



**Generation Interconnection
Feasibility Study Report
for
Queue Project AF2-210
FOSTER-GARVER ROAD 345 KV
120 MW Capacity / 200 MW Energy**

July 2020

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1 Introduction

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

2 Preface

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

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

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

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

3 General

Project AF2-210 is a request by the Interconnection Customer that proposes a 200 MW solar generator to be built at a to-be-determined location on the 345 kV line between the Foster and Garver substations. The estimate below was based on an assumed location by the Transmission Owner. A meeting will need to be held to determine the exact location of the substation should the customer choose to proceed forward in the study process. The Interconnection Customer proposed in-service date for this project is December 31, 2023. **This study does not imply a Duke Energy commitment to this in-service date.**

Queue Number	AF2-210
Project Name	FOSTER-GARVER ROAD 345 KV
State	Ohio
County	Pickaway
Transmission Owner	DEOK
MFO	200
MWE	200
MWC	120
Fuel	Solar
Basecase Study Year	2023

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Point of Interconnection

AF2-210 will interconnect with the Duke Energy transmission system by direct injection into a new 345 kV substation bus located on the feeder between the Foster and the Garver substations. The new substation will have a three-breaker ring bus configuration. The Point of Interconnection is located where Duke Energy's overhead line from the new substation terminates to the Interconnection Customer's structure mounted switches, approximately 25 feet outside the new substation fence; please refer to the single-line diagram in Attachment 1.

5 Cost Summary

The AF2-210 project will be responsible for the following costs:

Duke Energy facilities and network upgrades costs required to support the AF2-210 project are listed below. Please note this is a class 5 estimate, with a band range of (-50% to +100 %). It is also assumed there will be no issues obtaining Transmission Line easement for station power.

Description	Total Cost
Total Physical Interconnection Costs	\$19,281,580
Total System Network Upgrade Costs	\$ 4,714,600
Total Costs	\$23,997,180

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

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

6 Transmission Owner Scope of Work

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

6.1 Attachment Facilities

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

Description	Total Cost
Duke Energy will install, but is not limited to, a revenue metering package, equipment for protection and relaying, a take-off structure, a set of disconnect switches, a power quality monitor, necessary foundations, and overhead conductors from the new substation to the Interconnect Customer's pole mounted switches.	\$1,778,410
Total Attachment Facility Costs	\$1,778,410

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
Duke Energy will build a new 345 kV substation on Interconnect Customer supplied land. The substation will include, but is not limited to, a three-breaker ring bus configuration, three 345 kV breakers, eight sets of disconnect switches, associated bus work, insulators, relaying, metering, control building, take-off structures, lighting, fencing, gravel, ground grid, and foundations as necessary to form a complete substation installation.	\$13,870,233
Total Direct Connection Facility Costs	\$13,870,233

6.3 Non-Direct Connection Cost Estimate

Duke Energy will reconfigure the Foster to Garver 345 kV feeder to loop through the new substation, perform any work necessary on the 138 kV line near the existing towers to accomplish the loop in/loop out, and perform any work needed at the other substations on the remote ends of the line, including installing a wave trap and tuner at Foster.

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
Loop Through and 138 kV Line Work	\$3,520,300
Remote End Work	\$ 112,637
Total Non-Direct Connection Facility Costs	\$3,632,937

7 Incremental Capacity Transfer Rights (ICTRs)

Will be determined at a later study phase

8 Schedule

The estimated time to complete this work is approximately 26 months from a signed ISA and ICSA. This assumes no issues getting right of way, a PJM outage on the line or adjacent line on tower, and no major interruptions for weather.

9 Interconnection Customer Requirements

Interconnection Customer will be required to procure and provide land for the new substation. The land will be ceded to Duke Energy prior to construction of the new substation. The land must be near the Foster - Garver 345 kV feeder path and have direct access to publicly maintained roadway. The land shall be environmentally permitted, graded and ready for construction. Final size and location are to be approved by Duke Energy.

Interconnection Customer will be required to engineer, procure, and construct the connecting circuit from the Interconnection Customer's substation to the Point of Interconnection (POI). This includes, but is not limited to, a structure and disconnect switches to be installed approximately 25 feet outside the new substation fence at the POI.

Interconnection Customer will be responsible for meeting all criteria as specified in the applicable sections of the "Duke Energy Midwest transmission systems Facility Connection Requirements" document, Version 7, effective October 31, 2018, which can be found under this link:

<http://www.pjm.com/~media/planning/plan-standards/deok/deok-facility-connection-requirements.ashx>.

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

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

10.2 DEOK Requirements

The Interconnection Customer will be required to comply with all Duke Energy revenue metering requirements for generation interconnection customers. The revenue metering requirements may be found within the "Duke

Energy Midwest transmission systems Facility Connection Requirements” document, Version 7, effective October 31, 2018.

10.3 Meteorological Data Reporting Requirements

Solar generation facilities shall provide the Transmission Provider with site-specific meteorological data including:

- Back Panel temperature (Fahrenheit)
- Irradiance (Watts/meter²)
- Ambient air temperature (Fahrenheit) – (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

10.4 Interconnected Transmission Owner Requirements

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

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

11 Summer Peak - Load Flow Analysis

The Queue Project AF2-210 was evaluated as a 200 MW (Capacity 120 MW) injection tapping the Garver to Foster 345 kV line in the DEOK area. Project AF2-210 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-210 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

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

None

11.2 Multiple Facility Contingency

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

None

11.3 Contribution to Previously Identified Overloads

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

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 LOADING %	POST PROJE CT LOADING %	AC D C	MW IMPACT
95359776	243453	05BEATY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P4_#3196_05BE ATTY 345_302E	breaker	1203.0	124.75	125.59	DC	22.36
95359777	243453	05BEATY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P4_#10715_05C OLE 345_C	breaker	1203.0	124.18	124.99	DC	21.58
95359829	243453	05BEATY	345.0	AEP	244022	05COL E	345.0	AEP	1	AEP_P4_#8094_05BIX BY 345_C	breaker	1203.0	110.77	111.45	DC	17.97
95359830	243453	05BEATY	345.0	AEP	244022	05COL E	345.0	AEP	1	AEP_P4_#3195_05BE ATTY 345_304E	breaker	1203.0	111.15	111.84	DC	18.46
95359865	243454	05BIXBY	345.0	AEP	243459	05KIRK	345.0	AEP	1	AEP_P4_#10715_05C OLE 345_C	breaker	1409.0	103.55	104.17	DC	19.14
95359866	243454	05BIXBY	345.0	AEP	243459	05KIRK	345.0	AEP	1	AEP_P4_#3196_05BE ATTY 345_302E	breaker	1409.0	102.24	102.87	DC	19.55

11.4 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
95360071	243453	05BEATTY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P1-2_#10137	operation	1203.0	116.8	117.62	DC	21.57
95360143	243453	05BEATTY	345.0	AEP	244022	05COLE	345.0	AEP	1	AEP_P1-2_#713	operation	1203.0	103.18	103.84	DC	17.53
98779294	941510	AE2-148 TAP	345.0	DAY	945630	AF1-228 TAP	345.0	DAY	1	DAY_P1-2_#762	operation	1374.0	100.63	101.43	DC	24.55
95360126	945630	AF1-228 TAP	345.0	DAY	243453	05BEATTY	345.0	AEP	1	DAY_P1-2_#762	operation	1374.0	108.23	109.03	DC	24.55

11.5 System Reinforcements - Summer Peak Load Flow

ID	Idx	Facility	Upgrade Description	Cost
95359830,95359829	2	05BEATTY 345.0 kV - 05COLE 345.0 kV Ckt 1	<p>AEPO0001a (389) : Upgrade/Replace 3-345kV 1600A switches at Beatty station Project Type : FAC Cost : \$1,500,000 Time Estimate : 12-18 Months</p>	\$1,500,000
95359866,95359865	3	05BIXBY 345.0 kV - 05KIRK 345.0 kV Ckt 1	<p>AEPO0038d (489) : Sag Study will be required on 37.9 miles of line between Bixby and kirk .The cost is expected to be 151,600.New Ratings after sag study : S/N: 1409MVA S/E: 1887 MVA. Rebuild/Reconductor, cost : \$ 75.8 million Project Type : FAC Cost : \$151,600 Time Estimate : Sag Study : 6 - 12 Months</p> <p>AEPO0038e (490) : An engineering study will need to be conducted to determine if the Kirk Compliance Thermal limits 2396 Amps settings can be adjusted to mitigate the overload, Estimated Cost \$25,000. New relay packages will be required if the settings cannot be adjusted. Estimated Cost: \$600,000. Project Type : FAC Cost : \$25,000 Time Estimate : 12-18 Months</p> <p>s1510.1 (532): PJM solution at Kirk, Install 4-345kV 3,000A CBs & end bus and complete the 345kV breaker and a half configuration. Replace 345/138kV XF with 675 MVA unit. Connect in different 345kV bay and on new 138kV string before removing old unit. SN: 870 SE: 1017) and are necessary. Project Type : FAC Cost : \$0 Time Estimate : Months</p> <p>s1510.2 (533): PJM solution at Bixby, replace Kirk 345kV line risers and line switch and upgrade relaying. SN: 1409, SE: 1409 Project Type : FAC Cost : \$0 Time Estimate : Months</p>	\$176,600

ID	Idx	Facility	Upgrade Description	Cost
95359777,9535 9776	1	05BEATTY 345.0 kV - 05BIXBY 345.0 kV Ckt 1	<p>AEPO0003a (394) : Upgrade/Replace Three 345kV 1600A switches at Beatty station Project Type : FAC Cost : \$1,500,000 Time Estimate : 12-18 Months</p> <p>AEPO0003b (395) : 1) A sag study will be required on the 9.5 miles of ACSR ~ 954 ~ 45/7 ~ Bundled - Conductor Section 1 to mitigate the overload. Depending on the sag study results, the cost for this upgrade is expected to be between \$38,000 (no remediation required, just sag study) and \$19 million (complete line Reconductor/rebuild). New rating after sag study: S/N: 1409 S/E: 1887. 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 : \$38,000 Time Estimate : 12-18 Months</p> <p>AEPO0003c (396) : Upgrade/Replace four 345kV 2000A Bixby switches Project Type : FAC Cost : \$1,500,000 Time Estimate : 12-18 Months</p>	\$3,038,000
			TOTAL COST	\$4,714,600

11.6 Flow Gate Details

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

11.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
95359776	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	1203.0	124.75	125.59	DC	22.36

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
250164	08BKJDB1	0.1468	Adder	0.17
250165	08BKJDB2	0.1468	Adder	0.17
251827	WILLYESP	0.4708	Adder	0.55
251828	CLNTESP1	0.4765	Adder	0.56
251829	CLNTESP2	0.3177	Adder	0.37
253110	09ADKINS	37.2264	50/50	37.2264
253261	09MON D	0.3207	50/50	0.3207
904722	V4-073 E	0.2007	Adder	0.24
913222	Y1-054 E	1.5349	Adder	1.81
918802	AA1-099 E	0.3177	Adder	0.37
923522	AB1-169 C OP	128.9926	Adder	151.76
925921	AC1-068 C	12.4590	50/50	12.4590
925922	AC1-068 E	5.8264	50/50	5.8264
925931	AC1-069 C	12.4590	50/50	12.4590
925932	AC1-069 E	5.8264	50/50	5.8264
925981	AC1-074 C O1	4.1012	Adder	4.82
925982	AC1-074 E O1	1.7577	Adder	2.07
926011	AC1-078 C O1	7.8983	Adder	9.29
926012	AC1-078 E O1	13.1639	Adder	15.49
926061	AC1-085 C	23.9871	50/50	23.9871
926062	AC1-085 E	39.1369	50/50	39.1369
926101	AC1-089 C O1 (Suspended)	4.2244	Adder	4.97
926102	AC1-089 E O1 (Suspended)	6.8924	Adder	8.11
926791	AC1-165 C	12.3124	50/50	12.3124
926792	AC1-165 E	5.9730	50/50	5.9730
926801	AC1-166 C	12.3124	50/50	12.3124
926802	AC1-166 E	5.9730	50/50	5.9730
927181	AC1-212 C	0.1257	Adder	0.15
927182	AC1-212 E	1.1911	Adder	1.4
930062	AB1-014 E	8.0690	Adder	9.49
932381	AC2-055 C	1.8552	Adder	2.18
932382	AC2-055 E	3.0269	Adder	3.56
932421	AC2-060 C	6.5780	Adder	7.74
932422	AC2-060 E	3.7002	Adder	4.35
932431	AC2-061 C	4.2930	Adder	5.05
932432	AC2-061 E	4.3522	Adder	5.12
932462	AC2-066 E	4.8414	Adder	5.7
932481	AC2-068 C	3.1039	Adder	3.65
932482	AC2-068 E	5.0834	Adder	5.98
932551	AC2-075 C	0.9740	Adder	1.15

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932552	AC2-075 E	0.4907	Adder	0.58
932661	AC2-088 C O1	4.0523	Adder	4.77
932662	AC2-088 E O1	3.3347	Adder	3.92
932841	AC2-111 C O1	2.0610	Adder	2.42
932842	AC2-111 E O1	3.3627	Adder	3.96
934491	AD1-073 C	1.3567	Adder	1.6
934492	AD1-073 E	0.6989	Adder	0.82
934561	AD1-081 C	1.5797	Adder	1.86
934562	AD1-081 E	0.8138	Adder	0.96
935031	AD1-136 C	0.5698	Adder	0.67
935032	AD1-136 E	0.4854	Adder	0.57
935041	AD1-140 C O1	11.5394	Adder	13.58
935042	AD1-140 E O1	9.5399	Adder	11.22
936251	AD2-031 C O1	2.4091	Adder	2.83
936252	AD2-031 E O1	3.9306	Adder	4.62
936381	AD2-048 C	3.3733	Adder	3.97
936382	AD2-048 E	1.6830	Adder	1.98
938051	AE1-007 C	0.8902	Adder	1.05
938052	AE1-007 E	1.4524	Adder	1.71
938271	AE1-040 C O1	4.0663	Adder	4.78
938272	AE1-040 E O1	2.0460	Adder	2.41
938921	AE1-120	4.5811	Adder	5.39
939141	AE1-144 C O1	6.9356	Adder	8.16
939142	AE1-144 E O1	3.4419	Adder	4.05
940531	AE2-038 C O1	4.6266	Adder	5.44
940532	AE2-038 E O1	2.2917	Adder	2.7
941411	AE2-138 C	14.2309	Adder	16.74
941412	AE2-138 E	5.2635	Adder	6.19
941511	AE2-148 C	184.4823	50/50	184.4823
941512	AE2-148 E	83.4419	50/50	83.4419
941941	AE2-206 C O1	2.6832	Adder	3.16
941942	AE2-206 E O1	3.7054	Adder	4.36
941981	AE2-210 C O1	4.9036	Adder	5.77
941982	AE2-210 E O1	1.8445	Adder	2.17
942051	AE2-217 C	9.8153	Adder	11.55
942052	AE2-217 E	6.5435	Adder	7.7
942061	AE2-218 C	10.6318	Adder	12.51
942062	AE2-218 E	7.2216	Adder	8.5
942091	AE2-221 C	30.1338	50/50	30.1338
942092	AE2-221 E	20.0892	50/50	20.0892
942521	AE2-267 C O1	2.7171	Adder	3.2
942522	AE2-267 E O1	1.6795	Adder	1.98
942621	AE2-278 C	6.7957	Adder	7.99
942622	AE2-278 E	4.5330	Adder	5.33
942951	AE2-315	3.0422	Adder	3.58
942981	AE2-320 C O1	24.5148	50/50	24.5148
942982	AE2-320 E O1	12.1292	50/50	12.1292
943111	AE2-339 C	1.8463	Adder	2.17
943112	AE2-339 E	0.9094	Adder	1.07
943191	AE2-319 C O1	24.5148	50/50	24.5148
943192	AE2-319 E O1	12.1292	50/50	12.1292
943201	AE2-318 C	6.6259	Adder	7.8

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943202	AE2-318 E	3.2341	Adder	3.8
943771	AF1-045	3.0862	Adder	3.63
943773	AF1-045 E	2.0607	Adder	2.42
943943	AF1-062 BAT	20.4820	Merchant Transmission	20.4820
944031	AF1-071 C	0.5152	Adder	0.61
944032	AF1-071 E	0.8407	Adder	0.99
944101	AF1-078 C	1.2197	Adder	1.43
944102	AF1-078 E	1.6843	Adder	1.98
944521	AF1-117 C	52.2383	50/50	52.2383
944522	AF1-117 E	16.0917	50/50	16.0917
944621	AF1-127 C O1	3.9587	Adder	4.66
944622	AF1-127 E O1	1.9498	Adder	2.29
944941	AF1-159	1.3947	Adder	1.64
945561	AF1-221 C O1	9.2959	Adder	10.94
945562	AF1-221 E O1	2.7941	Adder	3.29
945631	AF1-228 C	45.6146	50/50	45.6146
945632	AF1-228 E	30.4098	50/50	30.4098
945681	AF1-233 C	13.1581	Adder	15.48
945682	AF1-233 E	6.5004	Adder	7.65
945841	AF1-249 C	1.2131	Adder	1.43
945842	AF1-249 E	0.4506	Adder	0.53
945861	AF1-251 C	9.8265	Adder	11.56
945862	AF1-251 E	6.5510	Adder	7.71
945911	AF1-256 C	4.2126	Adder	4.96
945912	AF1-256 E	2.8084	Adder	3.3
946171	AF1-282 C	9.4686	50/50	9.4686
946172	AF1-282 E	6.3124	50/50	6.3124
946181	AF1-283 C	12.3092	50/50	12.3092
946182	AF1-283 E	8.2061	50/50	8.2061
946511	AF1-315 C O1	3.5741	Adder	4.2
946512	AF1-315 E O1	2.3827	Adder	2.8
957171	AF2-011 O1	1.3358	Adder	2.97
957181	AF2-012 O1	6.9463	Adder	15.42
957391	AF2-033 C	0.4850	Adder	1.08
957392	AF2-033 E	0.7275	Adder	1.61
957401	AF2-034 C	0.4103	Adder	0.91
957402	AF2-034 E	0.3495	Adder	0.78
957721	AF2-066 C O1	2.7880	Adder	6.19
957722	AF2-066 E O1	1.8587	Adder	4.13
957731	AF2-067 C O1	1.4163	Adder	3.14
957732	AF2-067 E O1	0.9442	Adder	2.1
957851	AF2-079 C O1	5.3769	Adder	11.94
957852	AF2-079 E O1	3.5846	Adder	7.96
958171	AF2-111 C	7.5312	Adder	16.72
958172	AF2-111 E	5.0208	Adder	11.14
958291	AF2-123 C O1	1.0327	Adder	2.29
958292	AF2-123 E O1	1.4237	Adder	3.16
959073	AF2-198 BAT	1.2101	Merchant Transmission	1.2101
959191	AF2-210 C	6.0450	Adder	13.42
959192	AF2-210 E	4.0300	Adder	8.95
959201	AF2-211 C	2.1559	Adder	4.79
959202	AF2-211 E	1.4373	Adder	3.19

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959211	AF2-212 C O1	3.3470	Adder	7.43
959212	AF2-212 E O1	2.2313	Adder	4.95
959271	AF2-218 C O1	1.5520	Adder	3.45
959272	AF2-218 E O1	1.0350	Adder	2.3
959541	AF2-245 C	3.9144	Adder	8.69
959542	AF2-245 E	2.6096	Adder	5.79
959721	AF2-263 C	2.1867	Adder	4.85
959722	AF2-263 E	1.4578	Adder	3.24
960071	AF2-298 C O1	1.8836	Adder	4.18
960072	AF2-298 E O1	1.2600	Adder	2.8
960151	AF2-306	0.8891	Adder	1.97
960161	AF2-307 C	1.3542	Adder	3.01
960162	AF2-307 E	0.9028	Adder	2.0
960571	AF2-348 C	7.4285	Adder	16.49
960572	AF2-348 E	4.9523	Adder	10.99
961491	AF2-440 C	1.4760	Adder	3.28
961492	AF2-440 E	1.4760	Adder	3.28
WEC	WEC	0.7396	Confirmed LTF	0.7396
LGEE	LGEE	3.2313	Confirmed LTF	3.2313
CPL	CPL	0.2335	Confirmed LTF	0.2335
CBM-W2	CBM-W2	24.2260	Confirmed LTF	24.2260
NY	NY	0.9335	Confirmed LTF	0.9335
CBM-W1	CBM-W1	22.9058	Confirmed LTF	22.9058
TVA	TVA	3.5392	Confirmed LTF	3.5392
O-066	O-066	11.0746	Confirmed LTF	11.0746
CBM-S2	CBM-S2	4.5315	Confirmed LTF	4.5315
CBM-S1	CBM-S1	26.5057	Confirmed LTF	26.5057
G-007	G-007	1.7087	Confirmed LTF	1.7087
MEC	MEC	4.0726	Confirmed LTF	4.0726

11.6.2 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
95359830	243453	05BEATTY	AEP	244022	05COL E	AEP	1	AEP_P4_#3195_05BEATTY345_304E	breaker	1203.0	111.15	111.84	DC	18.46

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247964	Y1-063 BAT	0.3052	Merchant Transmission	0.3052
250164	08BKJDB1	0.1226	Adder	0.14
250165	08BKJDB2	0.1226	Adder	0.14
251827	WILLYESP	0.3878	Adder	0.46
251828	CLNTESP1	0.4057	Adder	0.48
251829	CLNTESP2	0.2704	Adder	0.32
253110	09ADKINS	31.2953	50/50	31.2953
253261	09MON D	0.2539	50/50	0.2539
904722	V4-073 E	0.1614	Adder	0.19
913222	Y1-054 E	1.2706	Adder	1.49
918802	AA1-099 E	0.2704	Adder	0.32
923522	AB1-169 C OP	110.0869	Adder	129.51
925921	AC1-068 C	10.4948	50/50	10.4948
925922	AC1-068 E	4.9079	50/50	4.9079
925931	AC1-069 C	10.4948	50/50	10.4948
925932	AC1-069 E	4.9079	50/50	4.9079
925981	AC1-074 C O1	3.4524	Adder	4.06
925982	AC1-074 E O1	1.4796	Adder	1.74
926011	AC1-078 C O1	4.7724	Adder	5.61
926012	AC1-078 E O1	7.9540	Adder	9.36
926061	AC1-085 C	20.0503	50/50	20.0503
926062	AC1-085 E	32.7137	50/50	32.7137
926101	AC1-089 C O1 (Suspended)	3.6749	Adder	4.32
926102	AC1-089 E O1 (Suspended)	5.9959	Adder	7.05
926791	AC1-165 C	10.3713	50/50	10.3713
926792	AC1-165 E	5.0313	50/50	5.0313
926801	AC1-166 C	10.3713	50/50	10.3713
926802	AC1-166 E	5.0313	50/50	5.0313
930062	AB1-014 E	6.7785	Adder	7.97
932381	AC2-055 C	1.7406	Adder	2.05
932382	AC2-055 E	2.8399	Adder	3.34
932421	AC2-060 C	6.1717	Adder	7.26
932422	AC2-060 E	3.4716	Adder	4.08
932431	AC2-061 C	3.7370	Adder	4.4
932432	AC2-061 E	3.7884	Adder	4.46
932462	AC2-066 E	4.0671	Adder	4.78
932481	AC2-068 C	2.4618	Adder	2.9
932482	AC2-068 E	4.0317	Adder	4.74
932551	AC2-075 C	0.8200	Adder	0.96
932552	AC2-075 E	0.4131	Adder	0.49

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932661	AC2-088 C O1	3.4275	Adder	4.03
932662	AC2-088 E O1	2.8206	Adder	3.32
932841	AC2-111 C O1	1.6279	Adder	1.92
932842	AC2-111 E O1	2.6561	Adder	3.12
934491	AD1-073 C	1.2729	Adder	1.5
934492	AD1-073 E	0.6557	Adder	0.77
934561	AD1-081 C	0.9545	Adder	1.12
934562	AD1-081 E	0.4917	Adder	0.58
935031	AD1-136 C	0.4820	Adder	0.57
935032	AD1-136 E	0.4106	Adder	0.48
935041	AD1-140 C O1	8.4174	Adder	9.9
935042	AD1-140 E O1	6.9589	Adder	8.19
936251	AD2-031 C O1	2.3927	50/50	2.3927
936252	AD2-031 E O1	3.9038	50/50	3.9038
936381	AD2-048 C	2.8441	Adder	3.35
936382	AD2-048 E	1.4190	Adder	1.67
938051	AE1-007 C	0.7060	Adder	0.83
938052	AE1-007 E	1.1519	Adder	1.36
938271	AE1-040 C O1	4.3159	50/50	4.3159
938272	AE1-040 E O1	2.1716	50/50	2.1716
938921	AE1-120	3.8485	Adder	4.53
939141	AE1-144 C O1	5.8953	Adder	6.94
939142	AE1-144 E O1	2.9256	Adder	3.44
940531	AE2-038 C O1	3.9327	Adder	4.63
940532	AE2-038 E O1	1.9480	Adder	2.29
941411	AE2-138 C	12.0013	Adder	14.12
941412	AE2-138 E	4.4389	Adder	5.22
941511	AE2-148 C	154.5298	50/50	154.5298
941512	AE2-148 E	69.8943	50/50	69.8943
941981	AE2-210 C O1	4.1353	Adder	4.87
941982	AE2-210 E O1	1.5555	Adder	1.83
942061	AE2-218 C	8.0099	Adder	9.42
942062	AE2-218 E	5.4407	Adder	6.4
942091	AE2-221 C	24.9786	50/50	24.9786
942092	AE2-221 E	16.6524	50/50	16.6524
942521	AE2-267 C O1	2.2359	Adder	2.63
942522	AE2-267 E O1	1.3821	Adder	1.63
942951	AE2-315	2.4471	Adder	2.88
942981	AE2-320 C O1	20.6500	50/50	20.6500
942982	AE2-320 E O1	10.2170	50/50	10.2170
943111	AE2-339 C	1.5527	Adder	1.83
943112	AE2-339 E	0.7648	Adder	0.9
943191	AE2-319 C O1	20.6500	50/50	20.6500
943192	AE2-319 E O1	10.2170	50/50	10.2170
943201	AE2-318 C	5.5475	Adder	6.53
943202	AE2-318 E	2.7077	Adder	3.19
943771	AF1-045	2.5839	Adder	3.04
943773	AF1-045 E	1.7253	Adder	2.03
944031	AF1-071 C	0.4070	Adder	0.48
944032	AF1-071 E	0.6640	Adder	0.78
944521	AF1-117 C	44.0077	50/50	44.0077
944522	AF1-117 E	13.5563	50/50	13.5563

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
944621	AF1-127 C O1	3.3373	Adder	3.93
944622	AF1-127 E O1	1.6437	Adder	1.93
944941	AF1-159	1.3852	50/50	1.3852
945631	AF1-228 C	38.2453	50/50	38.2453
945632	AF1-228 E	25.4969	50/50	25.4969
945681	AF1-233 C	11.1855	Adder	13.16
945682	AF1-233 E	5.5259	Adder	6.5
945841	AF1-249 C	1.0038	Adder	1.18
945842	AF1-249 E	0.3728	Adder	0.44
945861	AF1-251 C	8.2860	Adder	9.75
945862	AF1-251 E	5.5240	Adder	6.5
945911	AF1-256 C	3.5810	Adder	4.21
945912	AF1-256 E	2.3873	Adder	2.81
946102	AF1-275 BAT	18.6570	50/50	18.6570
946171	AF1-282 C	7.9146	50/50	7.9146
946172	AF1-282 E	5.2764	50/50	5.2764
946181	AF1-283 C	10.2890	50/50	10.2890
946182	AF1-283 E	6.8593	50/50	6.8593
946511	AF1-315 C O1	2.9945	Adder	3.52
946512	AF1-315 E O1	1.9963	Adder	2.35
957171	AF2-011 O1	1.0647	Adder	2.36
957181	AF2-012 O1	5.5365	Adder	12.29
957391	AF2-033 C	0.3768	Adder	0.84
957392	AF2-033 E	0.5651	Adder	1.25
957401	AF2-034 C	0.3359	Adder	0.75
957402	AF2-034 E	0.2861	Adder	0.64
957721	AF2-066 C O1	2.1771	Adder	4.83
957722	AF2-066 E O1	1.4514	Adder	3.22
957731	AF2-067 C O1	1.1092	Adder	2.46
957732	AF2-067 E O1	0.7395	Adder	1.64
957851	AF2-079 C O1	4.1272	Adder	9.16
957852	AF2-079 E O1	2.7515	Adder	6.11
958171	AF2-111 C	6.3852	Adder	14.17
958172	AF2-111 E	4.2568	Adder	9.45
959191	AF2-210 C	4.9887	Adder	11.07
959192	AF2-210 E	3.3258	Adder	7.38
959201	AF2-211 C	1.7029	Adder	3.78
959202	AF2-211 E	1.1353	Adder	2.52
959271	AF2-218 C O1	1.1765	Adder	2.61
959272	AF2-218 E O1	0.7846	Adder	1.74
959541	AF2-245 C	3.3243	Adder	7.38
959542	AF2-245 E	2.2162	Adder	4.92
960071	AF2-298 C O1	1.4929	Adder	3.31
960072	AF2-298 E O1	0.9986	Adder	2.22
960151	AF2-306	0.7563	Adder	1.68
960161	AF2-307 C	1.1519	Adder	2.56
960162	AF2-307 E	0.7679	Adder	1.7
960571	AF2-348 C	6.2960	Adder	13.98
960572	AF2-348 E	4.1973	Adder	9.32
961491	AF2-440 C	1.2678	Adder	2.81
961492	AF2-440 E	1.2678	Adder	2.81
WEC	WEC	0.4237	Confirmed LTF	0.4237

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LGEE	LGEE	2.6306	Confirmed LTF	2.6306
CPL	CPL	0.2739	Confirmed LTF	0.2739
CBM-W2	CBM-W2	18.1490	Confirmed LTF	18.1490
NY	NY	0.6890	Confirmed LTF	0.6890
CBM-W1	CBM-W1	11.8845	Confirmed LTF	11.8845
TVA	TVA	2.8350	Confirmed LTF	2.8350
O-066	O-066	8.1514	Confirmed LTF	8.1514
CBM-S2	CBM-S2	4.3350	Confirmed LTF	4.3350
CBM-S1	CBM-S1	21.3426	Confirmed LTF	21.3426
G-007	G-007	1.2574	Confirmed LTF	1.2574
MEC	MEC	2.6457	Confirmed LTF	2.6457

11.6.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
95359865	243454	05BIXBY	AEP	243459	05KIRK	AEP	1	AEP_P4_#10715_05COLE 345_C	breaker	1409.0	103.55	104.17	DC	19.14

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
250164	08BKJDB1	0.1380	Adder	0.16
250165	08BKJDB2	0.1380	Adder	0.16
251827	WILLYESP	0.4202	Adder	0.49
251828	CLNTESP1	0.4828	Adder	0.57
251829	CLNTESP2	0.3219	Adder	0.38
253110	09ADKINS	25.0515	50/50	25.0515
904722	V4-073 E	0.1537	Adder	0.18
913222	Y1-054 E	1.3952	Adder	1.64
918802	AA1-099 E	0.3219	Adder	0.38
923522	AB1-169 C OP	136.4660	50/50	136.4660
924351	AB2-083 C O1	4.9493	50/50	4.9493
924352	AB2-083 E O1	2.3291	50/50	2.3291
924371	AB2-085 C O1	5.1460	Adder	6.05
924372	AB2-085 E O1	2.4217	Adder	2.85
925341	AC1-001 C O1	9.8986	50/50	9.8986
925342	AC1-001 E O1	4.6582	50/50	4.6582
925921	AC1-068 C	8.7577	50/50	8.7577
925922	AC1-068 E	4.0955	50/50	4.0955
925931	AC1-069 C	8.7577	50/50	8.7577
925932	AC1-069 E	4.0955	50/50	4.0955
925981	AC1-074 C O1	3.8566	Adder	4.54
925982	AC1-074 E O1	1.6528	Adder	1.94
926011	AC1-078 C O1	8.9239	50/50	8.9239
926012	AC1-078 E O1	14.8731	50/50	14.8731
926061	AC1-085 C	19.7934	50/50	19.7934
926062	AC1-085 E	32.2946	50/50	32.2946
926101	AC1-089 C O1 (Suspended)	4.6609	Adder	5.48
926102	AC1-089 E O1 (Suspended)	7.6046	Adder	8.95
926791	AC1-165 C	8.6547	50/50	8.6547
926792	AC1-165 E	4.1986	50/50	4.1986
926801	AC1-166 C	8.6547	50/50	8.6547
926802	AC1-166 E	4.1986	50/50	4.1986
927061	AC1-194 C O1	2.8836	Adder	3.39
927062	AC1-194 E O1	4.7048	Adder	5.54
930062	AB1-014 E	7.1198	Adder	8.38
932201	AC2-029 C	5.2453	50/50	5.2453
932202	AC2-029 E	8.5580	50/50	8.5580
932381	AC2-055 C	3.1634	50/50	3.1634
932382	AC2-055 E	5.1614	50/50	5.1614
932411	AC2-059 C	13.4469	50/50	13.4469

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932412	AC2-059 E	13.8772	50/50	13.8772
932421	AC2-060 C	11.2166	50/50	11.2166
932422	AC2-060 E	6.3094	50/50	6.3094
932431	AC2-061 C	4.7948	Adder	5.64
932432	AC2-061 E	4.8608	Adder	5.72
932462	AC2-066 E	4.2719	Adder	5.03
932481	AC2-068 C	2.3694	Adder	2.79
932482	AC2-068 E	3.8805	Adder	4.57
932551	AC2-075 C	0.9159	Adder	1.08
932552	AC2-075 E	0.4614	Adder	0.54
932661	AC2-088 C O1	3.6488	Adder	4.29
932662	AC2-088 E O1	3.0027	Adder	3.53
934481	AD1-072 C	2.9540	50/50	2.9540
934482	AD1-072 E	1.3490	50/50	1.3490
934491	AD1-073 C	2.3134	50/50	2.3134
934492	AD1-073 E	1.1918	50/50	1.1918
934561	AD1-081 C	1.7848	50/50	1.7848
934562	AD1-081 E	0.9194	50/50	0.9194
935031	AD1-136 C	0.5131	Adder	0.6
935032	AD1-136 E	0.4371	Adder	0.51
935041	AD1-140 C O1	8.4695	Adder	9.96
935042	AD1-140 E O1	7.0020	Adder	8.24
936111	AD2-016 C	13.4469	50/50	13.4469
936112	AD2-016 E	13.8772	50/50	13.8772
936251	AD2-031 C O1	2.5401	50/50	2.5401
936252	AD2-031 E O1	4.1444	50/50	4.1444
936381	AD2-048 C	3.2002	Adder	3.76
936382	AD2-048 E	1.5967	Adder	1.88
937231	AD2-162 C	15.4728	50/50	15.4728
937232	AD2-162 E	7.5865	50/50	7.5865
938051	AE1-007 C	0.6795	Adder	0.8
938052	AE1-007 E	1.1087	Adder	1.3
938271	AE1-040 C O1	5.7108	50/50	5.7108
938272	AE1-040 E O1	2.8734	50/50	2.8734
938711	AE1-093	2.5497	Adder	3.0
938921	AE1-120	4.0422	Adder	4.76
939141	AE1-144 C O1	6.4823	Adder	7.63
939142	AE1-144 E O1	3.2169	Adder	3.78
940531	AE2-038 C O1	4.3242	Adder	5.09
940532	AE2-038 E O1	2.1419	Adder	2.52
941411	AE2-138 C	13.2984	Adder	15.65
941412	AE2-138 E	4.9186	Adder	5.79
941511	AE2-148 C	122.0585	50/50	122.0585
941512	AE2-148 E	55.2074	50/50	55.2074
941521	AE2-149 C	100.8098	50/50	100.8098
941522	AE2-149 E	37.5702	50/50	37.5702
941981	AE2-210 C O1	4.5823	Adder	5.39
941982	AE2-210 E O1	1.7236	Adder	2.03
942021	AE2-214 C	42.0312	50/50	42.0312
942022	AE2-214 E	28.0208	50/50	28.0208
942051	AE2-217 C	7.9747	Adder	9.38
942052	AE2-217 E	5.3164	Adder	6.25

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
942061	AE2-218 C	7.7117	Adder	9.07
942062	AE2-218 E	5.2381	Adder	6.16
942091	AE2-221 C	23.9778	50/50	23.9778
942092	AE2-221 E	15.9852	50/50	15.9852
942521	AE2-267 C O1	2.3552	Adder	2.77
942522	AE2-267 E O1	1.4558	Adder	1.71
942831	AE2-302 C O1	2.7532	Adder	3.24
942832	AE2-302 E O1	1.8355	Adder	2.16
942951	AE2-315	2.3299	Adder	2.74
942981	AE2-320 C O1	17.2321	50/50	17.2321
942982	AE2-320 E O1	8.5259	50/50	8.5259
943111	AE2-339 C	1.7436	Adder	2.05
943112	AE2-339 E	0.8588	Adder	1.01
943191	AE2-319 C O1	17.2321	50/50	17.2321
943192	AE2-319 E O1	8.5259	50/50	8.5259
943201	AE2-318 C	5.8708	Adder	6.91
943202	AE2-318 E	2.8655	Adder	3.37
943771	AF1-045	2.7345	Adder	3.22
943773	AF1-045 E	1.8259	Adder	2.15
943943	AF1-062 BAT	42.9460	50/50	42.9460
944521	AF1-117 C	36.7786	50/50	36.7786
944522	AF1-117 E	11.3294	50/50	11.3294
944621	AF1-127 C O1	3.7063	Adder	4.36
944622	AF1-127 E O1	1.8255	Adder	2.15
944941	AF1-159	1.4706	50/50	1.4706
945631	AF1-228 C	30.0530	50/50	30.0530
945632	AF1-228 E	20.0353	50/50	20.0353
945681	AF1-233 C	12.2749	Adder	14.44
945682	AF1-233 E	6.0641	Adder	7.13
945841	AF1-249 C	1.0766	Adder	1.27
945842	AF1-249 E	0.3999	Adder	0.47
945861	AF1-251 C	9.1914	Adder	10.81
945862	AF1-251 E	6.1276	Adder	7.21
945911	AF1-256 C	3.9266	Adder	4.62
945912	AF1-256 E	2.6177	Adder	3.08
946101	AF1-275	17.5130	50/50	17.5130
946171	AF1-282 C	7.8132	50/50	7.8132
946172	AF1-282 E	5.2088	50/50	5.2088
946181	AF1-283 C	10.1572	50/50	10.1572
946182	AF1-283 E	6.7714	50/50	6.7714
946511	AF1-315 C O1	3.1683	Adder	3.73
946512	AF1-315 E O1	2.1122	Adder	2.48
957171	AF2-011 O1	1.0125	Adder	2.25
957181	AF2-012 O1	5.2648	Adder	11.69
957391	AF2-033 C	0.3574	Adder	0.79
957392	AF2-033 E	0.5362	Adder	1.19
957401	AF2-034 C	0.3690	Adder	0.82
957402	AF2-034 E	0.3143	Adder	0.7
957721	AF2-066 C O1	2.0962	Adder	4.65
957722	AF2-066 E O1	1.3975	Adder	3.1
957731	AF2-067 C O1	1.0671	Adder	2.37
957732	AF2-067 E O1	0.7114	Adder	1.58

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957851	AF2-079 C O1	3.9752	Adder	8.82
957852	AF2-079 E O1	2.6501	Adder	5.88
958171	AF2-111 C	6.8710	Adder	15.25
958172	AF2-111 E	4.5807	Adder	10.17
958291	AF2-123 C O1	0.8921	Adder	1.98
958292	AF2-123 E O1	1.2299	Adder	2.73
959073	AF2-198 BAT	3.6062	50/50	3.6062
959191	AF2-210 C	5.1730	Adder	11.48
959192	AF2-210 E	3.4487	Adder	7.66
959271	AF2-218 C O1	1.1393	Adder	2.53
959272	AF2-218 E O1	0.7598	Adder	1.69
959541	AF2-245 C	3.6058	Adder	8.0
959542	AF2-245 E	2.4039	Adder	5.34
960071	AF2-298 C O1	1.4312	Adder	3.18
960072	AF2-298 E O1	0.9573	Adder	2.12
960151	AF2-306	0.8696	Adder	1.93
960161	AF2-307 C	1.3244	Adder	2.94
960162	AF2-307 E	0.8830	Adder	1.96
960571	AF2-348 C	6.7859	Adder	15.06
960572	AF2-348 E	4.5239	Adder	10.04
960801	AF2-371 C	7.9360	50/50	7.9360
960802	AF2-371 E	5.2907	50/50	5.2907
961491	AF2-440 C	3.2527	50/50	3.2527
961492	AF2-440 E	3.2527	50/50	3.2527
WEC	WEC	0.5960	Confirmed LTF	0.5960
LGEE	LGEE	3.1440	Confirmed LTF	3.1440
CPL	CPL	0.6522	Confirmed LTF	0.6522
CBM-W2	CBM-W2	24.2588	Confirmed LTF	24.2588
NY	NY	0.8820	Confirmed LTF	0.8820
CBM-W1	CBM-W1	19.8158	Confirmed LTF	19.8158
TVA	TVA	3.9802	Confirmed LTF	3.9802
O-066	O-066	10.4563	Confirmed LTF	10.4563
CBM-S2	CBM-S2	8.3059	Confirmed LTF	8.3059
CBM-S1	CBM-S1	28.4483	Confirmed LTF	28.4483
G-007	G-007	1.6110	Confirmed LTF	1.6110
MEC	MEC	3.6452	Confirmed LTF	3.6452

11.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

Queue Number	Project Name	Status
AA1-099	Clinton Co. 34.5kV	In Service
AB1-014	Hillcrest 138kV	Under Construction
AB1-169	Stuart 345kV	Engineering and Procurement
AB2-083	Delano 138kV	Active
AB2-085	Adams 138kV	Active
AC1-001	Delano 138kV	Active
AC1-068	Atlanta 69kV I	Engineering and Procurement
AC1-069	Atlanta 69kV II	Engineering and Procurement
AC1-074	Jacksonville-Renaker 138kV I	Active
AC1-078	Beatty-London 138kV	Active
AC1-085	Stuart-Clinton 345kV	Engineering and Procurement
AC1-089	Hillsboro-Wildcat 138kV	Suspended
AC1-165	Atlanta 69kV III	Engineering and Procurement
AC1-166	Atlanta 69kV IV	Engineering and Procurement
AC1-194	Elk 138kV	Active
AC1-212	Minster 69kV	Engineering and Procurement
AC2-029	Circleville 138kV	Active
AC2-055	Buckskin 69kV	Active
AC2-059	Biers Run-Circleville 138kV	Active
AC2-060	Buckskin 69kV	Active
AC2-061	Hillsboro-Clinton 138kV	Active
AC2-066	Hillcrest 138kV	Under Construction
AC2-068	Camden-Crystal II 69kV	Engineering and Procurement
AC2-075	Great Blue Heron Solar	Active
AC2-088	S. Bethel-Brown 69kV	Engineering and Procurement
AC2-111	College Corner 138kV	Active
AD1-072	Biers Run-Circleville 138 kV	Active
AD1-073	Buckskin 69 kV	Active
AD1-081	Beatty-London 138 kV	Active
AD1-136	South Bethel-Brown 69 kV	Engineering and Procurement
AD1-140	Greene-Clark 138 kV	Active
AD2-016	Biers Run-Circleville 138 kV	Active
AD2-031	Martinsville-Wilmington 69 kV	Active
AD2-048	Cynthia-Headquarters 69 kV	Active
AD2-162	Biers Run-Circleville 138kV	Active
AE1-007	Camden-Crystal III 69 kV	Active
AE1-040	Greenfield 69 kV	Active
AE1-093	Elk 138 kV	Active
AE1-120	Hillcrest 138 kV	Engineering and Procurement
AE1-144	Goddard-Plumville 138 kV	Active

Queue Number	Project Name	Status
AE2-038	Goddard-Plumsville 138 kV II	Active
AE2-138	Avon-North Clark 345 kV	Active
AE2-148	Beatty-Greene 345 kV	Active
AE2-149	Biers Run-Bixby 345 kV	Active
AE2-206	East Sidney-Quincy 138 kV	Active
AE2-210	Avon-North Clark 345 kV	Active
AE2-214	Cole 345 kV	Active
AE2-217	East Springfield-London 138 kV	Active
AE2-218	Eldean 138 kV	Active
AE2-221	Clinton-Stuart 345 kV	Active
AE2-267	Woodsdale 345 kV	Active
AE2-278	Urbana 138 kV	Active
AE2-302	East Beaver-Lick 138 kV	Active
AE2-315	Yankee Tap 69 kV	Active
AE2-318	Ford-Cedarville 138 kV	Active
AE2-319	Atlanta 69kV I	Active
AE2-320	Atlanta 69 kV II	Active
AE2-339	Avon 138 kV	Active
AF1-045	Cedarville-Ford 138 kV	Active
AF1-062	Jug Street 138 kV	Active
AF1-071	College Corner 138 kV	Active
AF1-078	East Sidney-Quincy 138 kV	Active
AF1-117	Atlanta-Stuart 345 kV	Active
AF1-127	Avon 345 kV	Active
AF1-159	Martinsville-Wilmington 69 kV	Active
AF1-221	College Corner-Drewersburg 138 kV	Active
AF1-228	Beatty-Greene 345 kV	Active
AF1-233	Flemingsburg 138 kV	Active
AF1-249	Nickel 12.47 kV	Active
AF1-251	Avon-North Clark 345 kV	Active
AF1-256	Flemingsburg-Spurlock 138 kV	Active
AF1-275	Cole 345 kV	Active
AF1-282	Stuart-Clinton 345 kV	Active
AF1-283	Stuart-Clinton 345 kV	Active
AF1-315	Cedarville-Ford 138 kV	Active
AF2-011	Tait 69 kV	Active
AF2-012	Tait 69 kV	Active
AF2-033	Miami Fort 138 kV	Active
AF2-034	Kendall	Active
AF2-066	West Manchester 69 kV	Active
AF2-067	West Manchester-Crown 69 kV	Active
AF2-079	Greenville 138 kV	Active
AF2-111	North Clark-Spurlock 345 kV	Active
AF2-123	Lafayette 69 kV	Active
AF2-198	Heath 69 kV	Active
AF2-210	Foster-Garver Road 345 kV	Active
AF2-211	College Corner 138 kV	Active
AF2-212	Shelby 138 kV	Active
AF2-218	Gettysburg 69 kV	Active
AF2-245	Spurlock-Flemingsburg 345 kV	Active
AF2-263	Shelby 138 kV	Active
AF2-298	Crown-Brookville 69 kV	Active

Queue Number	Project Name	Status
AF2-306	Hope-Blevins Valley Tap 69 kV	Active
AF2-307	Hope-Blevins Valley Tap 69 kV	Active
AF2-348	North Clark-Spurlock 345 kV	Active
AF2-371	Harrison-Poston 138 kV	Active
AF2-440	Martinsville-Highland 69 kV	Active
V4-073	Yankee 12.5kV	In Service
Y1-054	Rochelle 138kV	In Service
Y1-063	Trenton 34.5kV	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P4_#8094_05BIXBY 345_C	CONTINGENCY 'AEP_P4_#8094_05BIXBY 345_C' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 941520 TO BUS 243454 CKT 1 / 941520 AE2-149 TAP 345 243454 05BIXBY 345 1 END
AEP_P1-2_#10137	CONTINGENCY 'AEP_P1-2_#10137' OPEN BRANCH FROM BUS 243453 TO BUS 244022 CKT 1 / 243453 05BEATTY 345 244022 05COLE 345 1 END
DAY_P1-2_#762	CONTINGENCY 'DAY_P1-2_#762' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END
AEP_P4_#10715_05COLE 345_C	CONTINGENCY 'AEP_P4_#10715_05COLE 345_C' OPEN BRANCH FROM BUS 244022 TO BUS 243457 CKT 1 / 244022 05COLE 345 243457 05HAYDEN 345 1 OPEN BRANCH FROM BUS 244022 TO BUS 244023 CKT 1 / 244022 05COLE 345 244023 05COLE 138 1 END
AEP_P4_#3195_05BEATTY 345_304E	CONTINGENCY 'AEP_P4_#3195_05BEATTY 345_304E' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 243468 CKT 4 / 243453 05BEATTY 345 243468 05BEATTX 138 4 END
AEP_P4_#3196_05BEATTY 345_302E	CONTINGENCY 'AEP_P4_#3196_05BEATTY 345_302E' OPEN BRANCH FROM BUS 243453 TO BUS 244022 CKT 1 / 243453 05BEATTY 345 244022 05COLE 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 243468 CKT 4 / 243453 05BEATTY 345 243468 05BEATTX 138 4 END
AEP_P1-2_#713	CONTINGENCY 'AEP_P1-2_#713' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 END

12 Light Load Analysis

Light Load Studies (As applicable)

Not applicable.

13 Short Circuit Analysis

PJM filed FERC waiver request (ER20-1392-000) which included a “waiver of the short circuit analyses to be performed for and included in the AF2 New Service Queue Interconnection Feasibility Study reports due by July 31, 2020”. This was accepted by the FERC. Short Circuit Analysis will be performed during the SIS phase.

14 Stability and Reactive Power Assessment

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

To be determined during later study phases.

15 Affected Systems

15.1 MISO

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

15.2 LG&E

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