942662	AE2-282 E	2.5087	50/50	2.5087
943961	AF1-064 C O1	2.2374	Adder	2.63
943962	AF1-064 E O1	1.1120	Adder	1.31
944551	AF1-120 C	2.8888	50/50	2.8888
944552	AF1-120 E	1.4552	50/50	1.4552
945401	AF1-205 C	1.2995	Adder	1.53
945402	AF1-205 E	0.8663	Adder	1.02
945411	AF1-206 C O1	12.9668	50/50	12.9668
945412	AF1-206 E O1	8.6446	50/50	8.6446
958321	AF2-126 C	2.2776	Adder	2.68
958322	AF2-126 E	1.1388	Adder	1.34
960301	AF2-321 C	17.4794	50/50	17.4794
960302	AF2-321 E	11.6529	50/50	11.6529
962121	AG1-056 C	6.3776	50/50	6.3776
962122	AG1-056 E	4.2517	50/50	4.2517
964561	AG1-319 C	2.8582	Adder	6.34
964562	AG1-319 E	1.9055	Adder	4.23
CALDERWOOD	CALDERWOOD	0.0452	Confirmed LTF	0.0452
NY	NY	0.0487	Confirmed LTF	0.0487
PRAIRIE	PRAIRIE	0.2402	Confirmed LTF	0.2402
O-066	O-066	0.5922	Confirmed LTF	0.5922
CHEOAH	CHEOAH	0.0455	Confirmed LTF	0.0455
COTTONWOOD	COTTONWOOD	0.1932	Confirmed LTF	0.1932
G-007	G-007	0.0924	Confirmed LTF	0.0924
HAMLET	HAMLET	0.0520	Confirmed LTF	0.0520
GIBSON	GIBSON	0.0508	Confirmed LTF	0.0508
BLUEG	BLUEG	0.1597	Confirmed LTF	0.1597
TRIMBLE	TRIMBLE	0.0512	Confirmed LTF	0.0512
CATAWBA	CATAWBA	0.0319	Confirmed LTF	0.0319

11.6.13 Index 13

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
16451572 6	239154	02W.FREM	ATSI	243009	05FRMNT	AEP	1	AEP_P4_#517_05FOSTOR 345_A1	breaker	361.0	124.5	125.7	DC	9.51

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238601	02FRMENG 1	5.6013	50/50	5.6013
238602	02FRMENG 2	5.4826	50/50	5.4826
238603	02FRMENG 3	11.9999	50/50	11.9999
238979	02NAPMUN	1.8011	Adder	2.12
240968	02BG2 GEN	0.4334	Adder	0.51
240969	02BG4 G1	0.1114	Adder	0.13
240973	02BG6 AMPO	1.7205	Adder	2.02
240975	02PGE GEN	2.2622	Adder	2.66
240997	02BG10	1.2371	Adder	1.46
241946	**AB1-107 CT1 (Suspended)**	**18.3046**	**Adder**	**21.53**
241947	**AB1-107 CT2 (Suspended)**	**14.7433**	**Adder**	**17.35**
241948	**AB1-107 ST1 (Suspended)**	**16.6030**	**Adder**	**19.53**
244357	05GRANGER EL	-0.2381	Adder	-0.28
932791	AC2-103 C	1.6575	Adder	1.95
932792	AC2-103 E	11.0943	Adder	13.05
934764	AD1-103 C1	0.8421	Adder	0.99
934768	AD1-103 C2	1.1027	Adder	1.3
934769	AD1-103 C3	0.8421	Adder	0.99
934891	AD1-118	3.7312	Adder	4.39
938911	AE1-119	29.3169	Adder	34.49
941761	AE2-176 C	9.7927	50/50	9.7927
941762	AE2-176 E	3.9171	50/50	3.9171
942661	AE2-282 C	1.9728	Adder	2.32
942662	AE2-282 E	1.0381	Adder	1.22
943961	AF1-064 C O1	1.7517	Adder	2.06
943962	AF1-064 E O1	0.8706	Adder	1.02
944551	AF1-120 C	1.1954	Adder	1.41
944552	AF1-120 E	0.6022	Adder	0.71
945401	AF1-205 C	1.1683	Adder	1.37
945402	AF1-205 E	0.7789	Adder	0.92
945411	AF1-206 C O1	5.3658	Adder	6.31
945412	AF1-206 E O1	3.5772	Adder	4.21
958321	AF2-126 C	1.7831	Adder	2.1
958322	AF2-126 E	0.8916	Adder	1.05
963501	AG1-199	7.9157	Adder	17.57
964561	AG1-319 C	2.5697	Adder	5.7
964562	AG1-319 E	1.7131	Adder	3.8
965571	AG1-425	2.6114	50/50	2.6114
999763	AD1-103 E1	5.6353	Adder	6.63
999764	AD1-103 E2	7.3796	Adder	8.68
999765	AD1-103 E3	5.6353	Adder	6.63
G-007A	G-007A	0.0575	Confirmed LTF	0.0575

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
VFT	VFT	0.1741	Confirmed LTF	0.1741
CALDERWOOD	CALDERWOOD	0.2957	Confirmed LTF	0.2957
PRAIRIE	PRAIRIE	1.1985	Confirmed LTF	1.1985
CHEOAH	CHEOAH	0.2968	Confirmed LTF	0.2968
CBM-N	CBM-N	0.0396	Confirmed LTF	0.0396
COTTONWOOD	COTTONWOOD	1.0836	Confirmed LTF	1.0836
HAMLET	HAMLET	0.2916	Confirmed LTF	0.2916
GIBSON	GIBSON	0.3309	Confirmed LTF	0.3309
BLUEG	BLUEG	1.2881	Confirmed LTF	1.2881
TRIMBLE	TRIMBLE	0.4168	Confirmed LTF	0.4168
CATAWBA	CATAWBA	0.1890	Confirmed LTF	0.1890
CBM-W1	CBM-W1	12.8984	Confirmed LTF	12.8984

11.6.14 Index 14

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
16451581 4	23917 7	02WOODV I	ATSI	24542 2	05W.END FOS2	AEP	1	AEP_P4_#517_05FOSTOR 345_A1	breaker	185.0	103.05	105.43	DC	9.76

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	1.8496	Adder	2.18
240968	02BG2 GEN	0.4751	Adder	0.56
240969	02BG4 G1	0.1203	Adder	0.14
240973	02BG6 AMPO	1.8769	Adder	2.21
240975	02PGE GEN	2.4842	Adder	2.92
240997	02BG10	1.3376	Adder	1.57
241946	**AB1-107 CT1 (Suspended)**	**14.6848**	**Adder**	**17.28**
241947	**AB1-107 CT2 (Suspended)**	**12.2950**	**Adder**	**14.46**
241948	**AB1-107 ST1 (Suspended)**	**13.8459**	**Adder**	**16.29**
244357	05GRANGER EL	-0.2903	Adder	-0.34
934891	AD1-118	3.7592	Adder	4.42
938911	AE1-119	29.5366	Adder	34.75
942661	AE2-282 C	1.9090	Adder	2.25
942662	AE2-282 E	1.0045	Adder	1.18
943961	AF1-064 C O1	1.8581	Adder	2.19
943962	AF1-064 E O1	0.9235	Adder	1.09
944551	AF1-120 C	1.1567	Adder	1.36
944552	AF1-120 E	0.5827	Adder	0.69
945401	AF1-205 C	1.1997	Adder	1.41
945402	AF1-205 E	0.7998	Adder	0.94
945411	AF1-206 C O1	5.1922	Adder	6.11
945412	AF1-206 E O1	3.4615	Adder	4.07
958321	AF2-126 C	1.8915	Adder	2.23
958322	AF2-126 E	0.9458	Adder	1.11
963501	AG1-199	7.6198	Adder	16.91
964561	AG1-319 C	2.6388	Adder	5.86
964562	AG1-319 E	1.7592	Adder	3.9
G-007A	G-007A	0.0551	Confirmed LTF	0.0551
VFT	VFT	0.1548	Confirmed LTF	0.1548
CALDERWOOD	CALDERWOOD	0.2028	Confirmed LTF	0.2028
PRAIRIE	PRAIRIE	0.7568	Confirmed LTF	0.7568
CHEOAH	CHEOAH	0.2037	Confirmed LTF	0.2037
CBM-N	CBM-N	0.0348	Confirmed LTF	0.0348
COTTONWOOD	COTTONWOOD	0.7140	Confirmed LTF	0.7140
HAMLET	HAMLET	0.1998	Confirmed LTF	0.1998
GIBSON	GIBSON	0.2271	Confirmed LTF	0.2271
BLUEG	BLUEG	0.9166	Confirmed LTF	0.9166
TRIMBLE	TRIMBLE	0.2966	Confirmed LTF	0.2966
CATAWBA	CATAWBA	0.1299	Confirmed LTF	0.1299
CBM-W1	CBM-W1	13.1367	Confirmed LTF	13.1367

11.6.15 Index 15

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
165601036	239351	02EASTFAYT	ATSI	238712	02FAYET	ATSI	1	ATSI-P7-1-TE-138-016	tower	262.0	114.49	136.85	DC	58.56

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	13.0536	50/50	13.0536
239064	02RICHG1	0.2401	50/50	0.2401
239065	02RICHG2&3	0.4730	50/50	0.4730
239067	02RICHG4	2.6115	50/50	2.6115
239068	02RICHG5	2.6117	50/50	2.6117
239069	02RICHG6	2.6117	50/50	2.6117
239202	02STRYCT	0.7015	50/50	0.7015
940841	AE2-072 C	6.3908	Adder	7.52
940842	AE2-072 E	4.2605	Adder	5.01
941781	AE2-181 C	11.7315	50/50	11.7315
941782	AE2-181 E	7.8210	50/50	7.8210
942661	AE2-282 C	24.4716	50/50	24.4716
942662	AE2-282 E	12.8769	50/50	12.8769
943951	AF1-063 C O1	1.5403	Adder	1.81
943952	AF1-063 E O1	0.8539	Adder	1.0
944551	AF1-120 C	14.8279	50/50	14.8279
944552	AF1-120 E	7.4697	50/50	7.4697
945401	AF1-205 C	8.4672	50/50	8.4672
945402	AF1-205 E	5.6448	50/50	5.6448
945411	AF1-206 C O1	66.5583	50/50	66.5583
945412	AF1-206 E O1	44.3722	50/50	44.3722
958331	AF2-127 C	1.9872	Adder	2.34
958332	AF2-127 E	1.0455	Adder	1.23
960301	AF2-321 C	29.2552	50/50	29.2552
960302	AF2-321 E	19.5034	50/50	19.5034
962121	AG1-056 C	10.6742	50/50	10.6742
962122	AG1-056 E	7.1161	50/50	7.1161
964561	AG1-319 C	35.1389	50/50	35.1389
964562	AG1-319 E	23.4259	50/50	23.4259
WEC	WEC	0.0589	Confirmed LTF	0.0589
LGEE	LGEE	0.0961	Confirmed LTF	0.0961
CPLE	CPLE	0.0184	Confirmed LTF	0.0184
CBM-W2	CBM-W2	1.2902	Confirmed LTF	1.2902
NY	NY	0.0625	Confirmed LTF	0.0625
TVA	TVA	0.1554	Confirmed LTF	0.1554
O-066	O-066	0.6394	Confirmed LTF	0.6394
SIGE	SIGE	0.0279	Confirmed LTF	0.0279
CBM-S2	CBM-S2	0.4698	Confirmed LTF	0.4698
CBM-S1	CBM-S1	0.0452	Confirmed LTF	0.0452
G-007	G-007	0.0987	Confirmed LTF	0.0987
MEC	MEC	0.2717	Confirmed LTF	0.2717

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LAGN	LAGN	0.2118	Confirmed LTF	0.2118

11.6.16 Index 16

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
161700082	256000	18ARGNTA	METC	243234	05TWIN B	AEP	1	AEP_P7-1_#10999	tower	1409.0	112.22	112.68	DC	14.25

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	2.6994	Adder	3.18
240968	02BG2 GEN	0.5312	Adder	0.62
240969	02BG4 G1	0.1335	Adder	0.16
240973	02BG6 AMPO	2.0761	Adder	2.44
240975	02PGE GEN	2.7428	Adder	3.23
240997	02BG10	1.4831	Adder	1.74
241946	**AB1-107 CT1 (Suspended)**	**21.4076**	**Adder**	**25.19**
241947	**AB1-107 CT2 (Suspended)**	**21.8636**	**Adder**	**25.72**
241948	**AB1-107 ST1 (Suspended)**	**24.6214**	**Adder**	**28.97**
244415	05OLIV SLR C	-0.1301	Adder	-0.15
247528	05COVRT1	9.3873	50/50	9.3873
247529	05COVRT2	9.3873	50/50	9.3873
247530	05COVRT3	9.3873	50/50	9.3873
247531	05COVRT4	5.6460	50/50	5.6460
247532	05COVRT5	5.6033	50/50	5.6033
247533	05COVRT6	5.6460	50/50	5.6460
247548	V4-010 C	1.2964	Adder	1.53
247551	**U4-028 C (Suspended)**	**0.6095**	**Adder**	**0.72**
247552	**U4-029 C (Suspended)**	**0.6095**	**Adder**	**0.72**
247940	**U4-028 E (Suspended)**	**4.0791**	**Adder**	**4.8**
247941	**U4-029 E (Suspended)**	**4.0791**	**Adder**	**4.8**
247947	V4-010 E	8.6758	Adder	10.21
932791	AC2-103 C	2.1564	Adder	2.54
932792	AC2-103 E	14.4336	Adder	16.98
933282	AC2-140 E	-0.0919	Adder	-0.11
934461	AD1-070 C O1	1.7564	Adder	2.07
934462	AD1-070 E O1	8.2455	Adder	9.7
934764	AD1-103 C1	1.0955	Adder	1.29
934768	AD1-103 C2	1.4346	Adder	1.69
934769	AD1-103 C3	1.0955	Adder	1.29
934891	AD1-118	5.3455	Adder	6.29
936601	AD2-075	39.2515	50/50	39.2515
937021	AD2-136 C O1	2.1943	Adder	2.58
937022	AD2-136 E O1	14.6847	Adder	17.28
938911	AE1-119	42.0002	Adder	49.41
939161	AE1-146 C O1	3.5467	Adder	4.17
939162	AE1-146 E O1	1.6563	Adder	1.95
941741	AE2-174 C	1.7377	Adder	2.04
941742	AE2-174 E	8.1348	Adder	9.57
941761	AE2-176 C	4.1622	Adder	4.9
941762	AE2-176 E	1.6649	Adder	1.96
941781	AE2-181 C	2.0377	Adder	2.4

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941782	AE2-181 E	1.3585	Adder	1.6
942661	AE2-282 C	3.2386	Adder	3.81
942662	AE2-282 E	1.7041	Adder	2.0
943023	AE2-325 BAT	3.1722	Merchant Transmission	3.1722
943961	AF1-064 C O1	2.3623	Adder	2.78
943962	AF1-064 E O1	1.1741	Adder	1.38
944551	AF1-120 C	1.9623	Adder	2.31
944552	AF1-120 E	0.9885	Adder	1.16
944963	AF1-161 BAT	3.0385	Merchant Transmission	3.0385
945113	AF1-176 BAT	6.5556	Merchant Transmission	6.5556
945401	AF1-205 C	1.7509	Adder	2.06
945402	AF1-205 E	1.1673	Adder	1.37
945411	AF1-206 C O1	8.8083	Adder	10.36
945412	AF1-206 E O1	5.8722	Adder	6.91
945641	AF1-229 C	3.3079	Adder	3.89
945642	AF1-229 E	2.2052	Adder	2.59
950351	J466	5.0346	PJM External (MISO)	5.0346
950791	J201 C	0.7211	PJM External (MISO)	0.7211
950792	J201 E	2.8845	PJM External (MISO)	2.8845
950871	J246 C	0.2626	PJM External (MISO)	0.2626
950872	J246 E	1.0503	PJM External (MISO)	1.0503
950942	J325 E	0.6558	PJM External (MISO)	0.6558
952161	J571	1.5015	PJM External (MISO)	1.5015
952201	J589 C	6.2216	PJM External (MISO)	6.2216
952202	J589 E	33.6604	PJM External (MISO)	33.6604
952312	J646 E	0.2452	PJM External (MISO)	0.2452
952401	J752 C	2.6586	PJM External (MISO)	2.6586
952402	J752 E	14.3834	PJM External (MISO)	14.3834
952611	J717 C	5.9772	PJM External (MISO)	5.9772
952612	J717 E	32.3380	PJM External (MISO)	32.3380
952761	J728 C	5.5587	PJM External (MISO)	5.5587
952762	J728 E	30.1141	PJM External (MISO)	30.1141
952881	J758	43.6740	PJM External (MISO)	43.6740
952971	J793	202.7155	PJM External (MISO)	202.7155
953071	J794 C	0.3805	PJM External (MISO)	0.3805
953072	J794 E	2.0588	PJM External (MISO)	2.0588
953271	J701 C	1.3027	PJM External (MISO)	1.3027
953272	J701 E	7.0479	PJM External (MISO)	7.0479
953291	J796	44.8268	PJM External (MISO)	44.8268
953321	J799	24.9234	PJM External (MISO)	24.9234
953361	J806	30.2023	PJM External (MISO)	30.2023
953771	J832	20.7040	PJM External (MISO)	20.7040
953781	J833	13.0440	PJM External (MISO)	13.0440
953941	J857	25.7922	PJM External (MISO)	25.7922
954111	J875	22.6620	PJM External (MISO)	22.6620
954591	J937	143.7545	PJM External (MISO)	143.7545
955071	J984 C	6.6581	PJM External (MISO)	6.6581
955072	J984 E	36.0219	PJM External (MISO)	36.0219
955181	J996	10.3680	PJM External (MISO)	10.3680
955591	J1043 C	4.4966	PJM External (MISO)	4.4966
955592	J1043 E	79.6798	PJM External (MISO)	79.6798
955781	J1062	16.3470	PJM External (MISO)	16.3470

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
955861	J1071	23.7570	PJM External (MISO)	23.7570
956011	J1088	28.1490	PJM External (MISO)	28.1490
956021	J1089	31.7135	PJM External (MISO)	31.7135
956031	J1090	16.5123	PJM External (MISO)	16.5123
956741	J1172	8.9175	PJM External (MISO)	8.9175
956801	J1178	12.6100	PJM External (MISO)	12.6100
958321	AF2-126 C	2.4048	Adder	2.83
958322	AF2-126 E	1.2024	Adder	1.41
960301	AF2-321 C	5.6640	Adder	6.66
960302	AF2-321 E	3.7760	Adder	4.44
960841	AF2-375 C	3.6155	Adder	4.25
960842	AF2-375 E	2.4103	Adder	2.84
961052	AF2-396 BAT	4.6432	Merchant Transmission	4.6432
962121	AG1-056 C	1.0953	Adder	2.43
962122	AG1-056 E	0.7302	Adder	1.62
962281	AG1-076 C O1	2.1204	Adder	4.71
962282	AG1-076 E O1	3.1806	Adder	7.06
962602	AG1-109 BAT	1.6104	Merchant Transmission	1.6104
963501	AG1-199	33.6030	50/50	33.6030
964561	AG1-319 C	3.8512	Adder	8.55
964562	AG1-319 E	2.5674	Adder	5.7
965571	AG1-425	0.5883	Adder	1.31
965792	AG1-447 BAT	1.6887	Merchant Transmission	1.6887
965802	AG1-448 BAT	1.6887	Merchant Transmission	1.6887
999763	AD1-103 E1	7.3315	Adder	8.63
999764	AD1-103 E2	9.6008	Adder	11.3
999765	AD1-103 E3	7.3315	Adder	8.63
G-007A	G-007A	2.1026	Confirmed LTF	2.1026
VFT	VFT	5.6824	Confirmed LTF	5.6824
CALDERWOOD	CALDERWOOD	0.5830	Confirmed LTF	0.5830
PRAIRIE	PRAIRIE	7.0490	Confirmed LTF	7.0490
CHEOAH	CHEOAH	0.5791	Confirmed LTF	0.5791
CBM-N	CBM-N	1.0680	Confirmed LTF	1.0680
COTTONWOOD	COTTONWOOD	4.1790	Confirmed LTF	4.1790
HAMLET	HAMLET	0.2980	Confirmed LTF	0.2980
GIBSON	GIBSON	1.2323	Confirmed LTF	1.2323
BLUEG	BLUEG	2.9720	Confirmed LTF	2.9720
TRIMBLE	TRIMBLE	0.9449	Confirmed LTF	0.9449
CATAWBA	CATAWBA	0.2275	Confirmed LTF	0.2275
CBM-W1	CBM-W1	48.7616	Confirmed LTF	48.7616

11.6.17 Index 17

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
161700025	940840	AE2-072 TAP	ATSI	242993	05E.LEIPSIC2	AEP	1	ATSI-P7-1-TE-138-016	tower	223.0	117.9	128.46	DC	23.55

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	5.2481	50/50	5.2481
239064	02RICHG1	0.3543	50/50	0.3543
239065	02RICHG2&3	0.7314	50/50	0.7314
239067	02RICHG4	3.8543	50/50	3.8543
239068	02RICHG5	3.8546	50/50	3.8546
239069	02RICHG6	3.8546	50/50	3.8546
239202	02STRYCT	0.2815	50/50	0.2815
940841	AE2-072 C	46.5426	50/50	46.5426
940842	AE2-072 E	31.0284	50/50	31.0284
941781	AE2-181 C	3.6136	50/50	3.6136
941782	AE2-181 E	2.4090	50/50	2.4090
942661	AE2-282 C	4.4049	50/50	4.4049
942662	AE2-282 E	2.3179	50/50	2.3179
943951	AF1-063 C O1	2.6159	50/50	2.6159
943952	AF1-063 E O1	1.4503	50/50	1.4503
943961	AF1-064 C O1	1.5121	Adder	1.78
943962	AF1-064 E O1	0.7515	Adder	0.88
944551	AF1-120 C	2.6690	50/50	2.6690
944552	AF1-120 E	1.3446	50/50	1.3446
945401	AF1-205 C	3.4042	50/50	3.4042
945402	AF1-205 E	2.2694	50/50	2.2694
945411	AF1-206 C O1	11.9806	50/50	11.9806
945412	AF1-206 E O1	7.9871	50/50	7.9871
958321	AF2-126 C	1.5392	Adder	1.81
958322	AF2-126 E	0.7696	Adder	0.91
958331	AF2-127 C	3.3749	50/50	3.3749
958332	AF2-127 E	1.7756	50/50	1.7756
959181	AF2-209 C	4.9676	Adder	5.84
959182	AF2-209 E	2.3224	Adder	2.73
960301	AF2-321 C	13.1957	50/50	13.1957
960302	AF2-321 E	8.7971	50/50	8.7971
962121	AG1-056 C	4.8146	50/50	4.8146
962122	AG1-056 E	3.2098	50/50	3.2098
964561	AG1-319 C	14.1273	50/50	14.1273
964562	AG1-319 E	9.4182	50/50	9.4182
WEC	WEC	0.0454	Confirmed LTF	0.0454
CALDERWOOD	CALDERWOOD	0.0487	Confirmed LTF	0.0487
NY	NY	0.0359	Confirmed LTF	0.0359
O-066	O-066	0.5317	Confirmed LTF	0.5317
SIGE	SIGE	0.0035	Confirmed LTF	0.0035
CHEOAH	CHEOAH	0.0495	Confirmed LTF	0.0495

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
COTTONWOOD	COTTONWOOD	0.0735	Confirmed LTF	0.0735
G-007	G-007	0.0830	Confirmed LTF	0.0830
HAMLET	HAMLET	0.0658	Confirmed LTF	0.0658
MEC	MEC	0.1382	Confirmed LTF	0.1382
GIBSON	GIBSON	0.0147	Confirmed LTF	0.0147
BLUEG	BLUEG	0.1875	Confirmed LTF	0.1875
TRIMBLE	TRIMBLE	0.0618	Confirmed LTF	0.0618
CATAWBA	CATAWBA	0.0399	Confirmed LTF	0.0399
CBM-W1	CBM-W1	4.8089	Confirmed LTF	4.8089

11.6.18 Index 18

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
167141221	960300	AF2-321 TAP	ATSI	239060	02RDGVL	ATSI	1	ATSI-P2-4-TE-138-015	breaker	181.0	113.86	161.0	DC	85.33

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
238979	02NAPMUN	19.0187	50/50	19.0187
239202	02STRYCT	1.0051	50/50	1.0051
941781	AE2-181 C	11.8150	50/50	11.8150
941782	AE2-181 E	7.8767	50/50	7.8767
942661	AE2-282 C	15.1464	50/50	15.1464
942662	AE2-282 E	7.9700	50/50	7.9700
944551	AF1-120 C	9.1775	50/50	9.1775
944552	AF1-120 E	4.6233	50/50	4.6233
945401	AF1-205 C	12.3365	50/50	12.3365
945402	AF1-205 E	8.2243	50/50	8.2243
945411	AF1-206 C O1	41.1954	50/50	41.1954
945412	AF1-206 E O1	27.4636	50/50	27.4636
960301	AF2-321 C	48.7761	50/50	48.7761
960302	AF2-321 E	32.5174	50/50	32.5174
962121	AG1-056 C	17.7967	50/50	17.7967
962122	AG1-056 E	11.8644	50/50	11.8644
964561	AG1-319 C	51.1964	50/50	51.1964
964562	AG1-319 E	34.1309	50/50	34.1309
G-007A	G-007A	0.2541	Confirmed LTF	0.2541
VFT	VFT	0.6837	Confirmed LTF	0.6837
CALDERWOOD	CALDERWOOD	0.0527	Confirmed LTF	0.0527
PRAIRIE	PRAIRIE	0.4985	Confirmed LTF	0.4985
CHEOAH	CHEOAH	0.0526	Confirmed LTF	0.0526
CBM-N	CBM-N	0.1296	Confirmed LTF	0.1296
COTTONWOOD	COTTONWOOD	0.3108	Confirmed LTF	0.3108
HAMLET	HAMLET	0.0271	Confirmed LTF	0.0271
GIBSON	GIBSON	0.1201	Confirmed LTF	0.1201
BLUEG	BLUEG	0.3281	Confirmed LTF	0.3281
TRIMBLE	TRIMBLE	0.1052	Confirmed LTF	0.1052
CATAWBA	CATAWBA	0.0210	Confirmed LTF	0.0210
CBM-W1	CBM-W1	1.8927	Confirmed LTF	1.8927

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
AA1-006	Erie County Landfill	In Service
AB1-107	Bayshore-GM Powertrain 138 kV & Lallendorf 345kV	Suspended
AC1-051	Willard-S. Greenwich 69kV	Withdrawn
AC1-212	Minster 69kV	Withdrawn
AC2-015	Chatfield-Howard 138kV	Active
AC2-103	Beaver-Davis Besse 345 kV I	Engineering and Procurement
AC2-140	DC Cook Unit 2	In Service
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
AD2-136	Melmore Tap 138kV	Active
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
AE2-325	Valley 138 kV	Active
AF1-047	Mark Center 69 kV	Active
AF1-063	Lockwood Road 138 kV	Active
AF1-064	Weston 69 kV	Active
AF1-120	East Fayette 2 138 kV	Active
AF1-161	Valley 138 kV	Active
AF1-176	Corey 138 kV	Active
AF1-205	Napolean Muni 138 kV	Active
AF1-206	East Fayette 138 kV	Active
AF1-227	Marysville-East Lima 345 kV	Active
AF1-229	Galion-South Berwick 345 kV	Active
AF1-270	Blue Jacket-Kirby 138 kV	Active
AF1-279	Carlisle 138 kV	Active
AF1-285	Gunn Road 345 kV	Active
AF2-004	Beaver 345 kV	Active
AF2-005	Beaver 138 kV	Active

Queue Number	Project Name	Status
AF2-126	Weston 69 kV II	Active
AF2-127	Lockwood Road 138 kV	Active
AF2-209	South Hicksville-Sowers 138 kV	Active
AF2-321	Stryker-Ridgeville 138 kV	Active
AF2-375	Ebersole-Fostoria 138 kV	Active
AF2-396	Stinger 138 kV	Active
AG1-056	Stryker-Ridgeville 138 kV	Active
AG1-076	Fostoria Central 138 kV	Active
AG1-109	Valley 138 kV	Active
AG1-199	Allen Junction 345 kV	Active
AG1-319	Northside 138 kV	Active
AG1-323	Blue Jacket 138 kV	Active
AG1-358	Howard-Melmore 138 kV	Active
AG1-411	Maddox Creek-RP Mone 345 kV	Active
AG1-425	Groton 138 kV	Active
AG1-447	Olive-University Park 345 kV	Active
AG1-448	Olive-University Park 345 kV	Active
AG1-482	Hamilton 115 kV	Active
AG1-500	Beaver 345 kV	Active
AG1-501	Beaver 138 kV	Active
U4-028	Fostoria Central-Greenlawn-Howard 138kV	Suspended
U4-029	Fostoria Central-Greenlawn-Howard 138kV	Suspended
V4-010	Tiffin Center 138kV	Engineering and Procurement
Y1-069	Bay Shore-Fostoria Central 345kV & Bayshore-Monroe 345kV	In Service
J1043	MISO	MISO
J1062	MISO	MISO
J1071	MISO	MISO
J1088	MISO	MISO
J1089	MISO	MISO
J1090	MISO	MISO
J1172	MISO	MISO
J1178	MISO	MISO
J201	MISO	MISO
J246	MISO	MISO
J325	MISO	MISO
J466	MISO	MISO
J571	MISO	MISO
J589	MISO	MISO
J646	MISO	MISO
J701	MISO	MISO
J717	MISO	MISO
J728	MISO	MISO
J752	MISO	MISO
J758	MISO	MISO
J793	MISO	MISO
J794	MISO	MISO
J796	MISO	MISO
J799	MISO	MISO
J806	MISO	MISO
J832	MISO	MISO
J833	MISO	MISO
J857	MISO	MISO

Queue Number	Project Name	Status
J875	MISO	MISO
J937	MISO	MISO
J984	MISO	MISO
J996	MISO	MISO

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#768	CONTINGENCY 'AEP_P1-2_#768' OPEN BRANCH FROM BUS 241901 TO BUS 242936 CKT 1 / 241901 02LALLEND
AEP_P4_#12461_05S HICKSV 69.0_E	CONTINGENCY 'AEP_P4_#12461_05S HICKSV 69.0_E' DISCONNECT BUS 243179 / 243179 05S HICKSV 69.0 DISCONNECT BUS 243086 / 243086 05S HICK 138 END
ATSI-P2-4-TE-138-015	CONTINGENCY 'ATSI-P2-4-TE-138-015' /* MIDWAY 13303 TIE-BREAKER DISCONNECT BUS 238962 /* 02MIDWAY 138 DISCONNECT BUS 238960 /* 02MIDW K 138 END
AEP_P7-1_#10984-B	CONTINGENCY 'AEP_P7-1_#10984-B' OPEN BRANCH FROM BUS 940840 TO BUS 242993 CKT 1 / 940840 AE2-072 TAP 138 242993 05E.LPSC 138 1 OPEN BRANCH FROM BUS 242957 TO BUS 243080 CKT 1 / 242957 05BASEL8 138 243080 05RILEYC 138 1 OPEN BRANCH FROM BUS 242989 TO BUS 243083 CKT 1 / 242989 05E LIMA 138 243083 05CAMPSS 138 1 OPEN BRANCH FROM BUS 243083 TO BUS 243121 CKT 1 / 243083 05CAMPSS 138 243121 05ROCKPO 138 1 OPEN BRANCH FROM BUS 243080 TO BUS 247000 CKT 1 / 243080 05RILEYC 138 247000 05YELLWC 138 1 END
AEP_P1-2_#770	CONTINGENCY 'AEP_P1-2_#770' OPEN BRANCH FROM BUS 238889 TO BUS 242936 CKT 1 / 238889 02LEMOYN 345 242936 05FOSTOR 345 1 END
ATSI-P2-2-TE-138-023	CONTINGENCY 'ATSI-P2-2-TE-138-023' /* FAYETTE 138 DISCONNECT BUS 238712 /* 02FAYET 138 DISCONNECT BUS 238517 /* 02LYONS 138 END
ATSI-P7-1-OEC-345-004_NON	CONTINGENCY 'ATSI-P7-1-OEC-345-004_NON' /* DB - BAVER & DB - HAYES 345 DISCONNECT BRANCH FROM BUS 238654 TO BUS 907200 CKT 1 /* 02DAV-BE 345 AD1-103 345 DISCONNECT BRANCH FROM BUS 907200 TO BUS 238569 CKT 1 /* AD1-103 345 02BEAVER 345 DISCONNECT BRANCH FROM BUS 238654 TO BUS 239289 CKT 1 /* 02DAV-BE 345 02HAYES 345 END

Contingency Name	Contingency Definition
AEP_P2-2_#517_05FOSTOR 345_1	CONTINGENCY 'AEP_P2-2_#517_05FOSTOR 345_1' OPEN BRANCH FROM BUS 241901 TO BUS 242936 CKT 1 / 241901 02LALLEND
ATSI-P1-3-TE-138-012A	CONTINGENCY 'ATSI-P1-3-TE-138-012A' /* XFMR FAULT: 02MIDWAY 69KV TO 02MIDWAY 138KV 1 DISCONNECT BRANCH FROM BUS 238963 TO BUS 238962 CKT 1 /* 02MIDWAY 69 02MIDWAY 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 239263 CKT 1 /* 02MIDWAY 138 02STLUKE 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 238979 CKT 1 /* 02MIDWAY 138 02NAPMUN 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 238502 CKT 1 /* 02MIDWAY 138 02BRIM 138 REDUCE BUS 238962 SHUNT BY 100 PERCENT /* 02MIDWAY 138 END
AEP_P1-2_#2749_554-A	CONTINGENCY 'AEP_P1-2_#2749_554-A' OPEN BRANCH FROM BUS 238745 TO BUS 945640 CKT 1 / 238745 02GALION 345 945640 AF1-229 TAP 345 1 END
ATSI-P2-2-TE-138-005	CONTINGENCY 'ATSI-P2-2-TE-138-005' /* MIDWAY 138 J BUS DISCONNECT BRANCH FROM BUS 238963 TO BUS 238962 CKT 1 /* 02MIDWAY 69 02MIDWAY 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 238979 CKT 1 /* 02MIDWAY 138 02NAPMUN 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 238502 CKT 1 /* 02MIDWAY 138 02BRIM 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 239263 CKT 1 /* 02MIDWAY 138 02STLUKE 138 REDUCE BUS 238962 SHUNT BY 100 PERCENT /* 02MIDWAY 138 END
ATSI-P7-1-TE-138-016	CONTINGENCY 'ATSI-P7-1-TE-138-016' /* MIDWAY-NAPMUNI & MIDWAY-RICHL-WAUS 138 DISCONNECT BRANCH FROM BUS 238960 TO BUS 239165 CKT 1 /* 02MIDWY K 138 02WAUSEON 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 238979 CKT 1 /* 02MIDWAY 138 02NAPMUN 138 END
AEP_P1-2_#14793-A	CONTINGENCY 'AEP_P1-2_#14793-A' OPEN BRANCH FROM BUS 243086 TO BUS 959180 CKT 1 / 243086 05S HICK 138 959180 AF2-209 TAP 138 1 OPEN BRANCH FROM BUS 243086 TO BUS 243179 CKT 1 / 243086 05S HICK 138 243179 05S HICKSV 69.0 1 OPEN BRANCH FROM BUS 243029 TO BUS 243086 CKT 1 / 243029 05LCKWRD 138 243086 05S HICK 138 1 END

Contingency Name	Contingency Definition
Base Case	
AEP_P1-2_#7097_4883-B	CONTINGENCY 'AEP_P1-2_#7097_4883-B' OPEN BRANCH FROM BUS 940840 TO BUS 242993 CKT 1 / 940840 AE2-072 TAP 138 242993 05E.LEIPSIC2 138 1 END
AEP_P7-1_#10983-B	CONTINGENCY 'AEP_P7-1_#10983-B' OPEN BRANCH FROM BUS 239070 TO BUS 243029 CKT 1 / 239070 02RICHLD 138 243029 05LCKWRD 138 1 OPEN BRANCH FROM BUS 940840 TO BUS 242993 CKT 1 / 239269 AE2-072 TAP 138 242993 05E.LPSC 138 1 OPEN BRANCH FROM BUS 242971 TO BUS 243029 CKT 1 / 242971 05BRYAN 138 243029 05LCKWRD 138 1 REMOVE SWSHUNT FROM BUS 243029 / 243029 05LCKWRD 138 END
AEP_P7-1_#10983-A	CONTINGENCY 'AEP_P7-1_#10983-A' OPEN BRANCH FROM BUS 239070 TO BUS 243029 CKT 1 / 239070 02RICHLD 138 243029 05LCKWRD 138 1 OPEN BRANCH FROM BUS 239269 TO BUS 940840 CKT 1 / 239269 02RICHLJ 138 242993 AE2-072 TAP 138 1 OPEN BRANCH FROM BUS 242971 TO BUS 243029 CKT 1 / 242971 05BRYAN 138 243029 05LCKWRD 138 1 REMOVE SWSHUNT FROM BUS 243029 / 243029 05LCKWRD 138 END
ATSI-P1-2-OEC-345-810	CONTINGENCY 'ATSI-P1-2-OEC-345-810' /* LINE 02HAYES TO 02DAV-BE 345 CK 1 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238654 CKT 1 /* 02HAYES 345 02DAV-BE 345 END
AEP_P7-1_#10999	CONTINGENCY 'AEP_P7-1_#10999' OPEN BRANCH FROM BUS 243212 TO BUS 247803 CKT 1 / 243212 05BENTON 345 247803 05SEGRETO 345 1 OPEN BRANCH FROM BUS 243215 TO BUS 247803 CKT 1 / 243215 05COOK 345 247803 05SEGRETO 345 1 END
AEP_P2-1_242939 05MARYSV 345 945620 AF1-227 TAP 345 1-A	CONTINGENCY 'AEP_P2-1_242939 05MARYSV 345 945620 AF1-227 TAP 345 1-A' OPEN BRANCH FROM BUS 242939 TO BUS 945620 CKT 1 END

Contingency Name	Contingency Definition
ATSI-P2-3-TE-138-013	CONTINGENCY 'ATSI-P2-3-TE-138-013' /* MIDWAY 13308 BREAKER TO ANGOLA VIA ST LUKE DISCONNECT BUS 239263 /* 02STLUKE 138 DISCONNECT BUS 238651 /* 02DANA 138 DISCONNECT BUS 238786 /* 02HAWTHO 138 DISCONNECT BRANCH FROM BUS 238963 TO BUS 238962 CKT 1 /* 02MIDWAY 69 02MIDWAY 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 238979 CKT 1 /* 02MIDWAY 138 02NAPMUN 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 238502 CKT 1 /* 02MIDWAY 138 02BRIM 138 REDUCE BUS 238962 SHUNT BY 100 PERCENT /* 02MIDWAY 138 END
AEP_P4_#517_05FOSTOR 345_A1	CONTINGENCY 'AEP_P4_#517_05FOSTOR 345_A1' OPEN BRANCH FROM BUS 241901 TO BUS 242936 CKT 1 / 241901 02LALLEND
ATSI-P2-3-OEC-345-002	CONTINGENCY 'ATSI-P2-3-OEC-345-002' /* 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
ATSI-P1-2-TE-138-041	CONTINGENCY 'ATSI-P1-2-TE-138-041' /* LINE 02MIDWAY TO 02NAPMUN 138 DISCONNECT BRANCH FROM BUS 238962 TO BUS 238979 CKT 1 /* 02MIDWAY 138 02NAPMUN 138 END
ATSI-P2-2-TE-138-012	CONTINGENCY 'ATSI-P2-2-TE-138-012' /* WAUSEON 138 BUS DISCONNECT BUS 239165 /* 02WAUSEO 138 END
ATSI-P2-3-TE-345-034T	CONTINGENCY 'ATSI-P2-3-TE-345-034T' /* LALLEND

12 Short Circuit Analysis

The following Breakers are overdutied:

None.

12.1 System Reinforcements - Short Circuit

No short circuit impacts were identified for this project.

13 Affected Systems

13.1 NYISO

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

13.2 MISO

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

14 Attachment 1: One Line Diagram