Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-212

SHELBY 138 KV

90 MW Capacity / 150 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 Dayton.

2 Preface

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

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

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

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

3 General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Jay County, Indiana. The installed facilities will have a total capability of 150 MW with 90 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 31, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-212
Project Name	SHELBY 138 KV
State	Indiana
County	Jay
Transmission Owner	Dayton
MFO	150
MWE	150
MWC	90
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

The AF2-212 project will interconnect with The Dayton Power and Light Company transmission system at the Shelby 138kV substation.

The Shelby 138kV substation is currently a 138kV breaker-and-a-half with five breakers configuration. One additional 138kV breaker will be installed at the substation to interconnect the proposed facility as shown in Attachment 1. The Point of Interconnection (POI) will be the 138kV takeoff structure leaving the new breaker-and-a-half with six breakers configuration. Dayton will own the takeoff structure and all attachment hardware. The Interconnection Customer will own the generator lead line conductor terminating onto the structure. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct facilities on their side of the interconnection and land for Dayton's interconnection substation.

Attachment 1 shows a one-line diagram of the proposed primary direct connection of the (AF2-212) generation project to The Dayton Power & Light transmission system. Attachment 2 provides the proposed location for the point of interconnection. IC will be responsible for constructing all the facilities on its side of the POI including the attachment line.

5 Cost Summary

The AF2-212 "Shelby 138 KV " project is responsible for the interconnection facilities to the Dayton Power and Light system.

The AF2-212 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$1,690,000
Total System Network Upgrade Costs	$3,038,000
Total Costs	**$4,728,000**

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.

The required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of the AF2-212 generation project to the Dayton Transmission System is detailed in the following sections. The associated one-line with the generation project attachment facilities and primary direct and non-direct connection are shown in Attachment 1.

Note that the Dayton findings were made from a conceptual review of this project. A more detailed review of the connection facilities and their cost will be identified in a future study phase. Further note that the cost estimate data contained in this document should be considered high level estimates since it was produced without a detailed engineering review. The applicant will be responsible for the actual cost of construction. Dayton herein reserves the right to return to any issues in this document and, upon appropriate justification, request additional monies to complete any reinforcements to the transmission systems.

6 Transmission Owner Scope of Work

The AF2-212 project will use the existing interconnection facilities, so the only Transmission Owner work associated with this project is to provide engineering oversight and make remote relay setting changes at the AF2-212 interconnection substation and other related adjacent substations.

This report assumes that the Interconnection Customer will use the existing attachment line from its generating facility into the proposed Point of Interconnection since this project is an upgrade to the existing generators as depicted on the one line diagram in Attachment 1. The IC will also be responsible for the fiber/OPGW that Dayton requires on the generator line for the communication assisted trip scheme. The costs included below are for the necessary protection system review and any subsequent field changes needed to coordinate with IC attachment facilities.

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
Engineering review and commissioning	$15,000
Total Attachment Facility Costs	**$15,000**

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
None	$0
Total Direct Connection Facility Costs	$0

6.3 Non-Direct Connection Cost Estimate

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

Description	Total Cost
Tait 69 kV Substation - relay setting changes	$75,000
Install one 138 kV breaker at the Shelby Substation to interconnect the AF2-212 project. This will include the installation of all physical structures, P&C equipment, communications equipment, metering equipment, and associated facilities	$1,600,000
Total Non-Direct Connection Facility Costs	**$1,675,000**

7 Schedule

Based on the extent of the Dayton primary Attachment Facilities and Non-Direct Connection work required to support the AF2-212 generation project, it is expected to take a minimum of **eighteen (18) months** from the date of a fully executed Interconnection Construction Service Agreement to complete the installation. This includes the requirement for the IC to make a preliminary payment to Dayton which funds the Non-Direct Connection work and the first three months of engineering design that is related to the construction of the Attachment Facilities. It further assumes that the IC will provide all rights-of-way, permits, easements, etc. that will be needed. A further assumption is that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined Attachment Facilities and Non-Direct Connection work, and that all system outages will be allowed when requested.

8 Summer Peak - Load Flow Analysis (underlying transmission <100 kV system)

8.1 Power Flow Analysis & System Reinforcements

Additionally, Dayton performed an analysis of its underlying transmission <100 kV system. The following issues were found to be existing in the Dayton transmission system. This project does not currently have a financial responsibility towards these upgrades, but may get an allocation based on projects withdrawing from the queue. Allocations to upgrades are determined in the System Impact phase. The upgrades may need to be completed prior to initial operation of this facility.

Facility	Contingency Description	Existing Upgrade	Cost
253181 09NHOLLN 69 kV - 253201 09ROBINS 69 kV Ckt 1	Adkins – Beatty 345 kV	PJM Network Upgrade, N5456: From AC1-166, replace wave trap with 2000A wave trap. Project Cost: $56,000 Time Estimate: 20 weeks	$56,000
253099 09ATLNTA 69 kV - 253100 09ATLNTA 345 kV Ckt 1	Atlanta – New Holland 69 kV Robinson – New Holland 69 kV	Reinforcement Project, r190012: Add a second 250 MVA 345/69kV transformer. Project Cost: $5,000,000 Time Estimate: 24 months	$5,000,000
		TOTAL COST	**$5,056,000**

Note: Only the most severely overloaded conditions are listed above.

At the Primary POI, the AF2-212 project does not contribute to new overloads in the Dayton transmission system.

9 Interconnection Customer Requirements

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

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

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

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

10.2 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 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in Dayton's "Requirements for the connection of Facilities to the Dayton Power & Light company Transmission System" document located at: https://www.pjm.com/planning/design-engineering/to-tech-standards/private-dayton.aspx. Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

12 Compliance Issues and Interconnection Customer Requirements

The Dayton Power and Light Company (DP&L) has prepared this Facilities Connection Requirements document to ensure compliance with North American Electric Reliability Council (NERC) Reliability Standards and applicable Regional Reliability Organization, sub regional, Power Pool, and individual Transmission Owner planning criteria and facility connection requirements in compliance to NERC Standard FAC-001-2. These connection requirements apply to all generation facilities, transmission facilities, and end-users connecting to the DP&L transmission system. Detailed information outlining DP&L interconnection requirements can be reviewed utilizing the following link:

https://www.pjm.com/~/media/planning/plan-standards/private-dayton/dayton-facilities-connection-requirements.ashx

13 Power Factor Requirements

The IC shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the high-side of the facility substation transformer(s) connected to the Dayton transmission system.

14 Summer Peak - Load Flow Analysis (Transmission System) – Primary POI

The Queue Project AF2-212 was evaluated as a 150.0 MW (Capacity 90.0 MW) injection at the Shelby 138 kV substation in the Dayton area. Project AF2-212 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-212 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

14.1 Generation Deliverability

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

None

14.2 Multiple Facility Contingency

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

None

14.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
9536176	243453	05BEATTY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	1203.0	125.9	126.36	DC	12.38
9536176	243453	05BEATTY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P4_#10715_05COLE 345_C	breaker	1203.0	124.99	125.45	DC	12.11

14.4 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
9536206	243453	05BEATTY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P1-2_#10137	operation	1203.0	117.91	118.37	DC	12.11
9878108	941510	AE2-148 TAP	345.0	DAY	945630	AF1-228 TAP	345.0	DAY	1	DAY_P1-2_#762	operation	1374.0	101.72	102.2	DC	14.5
9536211	945630	AF1-228 TAP	345.0	DAY	243453	05BEATTY	345.0	AEP	1	DAY_P1-2_#762	operation	1374.0	109.32	109.8	DC	14.5

14.5 System Reinforcements - Summer Peak Load Flow (Transmission)

ID	Idx	Facility	Upgrade Description	Cost
95361769,95361768	1	05BEATTY 345.0 kV - 05BIXBY 345.0 kV Ckt 1	AEP **AEPO0003a (394)** : Upgrade/Replace Three 345kV 1600A switches at Beatty station **Project Type** : FAC **Cost** : $1,500,000 **Time Estimate** : 12-18 Months AEP **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 AEP **AEPO0003c (396)** : Upgrade/Replace four 345kV 2000A Bixby switches **Project Type** : FAC **Cost** : $1,500,000 **Time Estimate** : 12-18 Months	$3,038,000
			TOTAL COST	**$3,038,000**

14.6 Flow Gate Details – Primary POI

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

14.6.1 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
95361768	243453	05BEATTY	AEP	243454	05BIXBY	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	1203.0	125.9	126.36	DC	12.38

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
CPLE	CPLE	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

14.7 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
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
AC1-212	Minster 69kV	Engineering and Procurement
AC2-055	Buckskin 69kV	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
AD1-073	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
AD2-031	Martinsville-Wilmington 69 kV	Active
AD2-048	Cynthia-Headquarters 69 kV	Active
AE1-007	Camden-Crystal III 69 kV	Active
AE1-040	Greenfield 69 kV	Active
AE1-120	Hillcrest 138 kV	Engineering and Procurement
AE1-144	Goddard-Plumville 138 kV	Active
AE2-038	Goddard-Plumsville 138 kV II	Active
AE2-138	Avon-North Clark 345 kV	Active
AE2-148	Beatty-Greene 345 kV	Active
AE2-206	East Sidney-Quincy 138 kV	Active
AE2-210	Avon-North Clark 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
AE2-315	Yankee Tap 69 kV	Active
AE2-318	Ford-Cedarville 138 kV	Active
AE2-319	Atlanta 69kV I	Active

Queue Number	Project Name	Status
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
AF1-282	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
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
AF2-440	Martinsville-Highland 69 kV	Active
V4-073	Yankee 12.5kV	In Service
Y1-054	Rochelle 138kV	In Service

14.8 Contingency Descriptions – Primary POI

Contingency Name	Contingency Definition
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_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
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
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

15 Light Load Analysis

Light Load Studies (As applicable)

Not Applicable.

16 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.

17 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.

18 Affected Systems

18.1 MISO

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

18.2 LG&E

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

19 Summer Peak - Load Flow Analysis (Transmission System) – Secondary POI

The Queue Project AF2-212 was evaluated as a 150.0 MW (Capacity 90.0 MW) injection at the Shelby 345 kV substation in the Dayton area. Project AF2-212 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-212 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

19.1 Generation Deliverability

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

None

19.2 Multiple Facility Contingency

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

None

19.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
95361768	243453	05BEATTY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P4_#3196_05BEATTY 345_302E	breaker	1203.0	125.67	126.14	DC	12.42
95361769	243453	05BEATTY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P4_#10715_05COLE 345_C	breaker	1203.0	124.9	125.36	DC	12.11

19.4 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
95362063	243453	05BEATTY	345.0	AEP	243454	05BIXBY	345.0	AEP	1	AEP_P1-2_#10137	operation	1203.0	117.82	118.27	DC	12.11

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
98781082	941510	AE2-148 TAP	345.0	DAY	945630	AF1-228 TAP	345.0	DAY	1	DAY_P1-2_#762	operation	1374.0	101.72	102.2	DC	14.79
95362118	945630	AF1-228 TAP	345.0	DAY	243453	05BEATTY	345.0	AEP	1	DAY_P1-2_#762	operation	1374.0	109.32	109.81	DC	14.79

19.5 Flow Gate Details - Secondary POI

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

19.5.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
9536176 8	24345 3	05BEATT Y	AEP	24345 4	05BIXB Y	AEP	1	AEP_P4_#3196_05BEATT Y 345_302E	breake r	1203. 0	125.67	126.14	DC	12.42

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

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
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
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

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
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
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

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
946512	AF1-315 E O1	2.3827	Adder	2.8
957171	AF2-011 O2	1.3365	Adder	2.97
957181	AF2-012 O2	6.9500	Adder	15.43
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 O2	2.8325	Adder	6.29
957722	AF2-066 E O2	1.8884	Adder	4.19
957731	AF2-067 C O2	1.3940	Adder	3.09
957732	AF2-067 E O2	0.9293	Adder	2.06
957851	AF2-079 C O2	5.4046	Adder	12.0
957852	AF2-079 E O2	3.6030	Adder	8.0
958171	AF2-111 C O2	7.4137	Adder	16.46
958172	AF2-111 E O2	4.9424	Adder	10.97
959073	AF2-198 BAT	1.1293	Merchant Transmission	1.1293
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
959211	AF2-212 C O2	3.3571	Adder	7.45
959212	AF2-212 E O2	2.2381	Adder	4.97
959271	AF2-218 C O2	1.5511	Adder	3.44
959272	AF2-218 E O2	1.0344	Adder	2.3
959541	AF2-245 C O2	3.9144	Adder	8.69
959542	AF2-245 E O2	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 O2	1.9051	Adder	4.23
960072	AF2-298 E O2	1.2743	Adder	2.83
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 O2	1.0131	Adder	2.25
961492	AF2-440 E O2	1.0131	Adder	2.25
WEC	WEC	0.7396	Confirmed LTF	0.7396
LGEE	LGEE	3.2313	Confirmed LTF	3.2313
CPLE	CPLE	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

19.6 Contingency Descriptions – Secondary POI

Contingency Name	Contingency Definition
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_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
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
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