



**Generation Interconnection
Feasibility Study Report
for
Queue Project AG1-494
BOXWOOD-RIVERVILLE 138 KV
20 MW Capacity / 50 MW Energy**

January 2021

Table of Contents

1	Introduction.....	4
2	Preface.....	4
3	General.....	5
4	Point of Interconnection.....	6
5	Cost Summary.....	6
6	Transmission Owner Scope of Work.....	7
6.1	Attachment Facilities.....	7
6.2	Direct Connection Cost Estimate.....	7
6.3	Non-Direct Connection Cost Estimate.....	7
7	Schedule.....	8
8	Interconnection Customer Requirements.....	8
9	Revenue Metering and SCADA Requirements.....	8
9.1	PJM Requirements.....	8
9.2	Meteorological Data Reporting Requirements.....	8
9.3	Interconnected Transmission Owner Requirements.....	8
10	Summer Peak - Load Flow Analysis.....	10
10.1	Generation Deliverability.....	11
10.2	Multiple Facility Contingency.....	11
10.3	Contribution to Previously Identified Overloads.....	11
10.4	Potential Congestion due to Local Energy Deliverability.....	12
10.5	System Reinforcements - Summer Peak Load Flow.....	15
10.6	Flow Gate Details.....	17
10.6.1	Index 1.....	18
10.6.2	Index 2.....	19
10.6.3	Index 3.....	21
10.6.4	Index 4.....	23
10.6.5	Index 5.....	25
10.6.6	Index 6.....	26
10.6.7	Index 7.....	28
10.7	Queue Dependencies.....	30
10.8	Contingency Descriptions.....	32

11 Short Circuit Analysis.....38

12 Affected Systems39

 12.1 TVA.....39

 12.2 Duke Energy Progress.....39

 12.3 MISO39

 12.4 LG&E.....39

13 Attachment 1: One Line Diagram and Project Site Location.....40

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 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 Storage generating facility located in Amherst County, Virginia. The installed facilities will have a total capability of 50 MW with 20 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 01, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-494
Project Name	BOXWOOD-RIVERVILLE 138 KV
State	Virginia
County	Amherst
Transmission Owner	AEP
MFO	50
MWE	50
MWC	20
Fuel	Storage
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

AG1-494 will interconnect with the AEP transmission system via a new station cut into the Boxwood – Amherst 138 kV section of the Boxwood – Riverville 138 kV circuit.

To accommodate the interconnection on the Boxwood – Amherst 138 kV section of the Boxwood – Riverville 138 kV circuit, a new three (3) circuit breaker 138 kV switching station physically configured and operated as a ring-bus will be constructed (see Attachment 1). Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

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

5 Cost Summary

The AG1-494 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$9,786,000
Total System Network Upgrade Costs	\$95,774,600
Total Costs	\$105,560,600

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
138 kV Revenue Metering	\$376,000
Generator lead first span exiting the POI station, including the first structure outside the fence	\$400,000
Total Attachment Facility Costs	\$776,000

6.2 Direct Connection Cost Estimate

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

Description	Total Cost
A new three (3) circuit breaker 138 kV switching station physically configured and operated as a ring-bus will be constructed. Installation of associated protection and control equipment, 138 kV line risers, and SCADA will also be required.	\$8,150,000
Total Direct Connection Facility Costs	\$8,150,000

6.3 Non-Direct Connection Cost Estimate

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

Description	Total Cost
Boxwood – Amherst 138 kV T-Line Cut In	\$770,000
Review Protection and Control Settings at the Boxwood 138 kV substation	\$45,000
Review Protection and Control Settings at the Amherst 138 kV substation	\$45,000
Total Non-Direct Connection Facility Costs	\$860,000

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 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

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 AG1-494 was evaluated as a 50.0 MW (Capacity 20.0 MW) injection tapping the Boxwood to Riverville 138 kV line in the AEP area. Project AG1-494 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-494 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)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
169485357	938820	AE1-108 TAP	138.0	DVP	314746	4BREM0	138.0	DVP	1	Base Case	single	156.979995728	99.84	101.87	DC	3.18

10.2 Multiple Facility Contingency

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

None

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 LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
161898943	242575	05CAMDLM	138.0	AEP	242737	05OPOSSUMCK	138.0	AEP	1	AEP_P2-2_#10292_05NEWLDN138_1	bus	284.0	113.07	113.86	DC	4.23
161898822	242687	05JOHNMT	138.0	AEP	242734	05NEWLDN	138.0	AEP	1	AEP_P2-2_#13260_05SKIMMR69.0_1	bus	240.0	149.34	150.42	DC	4.9
161898823	242687	05JOHNMT	138.0	AEP	242734	05NEWLDN	138.0	AEP	1	AEP_P2-2_#10163_05EDAN2138_2	bus	240.0	147.52	148.38	DC	3.93
161899189	242687	05JOHNMT	138.0	AEP	242734	05NEWLDN	138.0	AEP	1	AEP_P7-1_#10778	tower	240.0	147.52	148.38	DC	3.93
161899190	242687	05JOHNMT	138.0	AEP	242734	05NEWLDN	138.0	AEP	1	AEP_P7-1_#10830	tower	240.0	143.63	144.54	DC	4.12
167466093	242687	05JOHNMT	138.0	AEP	242734	05NEWLDN	138.0	AEP	1	AEP_P4_#2914_05J.FERR	breaker	240.0	139.12	140.2	DC	4.91
167466094	242687	05JOHNMT	138.0	AEP	242734	05NEWLDN	138.0	AEP	1	AEP_P4_#311_05CLOVRD	breaker	240.0	139.12	140.2	DC	4.91
161898817	242741	05OTTER	138.0	AEP	242687	05JOHNMT	138.0	AEP	1	AEP_P2-2_#13260_05SKIMMR69.0_1	bus	245.0	149.82	150.88	DC	4.9
161898818	242741	05OTTER	138.0	AEP	242687	05JOHNMT	138.0	AEP	1	AEP_P2-2_#10163_05EDAN2138_2	bus	245.0	145.39	146.24	DC	3.93
161899199	242741	05OTTER	138.0	AEP	242687	05JOHNMT	138.0	AEP	1	AEP_P7-1_#10778	tower	245.0	145.39	146.24	DC	3.93
161899200	242741	05OTTER	138.0	AEP	242687	05JOHNMT	138.0	AEP	1	AEP_P7-1_#10830	tower	245.0	143.34	144.23	DC	4.12
167466101	242741	05OTTER	138.0	AEP	242687	05JOHNMT	138.0	AEP	1	AEP_P4_#2914_05J.FERR	breaker	245.0	136.78	137.84	DC	4.91
167466102	242741	05OTTER	138.0	AEP	242687	05JOHNMT	138.0	AEP	1	AEP_P4_#311_05CLOVRD	breaker	245.0	136.78	137.84	DC	4.91
164124326	314746	4BREMO	138.0	DVP	314744	3BREMO	115.0	DVP	1	DVP_P2-2: BREMO B1	bus	228.0	110.83	113.96	DC	7.13
164124327	314746	4BREMO	138.0	DVP	314744	3BREMO	115.0	DVP	1	AEP_P2-2_#10311_05REUSE NS2138_2	bus	228.0	105.21	110.11	DC	11.19
166998075	314746	4BREMO	138.0	DVP	314744	3BREMO	115.0	DVP	1	DVP_P7-1: LN 2106-2111	tower	228.0	113.78	117.26	DC	7.93

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADI NG %	POST PROJE CT LOADI NG %	AC DC	MW IMPA CT
166998076	314746	4BREMO	138.0	DVP	314744	3BREMO	115.0	DVP	1	DVP_P7-1: LN 555-2168-A	tower	228.0	107.42	110.93	DC	8.0
167214115	314746	4BREMO	138.0	DVP	314744	3BREMO	115.0	DVP	1	AP-P2-3-PE-500-016	breaker	228.0	104.22	107.71	DC	7.94
167214116	314746	4BREMO	138.0	DVP	314744	3BREMO	115.0	DVP	1	AP-P2-3-PE-500-014	breaker	228.0	104.22	107.71	DC	7.94
161898933	926520	AC1-123 TAP	138.0	AEP	242575	05CAMDLM	138.0	AEP	1	AEP_P2-2_#10292_05NEWLD N 138_1	bus	255.0	114.17	115.05	DC	4.23
164124236	938820	AE1-108 TAP	138.0	DVP	314746	4BREMO	138.0	DVP	1	DVP_P2-2: BREMO B1	bus	173.0	146.07	150.19	DC	7.13
164124237	938820	AE1-108 TAP	138.0	DVP	314746	4BREMO	138.0	DVP	1	DVP_P2-2: DOOMS B2	bus	173.0	137.86	142.39	DC	7.84
166998002	938820	AE1-108 TAP	138.0	DVP	314746	4BREMO	138.0	DVP	1	DVP_P7-1: LN 2106-2111	tower	173.0	149.95	154.53	DC	7.93
166998003	938820	AE1-108 TAP	138.0	DVP	314746	4BREMO	138.0	DVP	1	DVP_P7-1: LN 555-2168-A	tower	173.0	141.57	146.2	DC	8.0
167213975	938820	AE1-108 TAP	138.0	DVP	314746	4BREMO	138.0	DVP	1	AP-P2-3-PE-500-014	breaker	173.0	137.36	141.95	DC	7.94
167213976	938820	AE1-108 TAP	138.0	DVP	314746	4BREMO	138.0	DVP	1	AP-P2-3-PE-500-015	breaker	173.0	137.36	141.95	DC	7.94
161898973	946590	AF1-323 TAP	138.0	AEP	242792	05SCOTSV	138.0	AEP	1	AEP_P2-2_#1372_05JOSHUA 765_1	bus	167.0	103.01	109.84	DC	11.41
161898974	946590	AF1-323 TAP	138.0	AEP	242792	05SCOTSV	138.0	AEP	1	DVP_P2-2: BREMO B1	bus	167.0	105.18	109.45	DC	7.13
167214090	946590	AF1-323 TAP	138.0	AEP	242792	05SCOTSV	138.0	AEP	1	AEP_P4_#3174_05CL OVRD	breaker	167.0	103.01	109.84	DC	11.41

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 PROJE CT LOADI NG %	POST PROJE CT LOADI NG %	AC DC	MW IMPA CT
168023159	242549	05BANSTR	138.0	AEP	242632	05EDAN 2	138.0	AEP	1	AEP_P2-1_242720 05MONETA 138 242775 05ROCKCAS SS 138 1	operation	296.0	147.88	148.4	DC	3.43
168263180	242563	05BOXWD	138.0	AEP	246229	05REUSENS 2	138.0	AEP	1	AEP_P1-2_#10336-B	operation	167.0	96.26	108.97	DC	21.23
168263181	242563	05BOXWD	138.0	AEP	246229	05REUSENS 2	138.0	AEP	1	DVP_P1-2: LN 8-B	operation	167.0	96.26	108.97	DC	21.23
168263102	242575	05CAMDLM	138.0	AEP	242737	05OPOSSU MCK	138.0	AEP	1	Base Case	operation	205.0	119.36	120.23	DC	3.37

ID	FRO M BUS#	FROM BUS	kV	FRO M BUS ARE A	TO BUS#	TO BUS	kV	TO BUS ARE A	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADI NG %	POST PROJE CT LOADI NG %	AC DC	MW IMPA CT
168263 103	2425 75	05CAMDL M	138 .0	AEP	2427 37	05OPOSSU MCK	138 .0	AEP	1	DVP_P1-2: LN 104	operati on	284.0	112.58	113.35	DC	4.13
168262 905	2426 87	05JOHNM T	138 .0	AEP	2427 34	05NEWLDN	138 .0	AEP	1	Base Case	operati on	167.0	180.91	182.26	DC	4.26
168262 907	2426 87	05JOHNM T	138 .0	AEP	2427 34	05NEWLDN	138 .0	AEP	1	AEP_P1- 2_#3174_6	operati on	240.0	128.58	132.41	DC	9.19
163890 219	2427 01	05LEESVI	138 .0	AEP	3146 67	4ALTVSTA	138 .0	DVP	1	AEP_P2- 1_242575 05CAMDLM 138 242737 05OPOSSUMCK 138 1	operati on	284.0	121.07	121.78	DC	3.8
168263 039	2427 34	05NEWLD N	138 .0	AEP	2425 69	05BRUSHT	138 .0	AEP	1	AEP_P2- 1_242641 05FOREST 138 242734 05NEWLDN 138 1	operati on	207.0	117.44	118.27	DC	3.24
168263 132	2427 34	05NEWLD N	138 .0	AEP	2426 41	05FOREST	138 .0	AEP	1	AEP_P2- 1_242569 05BRUSHT 138 242734 05NEWLDN 138 1	operati on	240.0	104.04	104.91	DC	3.94
168262 897	2427 41	05OTTER	138 .0	AEP	2426 87	05JOHNM T	138 .0	AEP	1	Base Case	operati on	167.0	188.93	190.28	DC	4.26
163890 284	2427 92	05SCOTSV	138 .0	AEP	9388 20	AE1-108 TAP	138 .0	DVP	1	AEP_P2- 1_242515 05JOSHUA 765 247669 05JOSHUA 1EQ 999 1	operati on	167.0	97.02	103.85	DC	11.41
163890 285	2427 92	05SCOTSV	138 .0	AEP	9388 20	AE1-108 TAP	138 .0	DVP	1	AEP_P2- 1_247670 05JOSHUA_XFL 138 247669 05JOSHUA 1EQ 999 1	operati on	167.0	97.02	103.85	DC	11.41
163890 286	2427 92	05SCOTSV	138 .0	AEP	9388 20	AE1-108 TAP	138 .0	DVP	1	AEP_P2- 1_242688 05JOSHUA 138 247670 05JOSHUA_XFL 138 1	operati on	167.0	97.02	103.85	DC	11.41
163890 287	2427 92	05SCOTSV	138 .0	AEP	9388 20	AE1-108 TAP	138 .0	DVP	1	AEP_P1- 3_#1372_05JO SHUA 765_1	operati on	167.0	97.02	103.85	DC	11.41
168263 053	2428 02	05SMITH MTN	138 .0	AEP	9260 50	AC1-083 TAP	138 .0	AEP	1	AEP_P2- 1_242607 05CLOVRD 138 243892 05MEADS8 138 1	operati on	296.0	123.09	123.62	DC	3.43
168263 063	2428 02	05SMITH MTN	138 .0	AEP	2427 01	05LEESVI	138 .0	AEP	1	AEP_P2- 1_242575 05CAMDLM 138 242737 05OPOSSUMCK 138 1	operati on	255.0	118.64	119.43	DC	3.79
168555 203	3137 08	3FORK UNION	115 .0	DVP	3137 07	6FORK UNION	230 .0	DVP	1	DVP_P1-2: LN 2193	operati on	269.779998 779	126.73	127.25	DC	3.1
163890 041	3146 67	4ALTVSTA	138 .0	DVP	2427 41	05OTTER	138 .0	AEP	1	Base Case	operati on	167.0	190.84	192.2	DC	4.26
169485 466	3147 46	4BREMO	138 .0	DVP	3147 44	3BREMO	115 .0	DVP	1	Base Case	operati on	186.119995 117	124.15	128.42	DC	7.94
169485 308	3147 47	6BREMO	230 .0	DVP	3147 44	3BREMO	115 .0	DVP	1	DVP_P1-2: LN 2193	operati on	269.779998 779	189.73	190.5	DC	3.91

ID	FRO M BUS#	FROM BUS	kV	FRO M BUS ARE A	TO BUS#	TO BUS	kV	TO BUS ARE A	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADI NG %	POST PROJE CT LOADI NG %	AC DC	MW IMPA CT
168023 186	9260 50	AC1-083 TAP	138 .0	AEP	2425 50	05BEARSK	138 .0	AEP	1	AEP_P2- 1_242607 05CLOVRD 138 243892 05MEADS8 138 1	operati on	296.0	143.43	143.96	DC	3.43
169784 180	9265 20	AC1-123 TAP	138 .0	AEP	2425 75	05CAMDL M	138 .0	AEP	1	AEP_P2- 1_242607 05CLOVRD 138 243892 05MEADS8 138 1	operati on	255.0	114.61	115.22	DC	2.98
169784 182	9265 20	AC1-123 TAP	138 .0	AEP	2425 75	05CAMDL M	138 .0	AEP	1	Base Case	operati on	205.0	103.8	104.67	DC	3.37
169485 355	9388 20	AE1-108 TAP	138 .0	DVP	3147 46	4BREMO	138 .0	DVP	1	Base Case	operati on	156.979995 728	147.2	152.26	DC	7.94
168263 200	9465 90	AF1-323 TAP	138 .0	AEP	2427 92	05SCOTSV	138 .0	AEP	1	PJM_PLANT BEAR GARDEN	operati on	167.0	102.58	107.34	DC	7.94

10.5 System Reinforcements - Summer Peak Load Flow

ID	Idx	Facility	Upgrade Description	Cost
166998076,167 214116,167214 115,166998075, 164124326,164 124327	5	4BREMO 138.0 kV - 3BREMO 115.0 kV Ckt 1	<u>DVP</u> dom-362 (1920) : Add an additional 138/115 kV transformer at BreMO Project Type : CON Cost : \$7,000,000 Time Estimate : 16-18 Months	\$7,000,000
167466101,167 466102,161899 200,161898817, 161898818,161 899199	4	05OTTER 138.0 kV - 05JOHNMT 138.0 kV Ckt 1	<u>AEP</u> AEPA0019a (91) : 2) Rebuild/reconductor JohnMt - Otter Line, ACSR ~ 397.5 ~ 30/7 ~ LARK Conductor Section 1, 7 Miles. \$10.5M Project Type : FAC Cost : \$10,500,000 Time Estimate : 24-36 Months <u>AEP</u> AEPA0019b (92) : Replace 795 AAC station conductors at Otter Project Type : FAC Cost : \$10,670,000 Time Estimate : 18-24 Months <u>AEP</u> AEPA0019c (93) : Replace 1200 A Switch at Otter Project Type : FAC Cost : \$100,000 Time Estimate : 12-18 Months	\$21,270,000
167466093,161 899190,167466 094,161899189, 161898822,161 898823	3	05JOHNMT 138.0 kV - 05NEWLDN 138.0 kV Ckt 1	<u>AEP</u> AEPA0020a (94) : Current Station Rating: S/N: 167, S/E: 240 1) Rebuild/reconductor ACSR ~ 397.5 ~ 30/7 ~ LARK ~ Fe Clamps 9 d, Conductor Section 1, 14.43 miles Project Type : FAC Cost : \$21,650,000 Time Estimate : 12-18 Months <u>AEP</u> AEPA0020b (95) : Replace 1200 A Wavetrap at New London Project Type : FAC Cost : \$50,000 Time Estimate : 24-36 Months	\$21,700,000
169485357,166 998002,166998 003,164124236, 164124237,167 213976,167213 975	1	AE1-108 TAP 138.0 kV - 4BREMO 138.0 kV Ckt 1	<u>DVP</u> dom-397 (1955) : Reconductor 8.502 miles of 138 kV line 8 from AE1-108 Tap to BreMO with 636 ACSR 150 C Project Type : FAC Cost : \$5,101,200 Time Estimate : 30-36 Months	\$5,101,200
161898943	2	05CAMDLM 138.0 kV - 05OPOSSUMCK 138.0 kV Ckt 1	<u>AEP</u> AEPA0033a (112) : Reconductor/Rebuild 4.2 miles between Opossum Creek-Candlers Mountain 138 kV which currently has 556.5 ACSR 26/7 Dove Project Type : FAC Cost : \$6,300,000 Time Estimate : 12-18 Months	\$6,300,000

ID	Idx	Facility	Upgrade Description	Cost
167214090,161 898974,161898 973	7	AF1-323 TAP 138.0 kV - 05SCOTSV 138.0 kV Ckt 1	<u>AEP</u> AEPA0034a (437) : A sag study will be required on the 0.85 miles of ACSR ~ 397.5 ~ 30/7 ~ LARK - Conductor to determine what mitigation would be required (if any) to operate at the conductor's MOT. Depending on the sag study results, the cost for this upgrade is expected to be between \$3,400 (no remediation required, just sag study) and \$1.275 million (complete line reconductor/rebuild). Time Estimate: a) Sag Study: 6-12 months b) Rebuild: The standard tiem 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 : \$3,400 Time Estimate : 6 - 12 months Months	\$3,400
161898933	6	AC1-123 TAP 138.0 kV - 05CAMDLM 138.0 kV Ckt 1	<u>AEP</u> AEPA0027a (440) : Reconductor/ Rebuild 17.2 miles between Candiers Mountain - Redeye 138kV which currently has ACSR ~ 556 ACSR ~ 26/7 overhead conductor Project Type : FAC Cost : \$34,400,000 Time Estimate : 24 - 36 months Months	\$34,400,000
			TOTAL COST	\$95,774,600

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
166998002	938820	AE1-108 TAP	DVP	314746	4BREMO	DVP	1	DVP_P7-1: LN 2106-2111	tower	173.0	149.95	154.53	DC	7.93

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
935241	AD1-161 C	1.6457	Adder	1.94
935242	AD1-161 E	1.3514	Adder	1.59
938821	AE1-108 C O1	63.1217	50/50	63.1217
938822	AE1-108 E O1	28.3291	50/50	28.3291
946293	AF1-293 BAT	7.9115	Merchant Transmission	7.9115
946591	AF1-323 C	20.1656	50/50	20.1656
946592	AF1-323 E	13.4438	50/50	13.4438
958131	AF2-107 C	8.9351	50/50	8.9351
958132	AF2-107 E	4.8964	50/50	4.8964
960111	AF2-302 C	7.3330	50/50	7.3330
960112	AF2-302 E	4.8886	50/50	4.8886
961801	AG1-022 C	7.3330	50/50	7.3330
961802	AG1-022 E	4.8886	50/50	4.8886
962741	AG1-123 C O1	5.9944	50/50	5.9944
962742	AG1-123 E O1	4.1771	50/50	4.1771
962751	AG1-124 C O1	6.5196	50/50	6.5196
962752	AG1-124 E O1	4.5494	50/50	4.5494
964531	AG1-316 C O1	1.6607	Adder	3.69
964532	AG1-316 E O1	0.4152	Adder	0.92
965581	AG1-426	13.7520	50/50	13.7520
966251	AG1-494 C	3.1736	50/50	3.1736
966252	AG1-494 E	4.7604	50/50	4.7604
WEC	WEC	0.1559	Confirmed LTF	0.1559
LGEE	LGEE	0.3387	Confirmed LTF	0.3387
CPL	CPL	0.0607	Confirmed LTF	0.0607
CBM-W2	CBM-W2	4.5965	Confirmed LTF	4.5965
NY	NY	0.1288	Confirmed LTF	0.1288
TVA	TVA	0.7490	Confirmed LTF	0.7490
O-066	O-066	1.9652	Confirmed LTF	1.9652
SIGE	SIGE	0.0860	Confirmed LTF	0.0860
CBM-S2	CBM-S2	3.2677	Confirmed LTF	3.2677
CBM-S1	CBM-S1	0.2037	Confirmed LTF	0.2037
G-007	G-007	0.3098	Confirmed LTF	0.3098
MEC	MEC	0.7993	Confirmed LTF	0.7993
LAGN	LAGN	0.8908	Confirmed LTF	0.8908
CBM-W1	CBM-W1	6.6455	Confirmed LTF	6.6455

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 IMPAC T
161898943	242575	05CAMDL M	AEP	242737	05OPOSSUMCK	AEP	1	AEP_P2-2_#10292_05NEWLD N 138_1	bus	284.0	113.07	113.86	DC	4.23

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
246843	05SMG1	1.9399	50/50	1.9399
246844	05SMG2	5.2732	50/50	5.2732
246845	05SMG3	3.3060	50/50	3.3060
246846	05SMG4	5.1913	50/50	5.1913
246847	05SMG5	2.0219	50/50	2.0219
247284	05LEESVG	1.0979	50/50	1.0979
925661	AC1-042 C	1.6528	50/50	1.6528
925662	AC1-042 E	2.6967	50/50	2.6967
925997	AC1-075 E	1.0121	Adder	1.19
926024	AC1-080 E	0.3358	Adder	0.4
926051	AC1-083 C O1	4.8651	50/50	4.8651
926052	AC1-083 E O1	7.9379	50/50	7.9379
926521	AC1-123 C O1	3.6473	50/50	3.6473
926522	AC1-123 E O1	10.8777	50/50	10.8777
926645	AC1-145 C	0.3104	50/50	0.3104
926646	AC1-145 E	1.7657	50/50	1.7657
933941	AD1-017 C	0.9730	50/50	0.9730
933942	AD1-017 E	1.5876	50/50	1.5876
938451	AE1-064 C	9.5344	50/50	9.5344
938452	AE1-064 E	4.9301	50/50	4.9301
939011	AE1-130 C	3.6885	Adder	4.34
939012	AE1-130 E	1.8476	Adder	2.17
939941	AE1-230 C	0.7456	50/50	0.7456
939942	AE1-230 E	1.3256	50/50	1.3256
940081	AE1-250 C	7.2262	Adder	8.5
940082	AE1-250 E	4.8175	Adder	5.67
941801	AE2-185 C	3.7282	50/50	3.7282
941802	AE2-185 E	2.4854	50/50	2.4854
941821	AE2-187 C	3.7282	50/50	3.7282
941822	AE2-187 E	1.6570	50/50	1.6570
942671	AE2-283 C	4.1010	50/50	4.1010
942672	AE2-283 E	2.1540	50/50	2.1540
942751	AE2-291 C	3.4203	Adder	4.02
942752	AE2-291 E	2.2802	Adder	2.68
942761	AE2-292 C O1	4.2586	Adder	5.01
942762	AE2-292 E O1	2.8391	Adder	3.34
945081	AF1-173	1.4447	50/50	1.4447
961121	AF2-403	0.8285	50/50	0.8285
963601	AG1-209 C	0.2900	50/50	0.2900
963602	AG1-209 E	0.4350	50/50	0.4350
964141	AG1-275 C	1.2427	50/50	1.2427

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
964142	AG1-275 E	0.8285	50/50	0.8285
964151	AG1-276 C	1.2427	50/50	1.2427
964152	AG1-276 E	0.8285	50/50	0.8285
964251	AG1-286 C	0.6214	50/50	0.6214
964252	AG1-286 E	0.4142	50/50	0.4142
964531	AG1-316 C O1	49.4419	50/50	49.4419
964532	AG1-316 E O1	12.3605	50/50	12.3605
966253	AG1-494 BAT	2.2424	Merchant Transmission	2.2424
966691	AG1-539 C	0.9479	Adder	2.1
966692	AG1-539 E	1.2737	Adder	2.83
966761	AG1-547 C	3.3698	50/50	3.3698
966762	AG1-547 E	1.8082	50/50	1.8082
CPL	CPL	0.6825	Confirmed LTF	0.6825
NY	NY	0.0476	Confirmed LTF	0.0476
PRAIRIE	PRAIRIE	0.1627	Confirmed LTF	0.1627
TVA	TVA	0.0602	Confirmed LTF	0.0602
O-066	O-066	0.5115	Confirmed LTF	0.5115
CBM-S2	CBM-S2	6.4310	Confirmed LTF	6.4310
CBM-S1	CBM-S1	0.0038	Confirmed LTF	0.0038
G-007	G-007	0.0788	Confirmed LTF	0.0788
GIBSON	GIBSON	0.0682	Confirmed LTF	0.0682
BLUEG	BLUEG	0.2448	Confirmed LTF	0.2448
TRIMBLE	TRIMBLE	0.0801	Confirmed LTF	0.0801
LAGN	LAGN	0.0962	Confirmed LTF	0.0962

10.6.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
16189882 2	242687	05JOHNM T	AEP	24273 4	05NEWLD N	AEP	1	AEP_P2- 2_#13260_05SKIMM R 69.0_1	bus	240.0	149.34	150.42	DC	4.9

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
246843	05SMG1	1.1693	50/50	1.1693
246844	05SMG2	3.1786	50/50	3.1786
246845	05SMG3	1.9928	50/50	1.9928
246846	05SMG4	3.1292	50/50	3.1292
246847	05SMG5	1.2187	50/50	1.2187
247284	05LEESVG	1.8564	50/50	1.8564
315156	1HALLBR1	2.9223	50/50	2.9223
316118	AC1-105 C	1.8331	Adder	2.16
316123	AC1-075 C	1.2269	50/50	1.2269
925661	AC1-042 C	5.9959	50/50	5.9959
925662	AC1-042 E	9.7827	50/50	9.7827
925997	AC1-075 E	4.4060	50/50	4.4060
926023	AC1-080 C	0.4100	50/50	0.4100
926024	AC1-080 E	1.4619	50/50	1.4619
926051	AC1-083 C O1	2.5478	Adder	3.0
926052	AC1-083 E O1	4.1570	Adder	4.89
926274	AC1-105 E	0.9006	Adder	1.06
926645	AC1-145 C	1.1261	50/50	1.1261
926646	AC1-145 E	6.4053	50/50	6.4053
927261	AC1-222 C	1.9259	Adder	2.27
927262	AC1-222 E	1.8334	Adder	2.16
933941	AD1-017 C	0.5096	Adder	0.6
933942	AD1-017 E	0.8314	Adder	0.98
934311	AD1-055 C	1.3372	Adder	1.57
934312	AD1-055 E	0.3448	Adder	0.41
938451	AE1-064 C	4.7778	Adder	5.62
938452	AE1-064 E	2.4705	Adder	2.91
939941	AE1-230 C	2.7049	50/50	2.7049
939942	AE1-230 E	4.8087	50/50	4.8087
941801	AE2-185 C	13.5245	50/50	13.5245
941802	AE2-185 E	9.0163	50/50	9.0163
941821	AE2-187 C	13.5245	50/50	13.5245
941822	AE2-187 E	6.0109	50/50	6.0109
942671	AE2-283 C	14.8769	50/50	14.8769
942672	AE2-283 E	7.8141	50/50	7.8141
942751	AE2-291 C	15.1898	50/50	15.1898
942752	AE2-291 E	10.1266	50/50	10.1266
942761	AE2-292 C O1	18.9128	50/50	18.9128
942762	AE2-292 E O1	12.6086	50/50	12.6086
943901	AF1-058 C	0.7117	Adder	0.84
943902	AF1-058 E	0.4744	Adder	0.56

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945081	AF1-173	5.2407	50/50	5.2407
960061	AF2-297 C	2.8466	Adder	3.35
960062	AF2-297 E	1.8977	Adder	2.23
961121	AF2-403	3.0054	50/50	3.0054
962441	AG1-093 C O1	2.5908	Adder	5.75
962442	AG1-093 E O1	0.7885	Adder	1.75
963601	AG1-209 C	1.0519	50/50	1.0519
963602	AG1-209 E	1.5779	50/50	1.5779
964141	AG1-275 C	4.5082	50/50	4.5082
964142	AG1-275 E	3.0054	50/50	3.0054
964151	AG1-276 C	4.5082	50/50	4.5082
964152	AG1-276 E	3.0054	50/50	3.0054
964251	AG1-286 C	3.3401	50/50	3.3401
964252	AG1-286 E	2.2268	50/50	2.2268
964261	AG1-287 C	0.2829	Adder	0.63
964262	AG1-287 E	0.1886	Adder	0.42
964471	AG1-310 C	1.4850	50/50	1.4850
964472	AG1-310 E	0.7314	50/50	0.7314
964533	AG1-316 BAT	1.6207	Merchant Transmission	1.6207
966253	AG1-494 BAT	2.5943	Merchant Transmission	2.5943
966691	AG1-539 C	7.9424	50/50	7.9424
966692	AG1-539 E	10.6726	50/50	10.6726
966761	AG1-547 C	12.2246	50/50	12.2246
966762	AG1-547 E	6.5594	50/50	6.5594
CPL	CPL	0.9111	Confirmed LTF	0.9111
NY	NY	0.0210	Confirmed LTF	0.0210
PRAIRIE	PRAIRIE	0.4288	Confirmed LTF	0.4288
O-066	O-066	0.0673	Confirmed LTF	0.0673
CBM-S2	CBM-S2	8.1014	Confirmed LTF	8.1014
COTTONWOOD	COTTONWOOD	0.0105	Confirmed LTF	0.0105
G-007	G-007	0.0084	Confirmed LTF	0.0084
GIBSON	GIBSON	0.1381	Confirmed LTF	0.1381
BLUEG	BLUEG	0.4826	Confirmed LTF	0.4826
TRIMBLE	TRIMBLE	0.1564	Confirmed LTF	0.1564

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
161898817	242741	05OTTER	AEP	242687	05JOHNMT	AEP	1	AEP_P2-2_#13260_05SKIMMR69.0_1	bus	245.0	149.82	150.88	DC	4.9

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
246843	05SMG1	1.1693	50/50	1.1693
246844	05SMG2	3.1786	50/50	3.1786
246845	05SMG3	1.9928	50/50	1.9928
246846	05SMG4	3.1292	50/50	3.1292
246847	05SMG5	1.2187	50/50	1.2187
247284	05LEESVG	1.8564	50/50	1.8564
315156	1HALLBR1	2.9223	50/50	2.9223
316118	AC1-105 C	1.8331	Adder	2.16
316123	AC1-075 C	1.2269	50/50	1.2269
925661	AC1-042 C	5.9959	50/50	5.9959
925662	AC1-042 E	9.7827	50/50	9.7827
925997	AC1-075 E	4.4060	50/50	4.4060
926023	AC1-080 C	0.4100	50/50	0.4100
926024	AC1-080 E	1.4619	50/50	1.4619
926051	AC1-083 C O1	2.5478	Adder	3.0
926052	AC1-083 E O1	4.1570	Adder	4.89
926274	AC1-105 E	0.9006	Adder	1.06
926645	AC1-145 C	1.1261	50/50	1.1261
926646	AC1-145 E	6.4053	50/50	6.4053
927261	AC1-222 C	1.9259	Adder	2.27
927262	AC1-222 E	1.8334	Adder	2.16
933941	AD1-017 C	0.5096	Adder	0.6
933942	AD1-017 E	0.8314	Adder	0.98
934311	AD1-055 C	1.3372	Adder	1.57
934312	AD1-055 E	0.3448	Adder	0.41
938451	AE1-064 C	4.7778	Adder	5.62
938452	AE1-064 E	2.4705	Adder	2.91
939941	AE1-230 C	2.7049	50/50	2.7049
939942	AE1-230 E	4.8087	50/50	4.8087
940081	AE1-250 C	4.5831	Adder	5.39
940082	AE1-250 E	3.0554	Adder	3.59
941801	AE2-185 C	13.5245	50/50	13.5245
941802	AE2-185 E	9.0163	50/50	9.0163
941821	AE2-187 C	13.5245	50/50	13.5245
941822	AE2-187 E	6.0109	50/50	6.0109
942671	AE2-283 C	14.8769	50/50	14.8769
942672	AE2-283 E	7.8141	50/50	7.8141
942751	AE2-291 C	15.1898	50/50	15.1898
942752	AE2-291 E	10.1266	50/50	10.1266
942761	AE2-292 C O1	18.9128	50/50	18.9128
942762	AE2-292 E O1	12.6086	50/50	12.6086

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943901	AF1-058 C	0.7117	Adder	0.84
943902	AF1-058 E	0.4744	Adder	0.56
945081	AF1-173	5.2407	50/50	5.2407
960061	AF2-297 C	2.8466	Adder	3.35
960062	AF2-297 E	1.8977	Adder	2.23
961121	AF2-403	3.0054	50/50	3.0054
962441	AG1-093 C O1	2.5908	Adder	5.75
962442	AG1-093 E O1	0.7885	Adder	1.75
963601	AG1-209 C	1.0519	50/50	1.0519
963602	AG1-209 E	1.5779	50/50	1.5779
964141	AG1-275 C	4.5082	50/50	4.5082
964142	AG1-275 E	3.0054	50/50	3.0054
964151	AG1-276 C	4.5082	50/50	4.5082
964152	AG1-276 E	3.0054	50/50	3.0054
964261	AG1-287 C	0.2829	Adder	0.63
964262	AG1-287 E	0.1886	Adder	0.42
964471	AG1-310 C	1.4850	50/50	1.4850
964472	AG1-310 E	0.7314	50/50	0.7314
964533	AG1-316 BAT	1.6207	Merchant Transmission	1.6207
966253	AG1-494 BAT	2.5943	Merchant Transmission	2.5943
966691	AG1-539 C	7.9424	50/50	7.9424
966692	AG1-539 E	10.6726	50/50	10.6726
966761	AG1-547 C	12.2246	50/50	12.2246
966762	AG1-547 E	6.5594	50/50	6.5594
CPL	CPL	0.9111	Confirmed LTF	0.9111
NY	NY	0.0210	Confirmed LTF	0.0210
PRAIRIE	PRAIRIE	0.4288	Confirmed LTF	0.4288
O-066	O-066	0.0673	Confirmed LTF	0.0673
CBM-S2	CBM-S2	8.1014	Confirmed LTF	8.1014
COTTONWOOD	COTTONWOOD	0.0105	Confirmed LTF	0.0105
G-007	G-007	0.0084	Confirmed LTF	0.0084
GIBSON	GIBSON	0.1381	Confirmed LTF	0.1381
BLUEG	BLUEG	0.4826	Confirmed LTF	0.4826
TRIMBLE	TRIMBLE	0.1564	Confirmed LTF	0.1564

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
166998075	314746	4BREMO	DVP	314744	3BREMO	DVP	1	DVP_P7-1: LN 2106-2111	tower	228.0	113.78	117.26	DC	7.93

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
935241	AD1-161 C	1.6457	Adder	1.94
935242	AD1-161 E	1.3514	Adder	1.59
938821	AE1-108 C O1	63.1217	50/50	63.1217
938822	AE1-108 E O1	28.3291	50/50	28.3291
946293	AF1-293 BAT	7.9115	Merchant Transmission	7.9115
946591	AF1-323 C	20.1656	50/50	20.1656
946592	AF1-323 E	13.4438	50/50	13.4438
958131	AF2-107 C	8.9351	50/50	8.9351
958132	AF2-107 E	4.8964	50/50	4.8964
960111	AF2-302 C	7.3330	50/50	7.3330
960112	AF2-302 E	4.8886	50/50	4.8886
961801	AG1-022 C	7.3330	50/50	7.3330
961802	AG1-022 E	4.8886	50/50	4.8886
962741	AG1-123 C O1	5.9944	50/50	5.9944
962742	AG1-123 E O1	4.1771	50/50	4.1771
962751	AG1-124 C O1	6.5196	50/50	6.5196
962752	AG1-124 E O1	4.5494	50/50	4.5494
964531	AG1-316 C O1	1.6607	Adder	3.69
964532	AG1-316 E O1	0.4152	Adder	0.92
965581	AG1-426	13.7520	50/50	13.7520
966251	AG1-494 C	3.1736	50/50	3.1736
966252	AG1-494 E	4.7604	50/50	4.7604
WEC	WEC	0.1559	Confirmed LTF	0.1559
LGEE	LGEE	0.3387	Confirmed LTF	0.3387
CPLE	CPLE	0.0607	Confirmed LTF	0.0607
CBM-W2	CBM-W2	4.5965	Confirmed LTF	4.5965
NY	NY	0.1288	Confirmed LTF	0.1288
TVA	TVA	0.7490	Confirmed LTF	0.7490
O-066	O-066	1.9652	Confirmed LTF	1.9652
SIGE	SIGE	0.0860	Confirmed LTF	0.0860
CBM-S2	CBM-S2	3.2677	Confirmed LTF	3.2677
CBM-S1	CBM-S1	0.2037	Confirmed LTF	0.2037
G-007	G-007	0.3098	Confirmed LTF	0.3098
MEC	MEC	0.7993	Confirmed LTF	0.7993
LAGN	LAGN	0.8908	Confirmed LTF	0.8908
CBM-W1	CBM-W1	6.6455	Confirmed LTF	6.6455

10.6.6 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
161898933	926520	AC1-123 TAP	AEP	242575	05CAMDLM	AEP	1	AEP_P2-2_#10292_05NEWLDN138_1	bus	255.0	114.17	115.05	DC	4.23

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
246843	05SMG1	1.9399	50/50	1.9399
246844	05SMG2	5.2732	50/50	5.2732
246845	05SMG3	3.3060	50/50	3.3060
246846	05SMG4	5.1913	50/50	5.1913
246847	05SMG5	2.0219	50/50	2.0219
247284	05LEESVG	1.0979	50/50	1.0979
925661	AC1-042 C	1.6528	50/50	1.6528
925662	AC1-042 E	2.6967	50/50	2.6967
925997	AC1-075 E	1.0121	Adder	1.19
926024	AC1-080 E	0.3358	Adder	0.4
926051	AC1-083 C O1	4.8651	50/50	4.8651
926052	AC1-083 E O1	7.9379	50/50	7.9379
926521	AC1-123 C O1	3.6473	50/50	3.6473
926522	AC1-123 E O1	10.8777	50/50	10.8777
926645	AC1-145 C	0.3104	50/50	0.3104
926646	AC1-145 E	1.7657	50/50	1.7657
933941	AD1-017 C	0.9730	50/50	0.9730
933942	AD1-017 E	1.5876	50/50	1.5876
938451	AE1-064 C	9.5344	50/50	9.5344
938452	AE1-064 E	4.9301	50/50	4.9301
939011	AE1-130 C	3.6885	Adder	4.34
939012	AE1-130 E	1.8476	Adder	2.17
939941	AE1-230 C	0.7456	50/50	0.7456
939942	AE1-230 E	1.3256	50/50	1.3256
940081	AE1-250 C	7.2262	Adder	8.5
940082	AE1-250 E	4.8175	Adder	5.67
941801	AE2-185 C	3.7282	50/50	3.7282
941802	AE2-185 E	2.4854	50/50	2.4854
941821	AE2-187 C	3.7282	50/50	3.7282
941822	AE2-187 E	1.6570	50/50	1.6570
942671	AE2-283 C	4.1010	50/50	4.1010
942672	AE2-283 E	2.1540	50/50	2.1540
942751	AE2-291 C	3.4203	Adder	4.02
942752	AE2-291 E	2.2802	Adder	2.68
942761	AE2-292 C O1	4.2586	Adder	5.01
942762	AE2-292 E O1	2.8391	Adder	3.34
945081	AF1-173	1.4447	50/50	1.4447
961121	AF2-403	0.8285	50/50	0.8285
963601	AG1-209 C	0.2900	50/50	0.2900
963602	AG1-209 E	0.4350	50/50	0.4350
964141	AG1-275 C	1.2427	50/50	1.2427

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
964142	AG1-275 E	0.8285	50/50	0.8285
964151	AG1-276 C	1.2427	50/50	1.2427
964152	AG1-276 E	0.8285	50/50	0.8285
964251	AG1-286 C	0.6214	50/50	0.6214
964252	AG1-286 E	0.4142	50/50	0.4142
964533	AG1-316 BAT	9.0988	50/50	9.0988
966253	AG1-494 BAT	2.2424	Merchant Transmission	2.2424
966691	AG1-539 C	0.9479	Adder	2.1
966692	AG1-539 E	1.2737	Adder	2.83
966761	AG1-547 C	3.3698	50/50	3.3698
966762	AG1-547 E	1.8082	50/50	1.8082
CPLE	CPLE	0.6825	Confirmed LTF	0.6825
NY	NY	0.0476	Confirmed LTF	0.0476
PRAIRIE	PRAIRIE	0.1627	Confirmed LTF	0.1627
TVA	TVA	0.0602	Confirmed LTF	0.0602
O-066	O-066	0.5115	Confirmed LTF	0.5115
CBM-S2	CBM-S2	6.4310	Confirmed LTF	6.4310
CBM-S1	CBM-S1	0.0038	Confirmed LTF	0.0038
G-007	G-007	0.0788	Confirmed LTF	0.0788
GIBSON	GIBSON	0.0682	Confirmed LTF	0.0682
BLUEG	BLUEG	0.2448	Confirmed LTF	0.2448
TRIMBLE	TRIMBLE	0.0801	Confirmed LTF	0.0801
LAGN	LAGN	0.0962	Confirmed LTF	0.0962

10.6.7 Index 7

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
167214090	946590	AF1-323 TAP	AEP	242792	05SCOTSV	AEP	1	AEP_P4_#3174_05CLOVRD	breaker	167.0	103.01	109.84	DC	11.41

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
242889	05REUSENS	0.0886	50/50	0.0886
925661	AC1-042 C	1.1325	Adder	1.33
925662	AC1-042 E	1.8477	Adder	2.17
926522	AC1-123 E O1	1.9010	Adder	2.24
926646	AC1-145 E	1.2098	Adder	1.42
935241	AD1-161 C	4.2712	50/50	4.2712
935242	AD1-161 E	3.5075	50/50	3.5075
938451	AE1-064 C	2.8963	Adder	3.41
938452	AE1-064 E	1.4976	Adder	1.76
939941	AE1-230 C	0.5109	Adder	0.6
939942	AE1-230 E	0.9083	Adder	1.07
941801	AE2-185 C	2.5545	Adder	3.01
941802	AE2-185 E	1.7030	Adder	2.0
941821	AE2-187 C	2.5545	Adder	3.01
941822	AE2-187 E	1.1353	Adder	1.34
942671	AE2-283 C	2.8099	Adder	3.31
942672	AE2-283 E	1.4759	Adder	1.74
942751	AE2-291 C	2.8039	Adder	3.3
942752	AE2-291 E	1.8693	Adder	2.2
942761	AE2-292 C O1	3.4911	Adder	4.11
942762	AE2-292 E O1	2.3274	Adder	2.74
945081	AF1-173	0.9899	Adder	1.16
946293	AF1-293 BAT	7.1870	Merchant Transmission	7.1870
946591	AF1-323 C	21.2411	50/50	21.2411
946592	AF1-323 E	14.1607	50/50	14.1607
958131	AF2-107 C	10.8586	50/50	10.8586
958132	AF2-107 E	5.9504	50/50	5.9504
960111	AF2-302 C	7.7240	50/50	7.7240
960112	AF2-302 E	5.1494	50/50	5.1494
961121	AF2-403	0.5677	Adder	0.67
961801	AG1-022 C	7.7240	50/50	7.7240
961802	AG1-022 E	5.1494	50/50	5.1494
962741	AG1-123 C O1	9.2117	50/50	9.2117
962742	AG1-123 E O1	6.4190	50/50	6.4190
962751	AG1-124 C O1	11.0708	50/50	11.0708
962752	AG1-124 E O1	7.7252	50/50	7.7252
963601	AG1-209 C	0.1053	Adder	0.23
963602	AG1-209 E	0.1580	Adder	0.35
964141	AG1-275 C	0.4513	Adder	1.0
964142	AG1-275 E	0.3009	Adder	0.67
964151	AG1-276 C	0.4513	Adder	1.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
964152	AG1-276 E	0.3009	Adder	0.67
964251	AG1-286 C	0.6222	50/50	0.6222
964252	AG1-286 E	0.4148	50/50	0.4148
964531	AG1-316 C O1	8.2368	50/50	8.2368
964532	AG1-316 E O1	2.0592	50/50	2.0592
965582	AG1-426 BAT	5.7196	50/50	5.7196
966251	AG1-494 C	4.5632	50/50	4.5632
966252	AG1-494 E	6.8448	50/50	6.8448
966691	AG1-539 C	0.7770	Adder	1.72
966692	AG1-539 E	1.0441	Adder	2.32
966761	AG1-547 C	1.2238	Adder	2.72
966762	AG1-547 E	0.6566	Adder	1.46
WEC	WEC	0.1310	Confirmed LTF	0.1310
LGEE	LGEE	0.2821	Confirmed LTF	0.2821
CPL	CPL	0.2382	Confirmed LTF	0.2382
CBM-W2	CBM-W2	4.0947	Confirmed LTF	4.0947
NY	NY	0.1134	Confirmed LTF	0.1134
TVA	TVA	0.6832	Confirmed LTF	0.6832
O-066	O-066	1.7094	Confirmed LTF	1.7094
SIGE	SIGE	0.0733	Confirmed LTF	0.0733
CBM-S2	CBM-S2	4.6145	Confirmed LTF	4.6145
CBM-S1	CBM-S1	0.1828	Confirmed LTF	0.1828
G-007	G-007	0.2699	Confirmed LTF	0.2699
MEC	MEC	0.6849	Confirmed LTF	0.6849
LAGN	LAGN	0.8225	Confirmed LTF	0.8225
CBM-W1	CBM-W1	5.5800	Confirmed LTF	5.5800

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
AC1-042	Altavista-Mt. Airy 69kV	Engineering and Procurement
AC1-075	Perth-Hickory Grove 115kV	Engineering and Procurement
AC1-080	Perth-Hickory Grove 115kV	Engineering and Procurement
AC1-083	Smith Mountain-Bearskin 138kV	Active
AC1-105	Halifax-Mt. Laurel 115kV	Engineering and Procurement
AC1-123	Smith Mountain-Candler's Mountain 138kV	Under Construction
AC1-145	Gretna DP 69 kV	Engineering and Procurement
AC1-222	Crystal Hill-Halifax 115kV	Engineering and Procurement
AD1-017	Smith Mountain-Bearskin 138 kV	Active
AD1-055	Crystal Hill-Halifax 115 kV	Engineering and Procurement
AD1-161	Stonewall-Long Mountain 69 kV	Active
AE1-064	Rockcastle 138 kV	Active
AE1-108	Bremo-Scottsville 138 kV	Active
AE1-130	Meads Store 138 kV	Active
AE1-230	Shockoe 69 kV	Active
AE1-250	Smith Mountain-E. Danville 138 kV	Active
AE2-185	Gladys DP-Stonemill Switching Station 69 kV	Active
AE2-187	Shockoe DP-Chatham 69 kV	Active
AE2-283	Gladys-Stone Mill 69 kV	Active
AE2-291	Grit DP-Perth 115 kV	Active
AE2-292	Grit DP-Perth 115 kV	Active
AF1-058	Welco 34.5 kV	Engineering and Procurement
AF1-173	Gretna DP-Shockoe DP 69 kV	Active
AF1-293	Kidds Store-Fort Union 115 kV	Active
AF1-323	Scottsville-Colleen 138 kV	Active
AF2-107	Clifford 138 kV	Active
AF2-297	Sedge Hill 115 kV	Active
AF2-302	Scottsville-Colleen 138 kV	Active
AF2-403	Shockoe DP-Chatham 69 kV	Active
AG1-022	Scottsville-Colleen 138 kV	Active
AG1-093	Halifax-Chase City 115 kV	Active
AG1-123	Amherst-Riverville 138 kV	Active
AG1-124	Gladstone 138 kV	Active
AG1-209	Gretna 12.5 kV	Active
AG1-275	Gladys DP-Stone Mill 69 kV	Active
AG1-276	Gladys DP-Stone Mill 69 kV	Active
AG1-286	Johnson Mountain 138 kV	Active
AG1-287	South Boston 12.5 kV	Active
AG1-310	Crystal Hill-Perth 115 kV	Active

Queue Number	Project Name	Status
AG1-316	Rustburg 138 kV	Active
AG1-426	Bremo-Scottsville 138 kV	Active
AG1-494	Boxwood-Riverville 138 kV	Active
AG1-539	Grit DP-Perth 115 kV	Active
AG1-547	Mount Airy-Chatham 69 kV	Active

10.8 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P2-1_242575 05CAMDLM 138 242737 05OPOSSUMCK 138 1	CONTINGENCY 'AEP_P2-1_242575 05CAMDLM 138 242737 05OPOSSUMCK 138 1' OPEN BRANCH FROM BUS 242575 TO BUS 242737 CKT 1 END
DVP_P2-2: BREMO B1	CONTINGENCY 'DVP_P2-2: BREMO B1' /* BREMO 230 KV OPEN BRANCH FROM BUS 314326 TO BUS 314747 CKT 1 /* 6BEARGRDN 230.00 - 6BREMO 230.00 OPEN BRANCH FROM BUS 314326 TO BUS 315191 CKT 1 /* 6BEARGRDN 230.00 - 1BEARGRDN G118.000 OPEN BUS 315191 /* ISLAND: 1BEARGRDN G118.000 OPEN BRANCH FROM BUS 314326 TO BUS 314747 CKT 2 /* 6BEARGRDN 230.00 - 6BREMO 230.00 OPEN BRANCH FROM BUS 314326 TO BUS 315192 CKT 1 /* 6BEARGRDN 230.00 - 1BEARGRDN G218.000 OPEN BRANCH FROM BUS 314326 TO BUS 315193 CKT 1 /* 6BEARGRDN 230.00 - 1BEARGRDN S122.000 OPEN BUS 315192 /* ISLAND: 1BEARGRDN G218.000 OPEN BUS 315193 /* ISLAND: 1BEARGRDN S122.000 OPEN BRANCH FROM BUS 314677 TO BUS 314747 CKT 1 /* 6BUCKING 230.00 - 6BREMO 230.00 OPEN BRANCH FROM BUS 313868 TO BUS 314747 CKT 1 /* 6CARTERV 230.00 - 6BREMO 230.00 OPEN BRANCH FROM BUS 313867 TO BUS 314747 CKT 1 /* 6BREMODIST 230.00 - 6BREMO 230.00 OPEN BRANCH FROM BUS 314744 TO BUS 314747 CKT 1 /* 3BREMO 115.00 - 6BREMO 230.00 OPEN BUS 314747 /* 6BREMO 230.00 KV OPEN BUS 314326 /* ISLAND: 6BEARGRDN 230.00 END
AEP_P4_#3174_05CLOVRD	CONTINGENCY "'AEP_P4_#3174_05CLOVRD' 765_AA2" / 1543 OPEN BRANCH FROM BUS 242512 TO BUS 242515 CKT 1 / 242512 05CLOVRD 765 242515 05JOSHUA 765 1 END
AEP_P4_#2914_05J.FERR	CONTINGENCY "'AEP_P4_#2914_05J.FERR' 765_B2" / 1487 OPEN BRANCH FROM BUS 242512 TO BUS 242514 CKT 1 / 242512 05CLOVRD 765 242514 05J.FERR 765 1 OPEN BRANCH FROM BUS 242514 TO BUS 245993 CKT 4 / 242514 05J.FERR 765 245993 05J.FERR SVS 20.6 4 REMOVE SWSHUNT FROM BUS 242514 /* 242514 05J.FERR 765 END

Contingency Name	Contingency Definition
AEP_P2-2_#10311_05REUSENS2 138_2	CONTINGENCY 'AEP_P2-2_#10311_05REUSENS2 138_2' OPEN BRANCH FROM BUS 242563 TO BUS 246229 CKT 1 / 242563 05BOXWD 138 246229 05REUSENS2 138 1 OPEN BRANCH FROM BUS 243857 TO BUS 246229 CKT 1 / 243857 05COFFEE 138 246229 05REUSENS2 138 1 OPEN BRANCH FROM BUS 242657 TO BUS 246229 CKT 1 / 242657 05GRAVES 138 246229 05REUSENS2 138 1 OPEN BRANCH FROM BUS 242765 TO BUS 246229 CKT Z1 / 242765 05REUSENS1 138 246229 05REUSENS2 138 Z1 OPEN BRANCH FROM BUS 242890 TO BUS 246229 CKT 1 / 242890 05REUSENS2 34.5 246229 05REUSENS2 138 1 END
AEP_P2-1_242515 05JOSHUA 765 247669 05JOSHUA 1EQ 999 1	CONTINGENCY 'AEP_P2-1_242515 05JOSHUA 765 247669 05JOSHUA 1EQ 999 1' OPEN BRANCH FROM BUS 242515 TO BUS 247669 CKT 1 END
AEP_P2-1_242688 05JOSHUA 138 247670 05JOSHUA_XFL 138 1	CONTINGENCY 'AEP_P2-1_242688 05JOSHUA 138 247670 05JOSHUA_XFL 138 1' OPEN BRANCH FROM BUS 242688 TO BUS 247670 CKT 1 END
AEP_P2-1_247670 05JOSHUA_XFL 138 247669 05JOSHUA 1EQ 999 1	CONTINGENCY 'AEP_P2-1_247670 05JOSHUA_XFL 138 247669 05JOSHUA 1EQ 999 1' OPEN BRANCH FROM BUS 247670 TO BUS 247669 CKT 1 END
AEP_P1-2_#10336-B	CONTINGENCY 'AEP_P1-2_#10336-B' OPEN BRANCH FROM BUS 938820 TO BUS 314746 CKT 1 / 938820 AE1-108 TAP 138 314746 4BREMO 138 1 END
AEP_P4_#311_05CLOVRD	CONTINGENCY "'AEP_P4_#311_05CLOVRD' 765_CC2" / 1395 OPEN BRANCH FROM BUS 242512 TO BUS 242514 CKT 1 / 242512 05CLOVRD 765 242514 05J.FERR 765 1 END
DVP_P2-2: DOOMS B2	CONTINGENCY 'DVP_P2-2: DOOMS B2' /* DOOMS 115 KV OPEN BRANCH FROM BUS 314767 TO BUS 314793 CKT 1 /* 3MIDWAY 115.00 - 3DOOMS 115.00 OPEN BRANCH FROM BUS 314791 TO BUS 314793 CKT 1 /* 3BRND DP 115.00 - 3DOOMS 115.00 OPEN BRANCH FROM BUS 314793 TO BUS 314819 CKT 1 /* 3DOOMS 115.00 - 3WAYNSBO 115.00 END

Contingency Name	Contingency Definition
AEP_P2-2_#13260_05SKIMMR 69.0_1	CONTINGENCY 'AEP_P2-2_#13260_05SKIMMR 69.0_1' OPEN BRANCH FROM BUS 242886 TO BUS 314861 CKT 1 / 242886 05SKIMMR 69.0 314861 3SKIMMR 115 1 OPEN BRANCH FROM BUS 242886 TO BUS 314861 CKT 2 / 242886 05SKIMMR 69.0 314861 3SKIMMR 115 2 OPEN BRANCH FROM BUS 242860 TO BUS 242886 CKT 1 / 242860 05ABERT 69.0 242886 05SKIMMR 69.0 1 OPEN BRANCH FROM BUS 242884 TO BUS 242886 CKT 1 / 242884 05S.LYNCHB 69.0 242886 05SKIMMR 69.0 1 REMOVE SWSHUNT FROM BUS 242886 / 242886 05SKIMMR 69.0 END
DVP_P7-1: LN 2106-2111	CONTINGENCY 'DVP_P7-1: LN 2106-2111' /* . OPEN BRANCH FROM BUS 314326 TO BUS 314747 CKT 1 /* 6BEARGRDN 230.00 - 6BREMO 230.00 OPEN BRANCH FROM BUS 314326 TO BUS 315191 CKT 1 /* 6BEARGRDN 230.00 - 1BEARGRDN G118.000 OPEN BUS 315191 /* ISLAND: 1BEARGRDN G118.000 OPEN BRANCH FROM BUS 314326 TO BUS 314747 CKT 2 /* 6BEARGRDN 230.00 - 6BREMO 230.00 OPEN BRANCH FROM BUS 314326 TO BUS 315192 CKT 1 /* 6BEARGRDN 230.00 - 1BEARGRDN G218.000 OPEN BRANCH FROM BUS 314326 TO BUS 315193 CKT 1 /* 6BEARGRDN 230.00 - 1BEARGRDN S122.000 OPEN BUS 315192 /* ISLAND: 1BEARGRDN G218.000 OPEN BUS 315193 /* ISLAND: 1BEARGRDN S122.000 END
AP-P2-3-PE-500-016	CONTINGENCY "'AP-P2-3-PE-500-016'" / 183 OPEN BRANCH FROM BUS 235101 TO BUS 235103 CKT 1 / 235101 01BEDNGT 500 235103 01BLACKO 500 1 OPEN BRANCH FROM BUS 235103 TO BUS 235130 CKT 1 / 235103 01BLACKO 500 235130 01BO_SVC 23.0 1 OPEN BRANCH FROM BUS 235446 TO BUS 235103 CKT 3 / 235446 01BLACKO 138 235103 01BLACKO 500 3 DECREASE BUS 235103 SHUNT BY 100.00 PERCENT /* 235103 01BLACKO 500 END
AP-P2-3-PE-500-014	CONTINGENCY "'AP-P2-3-PE-500-014'" / 181 OPEN BRANCH FROM BUS 235103 TO BUS 964990 CKT 1 / 235103 01BLACKO 500 964990 AG1-363 TAP 500 1 OPEN BRANCH FROM BUS 235446 TO BUS 235103 CKT 3 / 235446 01BLACKO 138 235103 01BLACKO 500 3 OPEN BRANCH FROM BUS 235103 TO BUS 235130 CKT 1 / 235103 01BLACKO 500 235130 01BO_SVC 23.0 1 DECREASE BUS 235103 SHUNT BY 100.00 PERCENT /* 235103 01BLACKO 500 END

Contingency Name	Contingency Definition
AP-P2-3-PE-500-015	CONTINGENCY "'AP-P2-3-PE-500-015'" / 182 OPEN BRANCH FROM BUS 235103 TO BUS 964990 CKT 1 / 235103 01BLACKO 500 964990 AG1-363 TAP 500 1 OPEN BRANCH FROM BUS 235101 TO BUS 235103 CKT 1 / 235101 01BEDNGT 500 235103 01BLACKO 500 1 END
DVP_P1-2: LN 8-B	CONTINGENCY 'DVP_P1-2: LN 8-B' OPEN BRANCH FROM BUS 938820 TO BUS 314746 CKT 1 /* AE1-108 TAP 138.00 - 4BREMO 138.00 OPEN BRANCH FROM BUS 314744 TO BUS 314746 CKT 1 /* 3BREMO 115.00 - 4BREMO 138.00 OPEN BUS 314746 /* ISLAND: 4BREMO 138.00 END
AEP_P2-2_#10292_05NEWLDN 138_1	CONTINGENCY 'AEP_P2-2_#10292_05NEWLDN 138_1' OPEN BRANCH FROM BUS 242569 TO BUS 242734 CKT 1 / 242569 05BRUSHT 138 242734 05NEWLDN 138 1 OPEN BRANCH FROM BUS 242641 TO BUS 242734 CKT 1 / 242641 05FOREST 138 242734 05NEWLDN 138 1 OPEN BRANCH FROM BUS 242687 TO BUS 242734 CKT 1 / 242687 05JOHNMT 138 242734 05NEWLDN 138 1 END
AEP_P2-1_242720 05MONETA 138 242775 05ROCKCAS SS 138 1	CONTINGENCY 'AEP_P2-1_242720 05MONETA 138 242775 05ROCKCAS SS 138 1' OPEN BRANCH FROM BUS 242720 TO BUS 242775 CKT 1 END
DVP_P1-2: LN 104	CONTINGENCY 'DVP_P1-2: LN 104' OPEN BRANCH FROM BUS 242701 TO BUS 314667 CKT 1 /* 05LEESVI 138.00 - 4ALTVSTA 138.00 END
DVP_P7-1: LN 555-2168-A	CONTINGENCY 'DVP_P7-1: LN 555-2168-A' /* . OPEN BRANCH FROM BUS 314907 TO BUS 314912 CKT 1 /* 8DOOMS 500.00 - 8LEXNGTN 500.00 OPEN BRANCH FROM BUS 314794 TO BUS 965530 CKT 1 /* 6DOOMS 230.00 - AG1- 421 TAP 230.00 END
AEP_P2-1_242569 05BRUSHT 138 242734 05NEWLDN 138 1	CONTINGENCY 'AEP_P2-1_242569 05BRUSHT 138 242734 05NEWLDN 138 1' OPEN BRANCH FROM BUS 242569 TO BUS 242734 CKT 1 END
Base Case	

Contingency Name	Contingency Definition
AEP_P2-2_#1372_05JOSHUA 765_1	CONTINGENCY 'AEP_P2-2_#1372_05JOSHUA 765_1' OPEN BRANCH FROM BUS 242515 TO BUS 247669 CKT 1 / 242515 05JOSHUA 765 247669 05JOSHUA 1EQ 999 1 OPEN BRANCH FROM BUS 247669 TO BUS 247670 CKT 1 / 247669 05JOSHUA 1EQ 999 247670 05JOSHUA_XFL 138 1 OPEN BRANCH FROM BUS 242688 TO BUS 247670 CKT 1 / 242688 05JOSHUA 138 247670 05JOSHUA_XFL 138 1 END
AEP_P2-1_242641 05FOREST 138 242734 05NEWLDN 138 1	CONTINGENCY 'AEP_P2-1_242641 05FOREST 138 242734 05NEWLDN 138 1' OPEN BRANCH FROM BUS 242641 TO BUS 242734 CKT 1 END
AEP_P1-2_#3174_6	CONTINGENCY 'AEP_P1-2_#3174_6' OPEN BRANCH FROM BUS 242512 TO BUS 242515 CKT 1 / 242512 05CLOVRD 765 242515 05JOSHUA 765 1 END
DVP_P1-2: LN 2193	CONTINGENCY 'DVP_P1-2: LN 2193' OPEN BRANCH FROM BUS 313707 TO BUS 313867 CKT 1 /* 6FORK UNION 230.00 - 6BREMODIST 230.00 OPEN BRANCH FROM BUS 313867 TO BUS 314747 CKT 1 /* 6BREMODIST 230.00 - 6BREMO 230.00 OPEN BUS 313867 /* ISLAND: 6BREMODIST 230.00 END
AEP_P7-1_#10778	CONTINGENCY 'AEP_P7-1_#10778' OPEN BRANCH FROM BUS 242531 TO BUS 304094 CKT 1 / 242531 05EDANV2 230 304094 6YANCY TAP 230 1 OPEN BRANCH FROM BUS 242531 TO BUS 242632 CKT 4 / 242531 05EDANV2 230 242632 05EDAN 2 138 4 OPEN BRANCH FROM BUS 242549 TO BUS 242632 CKT 1 / 242549 05BANSTR 138 242632 05EDAN 2 138 1 OPEN BRANCH FROM BUS 242629 TO BUS 242632 CKT 1 / 242629 05E.MONU 138 242632 05EDAN 2 138 1 OPEN BRANCH FROM BUS 242629 TO BUS 242770 CKT 1 / 242629 05E.MONU 138 242770 05RIGIS 138 1 OPEN BRANCH FROM BUS 242631 TO BUS 242632 CKT Z1 / 242631 05EDAN 1 138 242632 05EDAN 2 138 Z1 OPEN BRANCH FROM BUS 242629 TO BUS 243948 CKT 1 / 242629 05E.MONU 138 243948 05BRANTLY 69.0 1 OPEN BRANCH FROM BUS 242770 TO BUS 243988 CKT 1 / 242770 05RIGIS 138 243988 05RIGIS 69.0 1 OPEN BRANCH FROM BUS 243974 TO BUS 243988 CKT 1 / 243974 05GOODYEAR 69.0 243988 05RIGIS 69.0 1 END

Contingency Name	Contingency Definition
PJM_PLANT BEAR GARDEN	CONTINGENCY 'PJM_PLANT BEAR GARDEN' REMOVE MACHINE G1 FROM BUS 315191 REMOVE MACHINE G2 FROM BUS 315192 REMOVE MACHINE S1 FROM BUS 315193 END
AEP_P2-1_242607 05CLOVRD 138 243892 05MEADS8 138 1	CONTINGENCY 'AEP_P2-1_242607 05CLOVRD 138 243892 05MEADS8 138 1' OPEN BRANCH FROM BUS 242607 TO BUS 243892 CKT 1 END
AEP_P2-2_#10163_05EDAN 2 138_2	CONTINGENCY 'AEP_P2-2_#10163_05EDAN 2 138_2' OPEN BRANCH FROM BUS 242531 TO BUS 304094 CKT 1 / 242531 05EDANV2 230 304094 6YANCY TAP 230 1 OPEN BRANCH FROM BUS 242531 TO BUS 242632 CKT 4 / 242531 05EDANV2 230 242632 05EDAN 2 138 4 OPEN BRANCH FROM BUS 242549 TO BUS 242632 CKT 1 / 242549 05BANSTR 138 242632 05EDAN 2 138 1 OPEN BRANCH FROM BUS 242629 TO BUS 242632 CKT 1 / 242629 05E.MONU 138 242632 05EDAN 2 138 1 OPEN BRANCH FROM BUS 242631 TO BUS 242632 CKT Z1 / 242631 05EDAN 1 138 242632 05EDAN 2 138 Z1 END
AEP_P7-1_#10830	CONTINGENCY 'AEP_P7-1_#10830' OPEN BRANCH FROM BUS 242555 TO BUS 242843 CKT 1 / 242555 05BLAINE 138 242843 05WLAKE 138 1 OPEN BRANCH FROM BUS 242748 TO BUS 243951 CKT 1 / 242748 05PENHOK 138 243951 05REDWOOD 138 1 OPEN BRANCH FROM BUS 242748 TO BUS 242802 CKT 1 / 242748 05PENHOK 138 242802 05SMITHMTN 138 1 OPEN BRANCH FROM BUS 242843 TO BUS 243951 CKT 1 / 242843 05WLAKE 138 243951 05REDWOOD 138 1 END
AEP_P1-3_#1372_05JOSHUA 765_1	CONTINGENCY 'AEP_P1-3_#1372_05JOSHUA 765_1' OPEN BRANCH FROM BUS 242515 TO BUS 247669 CKT 1 / 242515 05JOSHUA 765 247669 05JOSHUA 1EQ 999 1 OPEN BRANCH FROM BUS 247669 TO BUS 247670 CKT 1 / 247669 05JOSHUA 1EQ 999 247670 05JOSHUA_XFL 138 1 OPEN BRANCH FROM BUS 242688 TO BUS 247670 CKT 1 / 242688 05JOSHUA 138 247670 05JOSHUA_XFL 138 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).