



**Generation Interconnection
Feasibility Study Report
for
Queue Project AG1-047
JAY 138 KV
60 MW Capacity / 100 MW Energy**

January 2021

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1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is AEP.

2 Preface

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

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

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 a Solar generating facility located in Jay County, Indiana. The installed facilities will have a total capability of 100 MW with 60 MW of this output being recognized by PJM as Capacity.

The proposed in-service date for this project is October 01, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-047
Project Name	JAY 138 KV
State	Indiana
County	Jay
Transmission Owner	AEP
MFO	100
MWE	100
MWC	60
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

AG1-047 will interconnect with the AEP transmission system via a direct connection to the Jay 138 kV substation as an uprate to the PJM projects AC2-176 and AG1-017.

Note: It is assumed that the existing 138 kV revenue metering system, generation lead and Protection & Control Equipment installed for AC2-176 will be adequate for the increased generation of AG1-047. Depending on the timing of the completion of the AG1-047, there may (or may not) be a need to review and revise the relay settings for the increased generation of AG1-047.

5 Cost Summary

The AG1-047 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$45,000
Total System Network Upgrade Costs	\$2,810,600
Total Costs	\$2,855,600

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.

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

6 Transmission Owner Scope of Work

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

6.1 Attachment Facilities

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
None	\$0
Total Attachment Facility Costs	\$0

6.2 Direct Connection Cost Estimate

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
None	\$0
Total Direct Connection Facility Costs	\$0

6.3 Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

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

7 Schedule

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

8 Interconnection Customer Requirements

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

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

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.
2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

9 Revenue Metering and SCADA Requirements

9.1 PJM Requirements

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

9.2 Meteorological Data Reporting Requirements

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

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

9.3 Interconnected Transmission Owner Requirements

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

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

10 Summer Peak - Load Flow Analysis

The Queue Project AG1-047 was evaluated as a 100.0 MW (Capacity 60.0 MW) injection at the Jay 138 kV substation in the AEP area. Project AG1-047 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-047 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

10.1 Generation Deliverability

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

None

10.2 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC DC	MW IMPACT
161407070	243233	05TANNER	345.0	AEP	249567	08M.FORT	345.0	DEOK	1	AEP_P7-1_#11087-H	tower	2151.0	99.84	100.06	DC	10.37

10.3 Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

ID	FROM BUS #	FROM BUS	kV	FROM BUS AREA	TO BUS #	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC DC	MW IMPACT
161406966	243233	05TANNER	345.0	AEP	248001	06DEARB1	345.0	OVERC	Z1	DEOK_P7_4504MFTANNERS4512EBTANNERS	tower	1204.0	135.54	136.06	DC	14.44
164200101	243233	05TANNER	345.0	AEP	248001	06DEARB1	345.0	OVERC	Z1	AEP_P4_#14920_05TANNER345_T	breaker	1204.0	135.54	136.06	DC	14.44
164200437	243262	05COLLEGE C	138.0	AEP	250001	08COLLNV	138.0	DEOK&K	1	DEOK_P1_TODHUNTER JCT 138	single	167.0	101.28	103.14	DC	3.12
164200438	243262	05COLLEGE C	138.0	AEP	250001	08COLLNV	138.0	DEOK&K	1	AEP_P1-2_#6372_12497	single	167.0	101.28	103.14	DC	3.12
164200439	243262	05COLLEGE C	138.0	AEP	250001	08COLLNV	138.0	DEOK&K	1	DAY_P1_13803_HUTCHINGS_COLLEGE CORNER (AEP)_138KV	single	167.0	100.98	102.84	DC	3.12
161407010	243792	05LOSANTVILL	345.0	AEP	243233	05TANNER	345.0	AEP	2	AEP_P7-1_#11019-D	tower	648.0	116.3	116.91	DC	8.7
161407011	243792	05LOSANTVILL	345.0	AEP	243233	05TANNER	345.0	AEP	2	AEP_P7-1_#11087-H	tower	648.0	110.55	111.15	DC	8.72
161407042	923880	AB2-028TAP	345.0	AEP	243222	05FALLC	345.0	AEP	1	AEP_P7-1_#11019-D	tower	1318.0	104.05	105.27	DC	16.09

10.4 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECTIONS T LOADING %	POST PROJECTIONS T LOADING %	AC/D C	MW IMPACT
168076499	243218	05DESOTO	345.0	AEP	958860	AF2-177 TAP	345.0	AEP	2	AEP_P1-2_#4817_6341	operation	971.0	109.35	109.87	DC	11.2
168076548	243218	05DESOTO	345.0	AEP	945370	AF1-202 TAP	345.0	AEP	1	AEP_P1-2_#8702_2543-C	operation	897.0	101.32	102.55	DC	11.17
164200430	243262	05COLLEGE C	138.0	AEP	250001	08COLIN V	138.0	DEO&K	1	DEOK_P1_TODHUNTER JCT 138	operation	167.0	137.8	139.21	DC	5.19
164200431	243262	05COLLEGE C	138.0	AEP	250001	08COLIN V	138.0	DEO&K	1	AEP_P1-2_#6372_12497	operation	167.0	137.8	139.21	DC	5.19
168076347	944530	AF1-118 TAP	345.0	AEP	243232	05SORENS	345.0	AEP	2	AEP_P1-2_#4817_6341	operation	971.0	149.86	150.38	DC	11.2
169536590	944540	AF1-119 TAP	345.0	AEP	960970	AF2-388 TAP	345.0	AEP	1	AEP_P1-2_#8702_2543-C	operation	897.0	129.09	130.32	DC	11.17
169536582	944830	AF1-148 TAP	345.0	AEP	944530	AF1-118 TAP	345.0	AEP	2	AEP_P1-2_#4817_6341	operation	971.0	128.06	128.57	DC	11.2
169536672	945370	AF1-202 TAP	345.0	AEP	944540	AF1-119 TAP	345.0	AEP	1	AEP_P1-2_#8702_2543-C	operation	897.0	117.09	118.32	DC	11.17
169536655	958860	AF2-177 TAP	345.0	AEP	944830	AF1-148 TAP	345.0	AEP	2	AEP_P1-2_#4817_6341	operation	971.0	118.61	119.12	DC	11.2
168076367	960970	AF2-388 TAP	345.0	AEP	243225	05KEYSTON	345.0	AEP	1	AEP_P1-2_#8702_2543-C	operation	897.0	139.69	140.92	DC	11.17

10.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
161407042	5	AB2-028 TAP 345.0 kV - 05FALL C 345.0 kV Ckt 1	<u>AEP</u> Not a violation for AEP portion (471) : Not a violation for AEP portion Project Type : FAC Cost : \$0 Time Estimate : 0.0 Months <u>IPL</u> NonPJMArea (425) : The external (i.e. Non-PJM) Transmission Owner, IPL, will not evaluate this violation until the impact study phase. Project Type : FAC Cost : \$0 Time Estimate : 0.0 Months	\$0
164200437,164 200439,164200 438	3	05COLLCO 138.0 kV - 08COLINV 138.0 kV Ckt 1	<u>DEOK</u> Not a violation for DEOK portion (40) : Not a violation for DEOK portion Project Type : FAC Cost : \$0 Time Estimate : 0.0 Months <u>AEP</u> AEPI0005a (165) : A Sag Study will be required on the 0.15 mile section of line to mitigate the overload . New Rating after the Sag Study : S/N: 167 MVA S/E: 245 MVA. Depending on the sag study results, cost for this upgrade is expected to be between \$600 (no remediations required just sag study) and \$0.3 million (complete line reconductor/rebuild required). Time Estimate: a) Sag Study: 6-12 months b) Rebuild: The standard time required for construction differs from state to state. An approximate construction time would be 24 to 36 months after signing an interconnection agreement. Project Type : FAC Cost : \$600 Time Estimate : 6-12 Months AEPI0005b (166) : Reconductor/Rebuild the 0.15 mile section of ACSR~397.5~30/7~ LARK Project Type : FAC Cost : \$225,000 Time Estimate : 24-36 Months	\$225,600
161406966,164 200101	2	05TANNER 345.0 kV - 06DEARB1 345.0 kV Ckt Z1	<u>AEP</u> AEPI0024a (9) : Replace Tanner's Creek 345 kV Riser (Sub Cond 2870 MCM ACSR) Project Type : FAC Cost : \$100,000 Time Estimate : 12-18 Months AEPI0024a (215) : Replace Tanner's Creek 345 kV Riser (Sub Cond 2870 MCM ACSR) Project Type : FAC Cost : \$100,000 Time Estimate : 12-18 Months	\$200,000

ID	Idx	Facility	Upgrade Description	Cost
161407011,161407010	4	05LOSANTVILL 345.0 kV - 05TANNER 345.0 kV Ckt 2	AEPI0061a (465) : An engineering study will need to be conducted to determine if the Tanner Relay Thermal limit 1118 Amps settings can be adjusted to mitigate the overload. Project Type : FAC Cost : \$25,000 Time Estimate : 12-18 Months	\$25,000
161407070	1	05TANNER 345.0 kV - 08M.FORT 345.0 kV Ckt 1	<u>DEOK</u> Not a violation for DEOK portion (40) : Not a violation for DEOK portion Project Type : FAC Cost : \$0 Time Estimate : 0.0 Months <u>AEP</u> AEPI0060a (459) : Replace the Tanner's Creek 345 kV 3000 A Non oil circuit breaker. Project Type : FAC Cost : \$1,000,000 Time Estimate : 12-18 Months AEPI0060b (460) : Rebuild 0.28 miles line conductor 954 ACSR 45/7 two bundle line conductor. Project Type : FAC Cost : \$560,000 Time Estimate : 18-24 Months AEPI0060c (461) : Replace 7 Tanner 345 kV 2-1700 AAC 61 Str risers. Project Type : FAC Cost : \$700,000 Time Estimate : 12-18 Months AEPI0060d (462) : Replace Tanner 345 kV 3000 A wavetrap. Project Type : FAC Cost : \$100,000 Time Estimate : 12-18 Months	\$2,360,000
			TOTAL COST	\$2,810,600

10.6 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".

10.6.1 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
161407070	243233	05TANNER	AEP	249567	08M.FORT	DEO&K	1	AEP_P7-1_#11087-H	tower	2151.0	99.84	100.06	DC	10.37

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243795	05HDWTR1G C	0.9226	50/50	0.9226
246991	05WLD G1 C	0.2746	50/50	0.2746
247255	05WLD G2 C	0.2663	50/50	0.2663
247264	05LAWG1A	10.2180	50/50	10.2180
247265	05LAWG1B	10.2180	50/50	10.2180
247266	05LAWG1S	16.3198	50/50	16.3198
247267	05LAWG2A	10.2180	50/50	10.2180
247268	05LAWG2B	10.2180	50/50	10.2180
247269	05LAWG2S	16.3198	50/50	16.3198
247543	V3-007 C	0.9226	50/50	0.9226
247929	S-071 E	8.4138	Adder	9.9
247935	V3-007 E	39.1361	50/50	39.1361
247958	05WLD G2 E	22.9436	50/50	22.9436
247963	05HDWTR1G E	39.1361	50/50	39.1361
247968	Z2-115 E	0.1082	Adder	0.13
251823	Z1-065 BAT	1.1159	50/50	1.1159
251831	Z1-080 BAT	0.6310	Merchant Transmission	0.6310
251947	08EBND2	15.6682	50/50	15.6682
253349	AC2-067 C	-2.2651	Adder	-2.66
913222	Y1-054 E	-2.3455	Adder	-2.76
918803	AA1-099 BAT	0.4207	Merchant Transmission	0.4207
920501	AA2-148 C O1	4.3398	50/50	4.3398
920502	AA2-148 E O1	29.0432	50/50	29.0432
923881	AB2-028 C	4.3176	50/50	4.3176
923882	AB2-028 E	28.8944	50/50	28.8944
926881	AC1-175 C	17.0939	50/50	17.0939
926882	AC1-175 E	27.8901	50/50	27.8901
932661	AC2-088 C O1	-3.0851	Adder	-3.63
932681	AC2-090 C	8.5470	50/50	8.5470
932682	AC2-090 E	13.9450	50/50	13.9450
932841	AC2-111 C O1	2.4129	Adder	2.84
932842	AC2-111 E O1	3.9369	Adder	4.63
933596	AC2-176 E	9.9711	Adder	11.73
934161	AD1-043 C O1	6.2180	50/50	6.2180
934162	AD1-043 E O1	10.1452	50/50	10.1452
934961	AD1-128 C	8.2952	50/50	8.2952
934962	AD1-128 E	13.5343	50/50	13.5343
935031	AD1-136 C	-0.4338	Adder	-0.51
936561	AD2-071 C	8.3810	50/50	8.3810
936562	AD2-071 E	4.1280	50/50	4.1280
939761	AE1-207 C	8.4410	50/50	8.4410

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
939762	AE1-207 E	11.6566	50/50	11.6566
939771	AE1-208 C	7.2391	50/50	7.2391
939772	AE1-208 E	9.8715	50/50	9.8715
939781	AE1-209 C O1	2.5505	50/50	2.5505
939782	AE1-209 E O1	17.0685	50/50	17.0685
939791	AE1-210 C O1	2.5505	50/50	2.5505
939792	AE1-210 E O1	17.0685	50/50	17.0685
941691	AE2-169	4.3435	50/50	4.3435
941711	AE2-171	4.0908	50/50	4.0908
941721	AE2-172	5.0244	50/50	5.0244
942071	AE2-219 C	3.7010	Adder	4.35
942072	AE2-219 E	5.1109	Adder	6.01
942081	AE2-220 C	11.8083	50/50	11.8083
942082	AE2-220 E	16.3067	50/50	16.3067
942791	AE2-297 C O1	17.1938	50/50	17.1938
942792	AE2-297 E O1	11.4625	50/50	11.4625
943773	AF1-045 BAT	5.9304	Merchant Transmission	5.9304
944031	AF1-071 C	0.6032	Adder	0.71
944032	AF1-071 E	0.9842	Adder	1.16
944531	AF1-118 C O1	52.7662	50/50	52.7662
944532	AF1-118 E O1	15.9143	50/50	15.9143
944541	AF1-119 C O1	27.4708	50/50	27.4708
944542	AF1-119 E O1	11.7732	50/50	11.7732
944831	AF1-148 C O1	18.7203	50/50	18.7203
944832	AF1-148 E O1	12.4802	50/50	12.4802
945371	AF1-202 C O1	6.6711	50/50	6.6711
945372	AF1-202 E O1	32.5709	50/50	32.5709
945561	AF1-221 C O1	19.8770	50/50	19.8770
945562	AF1-221 E O1	5.9746	50/50	5.9746
945581	AF1-223 C O1	17.6589	50/50	17.6589
945582	AF1-223 E O1	11.7726	50/50	11.7726
946031	AF1-268 C O1	8.8202	50/50	8.8202
946032	AF1-268 E O1	4.0008	50/50	4.0008
956561	J1152	17.7260	PJM External (MISO)	17.7260
957393	AF2-033 BAT	4.9988	50/50	4.9988
957741	AF2-068 C O1	7.9346	Adder	9.33
957742	AF2-068 E O1	5.2897	Adder	6.22
958711	AF2-162 C	5.8866	50/50	5.8866
958712	AF2-162 E	2.9433	50/50	2.9433
958821	AF2-173 C	16.4800	50/50	16.4800
958822	AF2-173 E	22.7580	50/50	22.7580
958861	AF2-177 C O1	5.1017	50/50	5.1017
958862	AF2-177 E O1	34.1423	50/50	34.1423
959131	AF2-204 C	5.3293	Adder	6.27
959132	AF2-204 E	2.8127	Adder	3.31
959201	AF2-211 C	4.7624	Adder	5.6
959202	AF2-211 E	3.1749	Adder	3.74
960441	AF2-335 C	9.2940	50/50	9.2940
960442	AF2-335 E	3.0980	50/50	3.0980
960791	AF2-370	3.0980	50/50	3.0980
960971	AF2-388 C	6.9069	50/50	6.9069
960972	AF2-388 E	32.3371	50/50	32.3371

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
961161	AF2-407	46.3050	50/50	46.3050
961171	AF2-408	12.1008	50/50	12.1008
961761	AG1-017 C	0.1369	Adder	0.3
961762	AG1-017 E	0.6406	Adder	1.42
962031	AG1-047 C	2.8036	Adder	6.22
962032	AG1-047 E	1.8690	Adder	4.15
962051	AG1-049	0.7404	Adder	1.64
963582	AG1-207 BAT	5.3173	Merchant Transmission	5.3173
963721	AG1-224 C O1	27.8485	50/50	27.8485
963722	AG1-224 E O1	18.5657	50/50	18.5657
964351	AG1-297 C	40.7160	50/50	40.7160
964352	AG1-297 E	61.0740	50/50	61.0740
964611	AG1-324 C O1	1.6204	Adder	3.6
964612	AG1-324 E O1	0.6945	Adder	1.54
965031	AG1-367 C	11.7714	50/50	11.7714
965032	AG1-367 E	7.8476	50/50	7.8476
965101	AG1-375 C	11.7732	50/50	11.7732
965102	AG1-375 E	7.8488	50/50	7.8488
965111	AG1-376 C	2.3546	50/50	2.3546
965112	AG1-376 E	3.5320	50/50	3.5320
965461	AG1-414 C O1	2.2985	Adder	5.1
965462	AG1-414 E O1	1.5323	Adder	3.4
965651	AG1-433 C	3.4535	50/50	3.4535
965652	AG1-433 E	16.1685	50/50	16.1685
WEC	WEC	1.1721	Confirmed LTF	1.1721
LGEE	LGEE	1.7171	Confirmed LTF	1.7171
CPL	CPL	0.2566	Confirmed LTF	0.2566
CBM-W2	CBM-W2	36.0819	Confirmed LTF	36.0819
NY	NY	0.3274	Confirmed LTF	0.3274
TVA	TVA	3.1416	Confirmed LTF	3.1416
O-066	O-066	3.7553	Confirmed LTF	3.7553
SIGE	SIGE	0.6846	Confirmed LTF	0.6846
CBM-S2	CBM-S2	6.6190	Confirmed LTF	6.6190
CBM-S1	CBM-S1	0.8865	Confirmed LTF	0.8865
G-007	G-007	0.5849	Confirmed LTF	0.5849
MEC	MEC	5.9667	Confirmed LTF	5.9667
LAGN	LAGN	4.5500	Confirmed LTF	4.5500
CBM-W1	CBM-W1	40.6300	Confirmed LTF	40.6300

10.6.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
164200101	243233	05TANNER	AEP	248001	06DEARB	OVER	Z1	AEP_P4_#14920_05TANNER 345_T	breaker	1204.0	135.54	136.06	DC	14.44

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243415	05WWVSTA	2.5309	50/50	2.5309
243795	05HDWTR1G C	1.0971	50/50	1.0971
247264	05LAWG1A	15.3783	50/50	15.3783
247265	05LAWG1B	15.3783	50/50	15.3783
247266	05LAWG1S	24.5616	50/50	24.5616
247267	05LAWG2A	15.3783	50/50	15.3783
247268	05LAWG2B	15.3783	50/50	15.3783
247269	05LAWG2S	24.5616	50/50	24.5616
247289	05RICHG2	0.8780	50/50	0.8780
247543	V3-007 C	1.0971	50/50	1.0971
247929	S-071 E	12.2686	Adder	14.43
247935	V3-007 E	46.5363	50/50	46.5363
247958	05WLD G2 E	23.1449	Adder	27.23
247963	05HDWTR1G E	46.5363	50/50	46.5363
247968	Z2-115 E	0.1239	Adder	0.15
920501	AA2-148 C O1	5.7544	50/50	5.7544
920502	AA2-148 E O1	38.5101	50/50	38.5101
923881	AB2-028 C	4.8142	50/50	4.8142
923882	AB2-028 E	32.2178	50/50	32.2178
926881	AC1-175 C	20.3262	50/50	20.3262
926882	AC1-175 E	33.1638	50/50	33.1638
932681	AC2-090 C	10.1631	50/50	10.1631
932682	AC2-090 E	16.5819	50/50	16.5819
932841	AC2-111 C O1	5.5489	50/50	5.5489
932842	AC2-111 E O1	9.0535	50/50	9.0535
933596	AC2-176 E	13.8780	Adder	16.33
934161	AD1-043 C O1	7.4209	50/50	7.4209
934162	AD1-043 E O1	12.1079	50/50	12.1079
934961	AD1-128 C	10.6487	50/50	10.6487
934962	AD1-128 E	17.3743	50/50	17.3743
936561	AD2-071 C	8.3990	Adder	9.88
936562	AD2-071 E	4.1368	Adder	4.87
939761	AE1-207 C	8.1939	Adder	9.64
939762	AE1-207 E	11.3153	Adder	13.31
939771	AE1-208 C	8.9105	50/50	8.9105
939772	AE1-208 E	12.1507	50/50	12.1507
939781	AE1-209 C O1	2.7387	50/50	2.7387
939782	AE1-209 E O1	18.3283	50/50	18.3283
939791	AE1-210 C O1	2.7387	50/50	2.7387
939792	AE1-210 E O1	18.3283	50/50	18.3283
940981	AE2-089 C O1	9.8560	Adder	11.6
940982	AE2-089 E O1	6.5706	Adder	7.73

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941691	AE2-169	5.3463	50/50	5.3463
941711	AE2-171	4.8822	50/50	4.8822
941721	AE2-172	4.8773	Adder	5.74
942071	AE2-219 C	5.5578	Adder	6.54
942072	AE2-219 E	7.6750	Adder	9.03
942081	AE2-220 C	14.0411	50/50	14.0411
942082	AE2-220 E	19.3901	50/50	19.3901
942221	AE2-234 C O1	2.4758	Adder	2.91
942222	AE2-234 E O1	1.1198	Adder	1.32
942791	AE2-297 C O1	22.6554	50/50	22.6554
942792	AE2-297 E O1	15.1036	50/50	15.1036
944031	AF1-071 C	1.3872	50/50	1.3872
944032	AF1-071 E	2.2634	50/50	2.2634
944531	AF1-118 C O1	31.0803	Adder	36.57
944532	AF1-118 E O1	9.3738	Adder	11.03
944541	AF1-119 C O1	23.8476	50/50	23.8476
944542	AF1-119 E O1	10.2204	50/50	10.2204
944831	AF1-148 C O1	11.4832	Adder	13.51
944832	AF1-148 E O1	7.6554	Adder	9.01
945371	AF1-202 C O1	6.0411	50/50	6.0411
945372	AF1-202 E O1	29.4949	50/50	29.4949
945561	AF1-221 C O1	34.4242	50/50	34.4242
945562	AF1-221 E O1	10.3472	50/50	10.3472
945581	AF1-223 C O1	15.9912	50/50	15.9912
945582	AF1-223 E O1	10.6608	50/50	10.6608
946031	AF1-268 C O1	10.3711	50/50	10.3711
946032	AF1-268 E O1	4.7042	50/50	4.7042
953351	J805	18.8732	PJM External (MISO)	18.8732
954351	J903	9.6360	PJM External (MISO)	9.6360
955151	J993	19.1640	PJM External (MISO)	19.1640
956561	J1152	21.9860	PJM External (MISO)	21.9860
957741	AF2-068 C O1	11.0435	Adder	12.99
957742	AF2-068 E O1	7.3624	Adder	8.66
958711	AF2-162 C	5.1102	50/50	5.1102
958712	AF2-162 E	2.5551	50/50	2.5551
958821	AF2-173 C	17.6963	50/50	17.6963
958822	AF2-173 E	24.4377	50/50	24.4377
958861	AF2-177 C O1	4.3784	50/50	4.3784
958862	AF2-177 E O1	29.3016	50/50	29.3016
959131	AF2-204 C	7.6433	Adder	8.99
959132	AF2-204 E	4.0339	Adder	4.75
959201	AF2-211 C	10.9518	50/50	10.9518
959202	AF2-211 E	7.3012	50/50	7.3012
960441	AF2-335 C	10.8672	50/50	10.8672
960442	AF2-335 E	3.6224	50/50	3.6224
960791	AF2-370	3.6224	50/50	3.6224
960971	AF2-388 C	5.7355	50/50	5.7355
960972	AF2-388 E	26.8525	50/50	26.8525
961161	AF2-407	52.5750	50/50	52.5750
961171	AF2-408	14.3080	50/50	14.3080
961761	AG1-017 C	0.1906	Adder	0.42
961762	AG1-017 E	0.8916	Adder	1.98

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
962031	AG1-047 C	3.9021	Adder	8.66
962032	AG1-047 E	2.6014	Adder	5.77
962051	AG1-049	3.2125	50/50	3.2125
963721	AG1-224 C O1	39.1759	50/50	39.1759
963722	AG1-224 E O1	26.1173	50/50	26.1173
963731	AG1-225 C	10.4416	Adder	23.18
963732	AG1-225 E	7.0115	Adder	15.56
963791	AG1-232 C	3.4086	Adder	7.57
963792	AG1-232 E	2.2724	Adder	5.04
964351	AG1-297 C	55.6400	50/50	55.6400
964352	AG1-297 E	83.4600	50/50	83.4600
964611	AG1-324 C O1	2.1577	Adder	4.79
964612	AG1-324 E O1	0.9247	Adder	2.05
965031	AG1-367 C	12.6402	50/50	12.6402
965032	AG1-367 E	8.4268	50/50	8.4268
965101	AG1-375 C	10.1040	50/50	10.1040
965102	AG1-375 E	6.7360	50/50	6.7360
965111	AG1-376 C	2.0208	50/50	2.0208
965112	AG1-376 E	3.0312	50/50	3.0312
965461	AG1-414 C O1	2.6277	Adder	5.83
965462	AG1-414 E O1	1.7518	Adder	3.89
965651	AG1-433 C	2.8677	50/50	2.8677
965652	AG1-433 E	13.4263	50/50	13.4263
WEC	WEC	1.2880	Confirmed LTF	1.2880
CALDERWOOD	CALDERWOOD	0.1779	Confirmed LTF	0.1779
CBM-W2	CBM-W2	26.8710	Confirmed LTF	26.8710
NY	NY	0.5790	Confirmed LTF	0.5790
TVA	TVA	0.9828	Confirmed LTF	0.9828
O-066	O-066	7.3222	Confirmed LTF	7.3222
SIGE	SIGE	0.5410	Confirmed LTF	0.5410
CHEOAH	CHEOAH	0.1862	Confirmed LTF	0.1862
CBM-S1	CBM-S1	0.0262	Confirmed LTF	0.0262
G-007	G-007	1.1445	Confirmed LTF	1.1445
HAMLET	HAMLET	0.5290	Confirmed LTF	0.5290
MEC	MEC	5.5869	Confirmed LTF	5.5869
BLUEG	BLUEG	6.4232	Confirmed LTF	6.4232
TRIMBLE	TRIMBLE	2.4364	Confirmed LTF	2.4364
LAGN	LAGN	2.3030	Confirmed LTF	2.3030
CATAWBA	CATAWBA	0.3031	Confirmed LTF	0.3031
CBM-W1	CBM-W1	45.6211	Confirmed LTF	45.6211

10.6.3 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
164200438	243262	05COLLEGE C	AEP	250001	08COLINV	DEO&K	1	AEP_P1-2_#6372_12497	single	167.0	101.28	103.14	DC	3.12

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243415	05WWWSTA	2.5990	80/20	2.5990
247288	05RICHG1	0.8585	80/20	0.8585
247289	05RICHG2	0.8585	80/20	0.8585
247536	05BLUFF P WF	0.3064	80/20	0.3064
247621	Y3-024	0.0249	80/20	0.0249
932841	AC2-111 C O1	7.7164	80/20	7.7164
933594	AC2-176 C	0.1385	80/20	0.1385
934961	AD1-128 C	5.3665	80/20	5.3665
942071	AE2-219 C	4.2949	80/20	4.2949
944031	AF1-071 C	1.9291	80/20	1.9291
945561	AF1-221 C O1	28.2959	80/20	28.2959
957741	AF2-068 C O1	4.6737	80/20	4.6737
959201	AF2-211 C	15.2298	80/20	15.2298
961761	AG1-017 C	0.1522	80/20	0.1522
962031	AG1-047 C	3.1158	80/20	3.1158
962051	AG1-049	4.4674	80/20	4.4674
WEC	WEC	0.1824	Confirmed LTF	0.1824
LGEE	LGEE	0.0132	Confirmed LTF	0.0132
CBM-W2	CBM-W2	3.2794	Confirmed LTF	3.2794
NY	NY	0.0448	Confirmed LTF	0.0448
TVA	TVA	0.2058	Confirmed LTF	0.2058
SIGE	SIGE	0.0564	Confirmed LTF	0.0564
CBM-S1	CBM-S1	0.0471	Confirmed LTF	0.0471
HAMLET	HAMLET	0.0243	Confirmed LTF	0.0243
MEC	MEC	0.7834	Confirmed LTF	0.7834
LAGN	LAGN	0.3832	Confirmed LTF	0.3832
CATAWBA	CATAWBA	0.0122	Confirmed LTF	0.0122
CBM-W1	CBM-W1	6.7576	Confirmed LTF	6.7576

10.6.4 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
161407010	243792	05LOSANTVILL	AEP	243233	05TANNER	AEP	2	AEP_P7-1_#11019-D	tower	648.0	116.3	116.91	DC	8.7

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243795	05HDWTR1G C	1.2302	50/50	1.2302
247292	05KEY G1	1.6056	50/50	1.6056
247293	05KEY G2	1.6139	50/50	1.6139
247294	05KEY G3	1.6584	50/50	1.6584
247295	05KEY G4	1.6639	50/50	1.6639
247543	V3-007 C	1.2302	50/50	1.2302
247929	S-071 E	6.4399	Adder	7.58
247935	V3-007 E	52.1826	50/50	52.1826
247958	05WLD G2 E	12.3053	Adder	14.48
247963	05HDWTR1G E	52.1826	50/50	52.1826
247968	Z2-115 E	0.0710	Adder	0.08
920501	AA2-148 C O1	1.2391	Adder	1.46
920502	AA2-148 E O1	8.2928	Adder	9.76
923881	AB2-028 C	3.1600	50/50	3.1600
923882	AB2-028 E	21.1480	50/50	21.1480
926881	AC1-175 C	22.7924	50/50	22.7924
926882	AC1-175 E	37.1876	50/50	37.1876
932681	AC2-090 C	11.3962	50/50	11.3962
932682	AC2-090 E	18.5938	50/50	18.5938
933596	AC2-176 E	8.3609	Adder	9.84
934161	AD1-043 C O1	3.2434	Adder	3.82
934162	AD1-043 E O1	5.2919	Adder	6.23
934961	AD1-128 C	6.2278	50/50	6.2278
934962	AD1-128 E	10.1612	50/50	10.1612
936561	AD2-071 C	4.5275	Adder	5.33
936562	AD2-071 E	2.2300	Adder	2.62
939761	AE1-207 C	5.3327	Adder	6.27
939762	AE1-207 E	7.3642	Adder	8.66
939771	AE1-208 C	4.6605	Adder	5.48
939772	AE1-208 E	6.3552	Adder	7.48
939781	AE1-209 C O1	2.2885	50/50	2.2885
939782	AE1-209 E O1	15.3155	50/50	15.3155
939791	AE1-210 C O1	2.2885	50/50	2.2885
939792	AE1-210 E O1	15.3155	50/50	15.3155
940981	AE2-089 C O1	5.4568	Adder	6.42
940982	AE2-089 E O1	3.6379	Adder	4.28
941691	AE2-169	2.7963	Adder	3.29
941711	AE2-171	2.1338	Adder	2.51
941721	AE2-172	3.1742	Adder	3.73
942071	AE2-219 C	2.6489	Adder	3.12
942072	AE2-219 E	3.6581	Adder	4.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
942081	AE2-220 C	15.7447	50/50	15.7447
942082	AE2-220 E	21.7427	50/50	21.7427
942221	AE2-234 C O1	1.3094	Adder	1.54
942222	AE2-234 E O1	0.5922	Adder	0.7
942791	AE2-297 C O1	5.1611	Adder	6.07
942792	AE2-297 E O1	3.4408	Adder	4.05
944531	AF1-118 C O1	47.3452	50/50	47.3452
944532	AF1-118 E O1	14.2793	50/50	14.2793
944541	AF1-119 C O1	24.6484	50/50	24.6484
944542	AF1-119 E O1	10.5636	50/50	10.5636
944831	AF1-148 C O1	16.7971	50/50	16.7971
944832	AF1-148 E O1	11.1981	50/50	11.1981
945371	AF1-202 C O1	5.9860	50/50	5.9860
945372	AF1-202 E O1	29.2260	50/50	29.2260
945581	AF1-223 C O1	15.8454	50/50	15.8454
945582	AF1-223 E O1	10.5636	50/50	10.5636
946031	AF1-268 C O1	7.3944	50/50	7.3944
946032	AF1-268 E O1	3.3540	50/50	3.3540
957741	AF2-068 C O1	6.6532	Adder	7.83
957742	AF2-068 E O1	4.4355	Adder	5.22
958711	AF2-162 C	5.2818	50/50	5.2818
958712	AF2-162 E	2.6409	50/50	2.6409
958821	AF2-173 C	14.7874	50/50	14.7874
958822	AF2-173 E	20.4206	50/50	20.4206
958861	AF2-177 C O1	4.5776	50/50	4.5776
958862	AF2-177 E O1	30.6344	50/50	30.6344
959131	AF2-204 C	3.9443	Adder	4.64
959132	AF2-204 E	2.0817	Adder	2.45
960441	AF2-335 C	7.3248	50/50	7.3248
960442	AF2-335 E	2.4416	50/50	2.4416
960791	AF2-370	2.4416	50/50	2.4416
960971	AF2-388 C	6.1973	50/50	6.1973
960972	AF2-388 E	29.0147	50/50	29.0147
961161	AF2-407	30.1050	50/50	30.1050
961171	AF2-408	6.2111	Adder	7.31
961761	AG1-017 C	0.1148	Adder	0.25
961762	AG1-017 E	0.5372	Adder	1.19
962031	AG1-047 C	2.3508	Adder	5.22
962032	AG1-047 E	1.5672	Adder	3.48
963731	AG1-225 C	5.3565	Adder	11.89
963732	AG1-225 E	3.5969	Adder	7.98
964611	AG1-324 C O1	1.3588	Adder	3.02
964612	AG1-324 E O1	0.5823	Adder	1.29
965031	AG1-367 C	10.5624	50/50	10.5624
965032	AG1-367 E	7.0416	50/50	7.0416
965101	AG1-375 C	10.5636	50/50	10.5636
965102	AG1-375 E	7.0424	50/50	7.0424
965111	AG1-376 C	2.1127	50/50	2.1127
965112	AG1-376 E	3.1691	50/50	3.1691
965461	AG1-414 C O1	1.6157	Adder	3.59
965462	AG1-414 E O1	1.0771	Adder	2.39
965651	AG1-433 C	3.0987	50/50	3.0987

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
965652	AG1-433 E	14.5073	50/50	14.5073
WEC	WEC	0.4167	Confirmed LTF	0.4167
CBM-W2	CBM-W2	10.6803	Confirmed LTF	10.6803
NY	NY	0.0896	Confirmed LTF	0.0896
TVA	TVA	0.7434	Confirmed LTF	0.7434
O-066	O-066	1.1172	Confirmed LTF	1.1172
SIGE	SIGE	0.1869	Confirmed LTF	0.1869
CBM-S2	CBM-S2	0.3550	Confirmed LTF	0.3550
CBM-S1	CBM-S1	0.1615	Confirmed LTF	0.1615
G-007	G-007	0.1743	Confirmed LTF	0.1743
HAMLET	HAMLET	0.0017	Confirmed LTF	0.0017
MEC	MEC	1.9640	Confirmed LTF	1.9640
BLUEG	BLUEG	0.1441	Confirmed LTF	0.1441
TRIMBLE	TRIMBLE	0.1180	Confirmed LTF	0.1180
LAGN	LAGN	1.2075	Confirmed LTF	1.2075
CBM-W1	CBM-W1	14.8752	Confirmed LTF	14.8752

10.6.5 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
161407042	923880	AB2-028 TAP	AEP	243222	05FALL C	AEP	1	AEP_P7-1_#11019-D	tower	1318.0	104.05	105.27	DC	16.09

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243795	05HDWTR1G C	1.3143	50/50	1.3143
247292	05KEY G1	3.3844	50/50	3.3844
247293	05KEY G2	3.4019	50/50	3.4019
247294	05KEY G3	3.4956	50/50	3.4956
247295	05KEY G4	3.5073	50/50	3.5073
247536	05BLUFF P WF	0.5695	50/50	0.5695
247543	V3-007 C	1.3143	50/50	1.3143
247621	Y3-024	0.0507	50/50	0.0507
247929	S-071 E	14.4384	50/50	14.4384
247935	V3-007 E	55.7513	50/50	55.7513
247963	05HDWTR1G E	55.7513	50/50	55.7513
923881	AB2-028 C	15.6702	50/50	15.6702
923882	AB2-028 E	104.8698	50/50	104.8698
926881	AC1-175 C	24.3512	50/50	24.3512
926882	AC1-175 E	39.7308	50/50	39.7308
932681	AC2-090 C	12.1756	50/50	12.1756
932682	AC2-090 E	19.8654	50/50	19.8654
932841	AC2-111 C O1	2.4845	Adder	2.92
932842	AC2-111 E O1	4.0537	Adder	4.77
933594	AC2-176 C	0.4291	50/50	0.4291
933596	AC2-176 E	18.2023	50/50	18.2023
934961	AD1-128 C	12.0869	50/50	12.0869
934962	AD1-128 E	19.7207	50/50	19.7207
939761	AE1-207 C	8.5841	50/50	8.5841
939762	AE1-207 E	11.8543	50/50	11.8543
939771	AE1-208 C	6.8024	50/50	6.8024
939772	AE1-208 E	9.2760	50/50	9.2760
939781	AE1-209 C O1	4.8248	50/50	4.8248
939782	AE1-209 E O1	32.2892	50/50	32.2892
939791	AE1-210 C O1	4.8248	50/50	4.8248
939792	AE1-210 E O1	32.2892	50/50	32.2892
940981	AE2-089 C O1	11.2521	50/50	11.2521
940982	AE2-089 E O1	7.5014	50/50	7.5014
941691	AE2-169	4.0814	50/50	4.0814
941721	AE2-172	5.1096	50/50	5.1096
942071	AE2-219 C	6.1156	50/50	6.1156
942072	AE2-219 E	8.4454	50/50	8.4454
942081	AE2-220 C	16.8215	50/50	16.8215
942082	AE2-220 E	23.2297	50/50	23.2297
942221	AE2-234 C O1	1.8295	Adder	2.15
942222	AE2-234 E O1	0.8275	Adder	0.97

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
944031	AF1-071 C	0.6211	Adder	0.73
944032	AF1-071 E	1.0134	Adder	1.19
944531	AF1-118 C O1	99.7969	50/50	99.7969
944532	AF1-118 E O1	30.0986	50/50	30.0986
944541	AF1-119 C O1	51.9582	50/50	51.9582
944542	AF1-119 E O1	22.2678	50/50	22.2678
944831	AF1-148 C O1	35.4058	50/50	35.4058
944832	AF1-148 E O1	23.6039	50/50	23.6039
945371	AF1-202 C O1	12.6184	50/50	12.6184
945372	AF1-202 E O1	61.6076	50/50	61.6076
945561	AF1-221 C O1	9.9512	Adder	11.71
945562	AF1-221 E O1	2.9911	Adder	3.52
945581	AF1-223 C O1	33.4017	50/50	33.4017
945582	AF1-223 E O1	22.2678	50/50	22.2678
946031	AF1-268 C O1	13.7794	50/50	13.7794
946032	AF1-268 E O1	6.2502	50/50	6.2502
957741	AF2-068 C O1	14.4846	50/50	14.4846
957742	AF2-068 E O1	9.6564	50/50	9.6564
958711	AF2-162 C	11.1339	50/50	11.1339
958712	AF2-162 E	5.5670	50/50	5.5670
958821	AF2-173 C	31.1758	50/50	31.1758
958822	AF2-173 E	43.0522	50/50	43.0522
958861	AF2-177 C O1	9.6494	50/50	9.6494
958862	AF2-177 E O1	64.5766	50/50	64.5766
959201	AF2-211 C	4.9037	Adder	5.77
959202	AF2-211 E	3.2691	Adder	3.85
960441	AF2-335 C	10.8810	50/50	10.8810
960442	AF2-335 E	3.6270	50/50	3.6270
960791	AF2-370	3.6270	50/50	3.6270
960971	AF2-388 C	13.0638	50/50	13.0638
960972	AF2-388 E	61.1622	50/50	61.1622
961162	AF2-407 BAT	92.1750	50/50	92.1750
961172	AF2-408 BAT	13.2912	50/50	13.2912
961761	AG1-017 C	0.4716	50/50	0.4716
961762	AG1-017 E	2.2065	50/50	2.2065
962031	AG1-047 C	9.6564	50/50	9.6564
962032	AG1-047 E	6.4376	50/50	6.4376
962051	AG1-049	0.7624	Adder	1.69
963731	AG1-225 C	8.8749	Adder	19.7
963732	AG1-225 E	5.9595	Adder	13.23
964353	AG1-297 BAT	21.6346	Merchant Transmission	21.6346
964611	AG1-324 C O1	5.5925	50/50	5.5925
964612	AG1-324 E O1	2.3968	50/50	2.3968
965031	AG1-367 C	22.2684	50/50	22.2684
965032	AG1-367 E	14.8456	50/50	14.8456
965101	AG1-375 C	22.2678	50/50	22.2678
965102	AG1-375 E	14.8452	50/50	14.8452
965111	AG1-376 C	4.4536	50/50	4.4536
965112	AG1-376 E	6.6803	50/50	6.6803
965461	AG1-414 C O1	1.8038	Adder	4.0
965462	AG1-414 E O1	1.2026	Adder	2.67
965651	AG1-433 C	6.5319	50/50	6.5319

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
965652	AG1-433 E	30.5811	50/50	30.5811
G-007A	G-007A	0.4771	Confirmed LTF	0.4771
VFT	VFT	1.2900	Confirmed LTF	1.2900
CALDERWOOD	CALDERWOOD	0.6222	Confirmed LTF	0.6222
PRAIRIE	PRAIRIE	8.6195	Confirmed LTF	8.6195
CHEOAH	CHEOAH	0.6166	Confirmed LTF	0.6166
CBM-N	CBM-N	0.2412	Confirmed LTF	0.2412
COTTONWOOD	COTTONWOOD	4.5381	Confirmed LTF	4.5381
HAMLET	HAMLET	0.3101	Confirmed LTF	0.3101
GIBSON	GIBSON	3.8804	Confirmed LTF	3.8804
BLUEG	BLUEG	3.2394	Confirmed LTF	3.2394
TRIMBLE	TRIMBLE	0.8826	Confirmed LTF	0.8826
CATAWBA	CATAWBA	0.2222	Confirmed LTF	0.2222

10.7 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
AA1-099	Clinton Co. 34.5kV	In Service
AA2-148	Madison-Tanners Creek 138kV	Active
AB2-028	Fall Creek-Desoto 345kV	Active
AC1-175	Losantville 345kV	Active
AC2-067	Camden-Crystal I 69kV	Engineering and Procurement
AC2-088	S. Bethel-Brown 69kV	Engineering and Procurement
AC2-090	Losantville 345kV	Active
AC2-111	College Corner 138kV	Active
AC2-176	Jay 138 kV	In Service
AD1-043	Makahoy 138 kV	Active
AD1-128	Modoc-Delaware 138 kV	Active
AD1-136	South Bethel-Brown 69 kV	Engineering and Procurement
AD2-071	Strawton-Pipe Creek 138 kV	Active
AE1-207	Mississinewa-Gaston 138 kV	Active
AE1-208	Delaware-Van Buren 138 kV	Active
AE1-209	Desoto 345 kV	Active
AE1-210	Desoto 345 kV	Active
AE2-089	Pennville-Adams 138 kV	Active
AE2-169	Delaware-Van Buren 138 kV	Active
AE2-171	Makahoy 138 kV	Active
AE2-172	Mississinewa-Gaston 138 kV	Active
AE2-219	Bluff Point-Randolph 138 kV	Active
AE2-220	Losantville 345 kV	Active
AE2-234	Liberty Center-Buckeye Tap 69 kV	Active
AE2-297	Madison-Tanners Creek 138 kV	Active
AF1-045	Cedarville-Ford 138 kV	Active
AF1-071	College Corner 138 kV	Active
AF1-118	Sorenson-Desoto 345 kV	Active
AF1-119	Keystone-Desoto 345 kV	Active
AF1-148	Sorenson-Desoto 345 kV	Active
AF1-202	Keystone-Desoto 345 kV	Active
AF1-221	College Corner-Drewersburg 138 kV	Active
AF1-223	Jay-Desoto 138 kV	Active
AF1-268	Desoto-Jay 138 kV	Active
AF2-033	Miami Fort GT 138 kV	Active
AF2-068	Jay 138 kV	Active
AF2-162	Keystone-Desoto 345 kV	Active
AF2-173	Desoto 345 kV	Active
AF2-177	Sorenson-DeSoto #2 345 kV	Active

Queue Number	Project Name	Status
AF2-204	Van Buren 138 kV	Active
AF2-211	College Corner 138 kV	Active
AF2-335	West Del-Royerton 138 kV	Active
AF2-370	West Del-Royerton 138 kV	Active
AF2-388	Desoto-Sorenson 345 kV	Active
AF2-407	Fall Creek 345 kV	Active
AF2-408	Fall Creek 138 kV	Active
AG1-017	Jay 138 kV	Active
AG1-047	Jay 138 kV	Active
AG1-049	College Corner 138 kV	Active
AG1-207	Northridge 138 kV	Active
AG1-224	Pendleton-Tanners Creek 138 kV	Active
AG1-225	Adams 138 kV	Active
AG1-232	Magley 138 kV	Active
AG1-297	Hanna-Tanners Creek 345 kV	Active
AG1-324	Jay-Desoto 138 kV	Active
AG1-367	DeSoto 345 kV	Active
AG1-375	Sorenson-Desoto 345 kV	Active
AG1-376	Sorenson-DeSoto 345 kV	Active
AG1-414	Mississinewa 138 kV	Active
AG1-433	DeSoto-Keystone 345 kV	Active
V3-007	Desoto-Tanners Creek #1 345kV	Under Construction
Y1-054	Rochelle 138kV	In Service
Y3-024	Bluff Point 12kV	In Service
Z1-065	Wiley 34.5kV	In Service
Z1-080	Clinton County 34.5kV	In Service
Z2-115	Deer Creek 12.47kV	In Service
J1152	MISO	MISO
J805	MISO	MISO
J903	MISO	MISO
J993	MISO	MISO

10.8 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P7-1_#11087-H	CONTINGENCY 'AEP_P7-1_#11087-H' OPEN BRANCH FROM BUS 960970 TO BUS 243225 CKT 1 / 960970 AF2-388 TAP 345 243225 05KEYSTN 345 1 OPEN BRANCH FROM BUS 944530 TO BUS 243232 CKT 2 / 944530 AF1-118 TAP 345 243232 05SORENS 345 2 END
AEP_P1-2_#6372_12497	CONTINGENCY 'AEP_P1-2_#6372_12497' OPEN BRANCH FROM BUS 243262 TO BUS 250106 CKT 1 / 243262 05COLLEGE C 138 250106 08TODHJT 138 1 END
AEP_P4_#14920_05TANNER 345_T	CONTINGENCY 'AEP_P4_#14920_05TANNER 345_T' OPEN BRANCH FROM BUS 243233 TO BUS 249565 CKT 1 / 243233 05TANNER 345 249565 08EBEND
AEP_P1-2_#4817_6341	CONTINGENCY 'AEP_P1-2_#4817_6341' OPEN BRANCH FROM BUS 243225 TO BUS 243232 CKT 1 / 243225 05KEYSTN 345 243232 05SORENS 345 1 END
DEOK_P7_4504MFTANNERS4512EB TANNERS	CONTINGENCY 'DEOK_P7_4504MFTANNERS4512EBTANNERS' OPEN BRANCH FROM BUS 243233 TO BUS 249567 CKT 1 OPEN BRANCH FROM BUS 243233 TO BUS 249565 CKT 1 END
AEP_P1-2_#8702_2543-C	CONTINGENCY 'AEP_P1-2_#8702_2543-C' OPEN BRANCH FROM BUS 944530 TO BUS 243232 CKT 2 / 944530 AF1-118 TAP 345 243232 05SORENS 345 2 END
DEOK_P1_TODHUNTER JCT 138	CONTINGENCY 'DEOK_P1_TODHUNTER JCT 138' OPEN BUS 250106 END
AEP_P7-1_#11019-D	CONTINGENCY 'AEP_P7-1_#11019-D' OPEN BRANCH FROM BUS 944530 TO BUS 243232 CKT 2 / 944530 AF1-118 TAP 345 243232 05SORENS 345 2 OPEN BRANCH FROM BUS 243225 TO BUS 243232 CKT 1 / 243225 05KEYSTN 345 243232 05SORENS 345 1 END

Contingency Name	Contingency Definition
DAY_P1_13803_HUTCHINGS_COLLEGE CORNER (AEP)_138KV	CONTINGENCY 'DAY_P1_13803_HUTCHINGS_COLLEGE CORNER (AEP)_138KV' OPEN BRANCH FROM BUS 253057 TO BUS 250106 CKT 1 END

11 Short Circuit Analysis

The following Breakers are overdutied

None.

12 Affected Systems

12.1 TVA

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

12.2 Duke Energy Progress

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

12.3 MISO

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

12.4 LG&E

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