



**Generation Interconnection
Feasibility Study Report
for
Queue Project AG1-454
GUARDIAN 138 KV
50 MW Capacity / 50 MW Energy**

January 2021

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1 Introduction

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

2 Preface

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

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

The 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 Noble County, Indiana. The installed facilities will have a total capability of 50 MW with 50 MW of this output being recognized by PJM as Capacity.

The proposed in-service date for this project is December 31, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-454
Project Name	GUARDIAN 138 KV
State	Indiana
County	Noble
Transmission Owner	AEP
MFO	190
MWE	50
MWC	50
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

AG1-454 will interconnect with the AEP transmission system along one of the following Points of Interconnection:

Primary POI: Guardian 138 kV substation.

AG1-454 will interconnect with the AEP transmission system via a direct connection to the Guardian 138 kV substation as an uprate to the PJM project AG1-453. If both AG1-453 and AG1-454 move forward the combined MFO will be 190 MW.

Note: It is assumed that the existing 138 kV revenue metering system, generation lead and Protection & Control Equipment that will be installed for AG1-453 will be adequate for the increased generation of AG1-454. Depending on the timing of the completion of the AG1-453 interconnection construction relative to the AG1-454 completion, there may (or may not) be a need to review and revise the relay settings for the increased generation of AG1-454.

Secondary POI: Charger to Countryside 138 kV line.

AG1-454 will interconnect with the AEP transmission system via a direct connection to the AG1-453 proposed 138 kV substation as an uprate to the PJM project AG1-453.

Note: It is assumed that the existing 138 kV revenue metering system, generation lead and Protection & Control Equipment that will be installed for AG1-453 will be adequate for the increased generation of AG1-454. Depending on the timing of the completion of the AG1-453 interconnection construction relative to the AG1-454 completion, there may (or may not) be a need to review and revise the relay settings for the increased generation of AG1-454.

5 Cost Summary

The AG1-454 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$45,000
Total System Network Upgrade Costs	\$200,000
Total Costs	\$245,000

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 2016-36, 2016-25 I.R.B. (6/20/2016). If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

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

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

6 Transmission Owner Scope of Work

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

6.1 Attachment Facilities

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

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

6.2 Direct Connection Cost Estimate

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

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

6.3 Non-Direct Connection Cost Estimate

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

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

7 Schedule

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

8 Interconnection Customer Requirements

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

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

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

9 Revenue Metering and SCADA Requirements

9.1 PJM Requirements

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

9.2 Meteorological Data Reporting Requirements

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 - Primary POI

The Queue Project AG1-454 was evaluated as a 50.0 MW (Capacity 50.0 MW) injection at the Guardian 138 kV substation in the AEP area. Project AG1-454 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-454 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 LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
168246116	243284	05DUPONT	138.0	AEP	243366	05ROB PK12	138.0	AEP	1	AEP_P1-2_#5625_3105-B	single	255.0	85.62	105.22	DC	50.0
168246113	243890	05WOODS R	138.0	AEP	243284	05DUPONT	138.0	AEP	1	AEP_P1-2_#5625_3105-B	single	255.0	94.16	113.77	DC	50.0

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)

None

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 PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
168246201	243279	05DIAMND	138.0	AEP	243890	05WOOD SR	138.0	AEP	1	AEP_P1-2_#5625_3105-B	operation	335.0	126.18	141.1	DC	50.0
168246202	243279	05DIAMND	138.0	AEP	243890	05WOOD SR	138.0	AEP	1	Base Case	operation	251.0	95.87	105.55	DC	24.31
168246114	243284	05DUPONT	138.0	AEP	243366	05ROB PK12	138.0	AEP	1	AEP_P1-2_#5625_3105-B	operation	255.0	154.98	174.59	DC	50.0
168246115	243284	05DUPONT	138.0	AEP	243366	05ROB PK12	138.0	AEP	1	Base Case	operation	219.0	97.32	108.42	DC	24.31

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 LOADIN G %	POST PROJECT LOADIN G %	AC DC	MW IMPACT
168246133	243304	05GUARDN	138.0	AEP	243279	05DIAMND	138.0	AEP	1	AEP_P1-2_#5625_3105-B	operation	286.0	150.03	167.52	DC	50.0
168246134	243304	05GUARDN	138.0	AEP	243279	05DIAMND	138.0	AEP	1	Base Case	operation	226.0	109.3	120.06	DC	24.31
168246111	243890	05WOODSR	138.0	AEP	243284	05DUPONT	138.0	AEP	1	AEP_P1-2_#5625_3105-B	operation	255.0	163.53	183.14	DC	50.0
168246112	243890	05WOODSR	138.0	AEP	243284	05DUPONT	138.0	AEP	1	Base Case	operation	219.0	107.27	118.37	DC	24.31
169761720	943000	AE2-323TAP	138.0	AEP	243385	05TWIN B	138.0	AEP	1	AEP_P1-2_#5530_1741	operation	330.0	130.03	145.18	DC	50.0
169761721	943000	AE2-323TAP	138.0	AEP	243385	05TWIN B	138.0	AEP	1	AEP_P2-1_24327905DIAMND138 24330405GUARDN138 1	operation	330.0	130.03	145.18	DC	50.0

10.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
168246113	2	05WOODSR 138.0 kV - 05DUPONT 138.0 kV Ckt 1	<u>AEP</u> AEP10054a (557) : Replace 765 AAC 37 STR Riser at Dupont station toward WoodsRd Project Type : FAC Cost : \$100,000 Time Estimate : 12-18 Months	\$100,000
168246116	1	05DUPONT 138.0 kV - 05ROB PK12 138.0 kV Ckt 1	<u>AEP</u> AEP10049a (550) : Replace 795 AAC 37 STR Riser at Dupont station toward Rob Park Project Type : FAC Cost : \$100,000 Time Estimate : 12-18 Months	\$100,000
			TOTAL COST	\$200,000

10.6 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".

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
168246116	243284	05DUPONT	AEP	243366	05ROB PK12	AEP	1	AEP_P1-2_#5625_3105-B	single	255.0	85.62	105.22	DC	50.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943001	AE2-323 C	67.1000	80/20	67.1000
943781	AF1-046 C	31.3200	80/20	31.3200
963701	AG1-222 C	82.9000	80/20	82.9000
965841	AG1-453 C O1	84.0000	80/20	84.0000
965851	AG1-454 O1	50.0000	80/20	50.0000

10.6.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
168246113	243890	05WOODSR	AEP	243284	05DUPONT	AEP	1	AEP_P1-2_#5625_3105-B	single	255.0	94.16	113.77	DC	50.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943001	AE2-323 C	67.1000	80/20	67.1000
943781	AF1-046 C	31.3200	80/20	31.3200
963701	AG1-222 C	82.9000	80/20	82.9000
965841	AG1-453 C O1	84.0000	80/20	84.0000
965851	AG1-454 O1	50.0000	80/20	50.0000

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
AE2-323	Twin Branch-Guardian 138 kV	Active
AF1-046	Twin Branch-Guardian 138 kV	Active
AG1-222	Guardian-Twin Branch 138 kV	Active
AG1-453	Guardian 138 kV	Active
AG1-454	Guardian 138 kV	Active

10.8 Contingency Descriptions - Primary POI

Contingency Name	Contingency Definition
Base Case	
AEP_P2-1_243279 05DIAMND 138 243304 05GUARDN 138 1	CONTINGENCY 'AEP_P2-1_243279 05DIAMND 138 243304 05GUARDN 138 1' OPEN BRANCH FROM BUS 243279 TO BUS 243304 CKT 1 END
AEP_P1-2_#5625_3105-B	CONTINGENCY 'AEP_P1-2_#5625_3105-B' OPEN BRANCH FROM BUS 943000 TO BUS 243385 CKT 1 / 943000 AE2-323 TAP 138 243385 05TWIN B 138 1 END
AEP_P1-2_#5530_1741	CONTINGENCY 'AEP_P1-2_#5530_1741' OPEN BRANCH FROM BUS 243279 TO BUS 243304 CKT 1 / 243279 05DIAMND 138 243304 05GUARDN 138 1 OPEN BRANCH FROM BUS 243279 TO BUS 243890 CKT 1 / 243279 05DIAMND 138 243890 05WOODSR 138 1 OPEN BRANCH FROM BUS 243284 TO BUS 243366 CKT 1 / 243284 05DUPONT 138 243366 05ROB PK12 138 1 OPEN BRANCH FROM BUS 243284 TO BUS 243890 CKT 1 / 243284 05DUPONT 138 243890 05WOODSR 138 1 END

11 Short Circuit Analysis - Primary POI

The following Breakers are overdutied:

None.

12 Summer Peak - Load Flow Analysis - Secondary POI

The Queue Project AG1-454 was evaluated as a 50.0 MW (Capacity 50.0 MW) injection tapping the Charger to Countryside 138 kV line in the AEP area. Project AG1-454 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-454 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

12.1 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 LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
174725638	965840	AG1-453 TAP	138.0	AEP	247433	05CHARGER	138.0	AEP	1	AEP_P1-2_#6388	single	167.0	89.95	107.01	DC	28.49

12.2 Multiple Facility Contingency

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

None

12.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
172685294	965840	AG1-453 TAP	138.0	AEP	247433	05CHARGER	138.0	AEP	1	AEP_P7-1_#11092	tower	167.0	112.01	129.05	DC	28.45
172685295	965840	AG1-453 TAP	138.0	AEP	247433	05CHARGER	138.0	AEP	1	AEP_P7-1_#11090	tower	167.0	111.64	128.52	DC	28.2
173911529	965840	AG1-453 TAP	138.0	AEP	247433	05CHARGER	138.0	AEP	1	AEP_P4_#24_05COLN GW 345_A	breaker	167.0	111.58	128.46	DC	28.2

12.4 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 IMPACT
174725682	243266	05COUN TR	138.0	AEP	243264	05CONCOR	138.0	AEP	1	AEP_P1-2_#5509_1730-B	operation	167.0	81.88	111.82	DC	50.0

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
174725636	965840	AG1-453 TAP	138.0	AEP	247433	05CHARGER	138.0	AEP	1	AEP_P1-2_#6388	operation	167.0	109.57	126.63	DC	28.49
174725637	965840	AG1-453 TAP	138.0	AEP	247433	05CHARGER	138.0	AEP	1	Base Case	operation	167.0	95.86	112.87	DC	28.4
174725677	965840	AG1-453 TAP	138.0	AEP	243266	05COUNT R	138.0	AEP	1	AEP_P1-2_#5509_1730-B	operation	167.0	83.41	113.35	DC	50.0

12.5 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".

12.5.1 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
172685294	965840	AG1-453 TAP	AEP	247433	05CHARGER	AEP	1	AEP_P7-1_#11092	tower	167.0	112.01	129.05	DC	28.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247620	Y3-023	0.1246	50/50	0.1246
965841	AG1-453 C O2	47.7985	50/50	47.7985
965842	AG1-453 E O2	31.8657	50/50	31.8657
965851	AG1-454 O2	28.4515	50/50	28.4515
WEC	WEC	0.1458	Confirmed LTF	0.1458
CALDERWOOD	CALDERWOOD	0.0094	Confirmed LTF	0.0094
CBM-W2	CBM-W2	0.7795	Confirmed LTF	0.7795
NY	NY	0.0619	Confirmed LTF	0.0619
TVA	TVA	0.0434	Confirmed LTF	0.0434
O-066	O-066	0.7403	Confirmed LTF	0.7403
SIGE	SIGE	0.0096	Confirmed LTF	0.0096
CHEOAH	CHEOAH	0.0100	Confirmed LTF	0.0100
CBM-S1	CBM-S1	0.0049	Confirmed LTF	0.0049
G-007	G-007	0.1155	Confirmed LTF	0.1155
HAMLET	HAMLET	0.0335	Confirmed LTF	0.0335
MEC	MEC	0.5196	Confirmed LTF	0.5196
GIBSON	GIBSON	0.0098	Confirmed LTF	0.0098
BLUEG	BLUEG	0.0990	Confirmed LTF	0.0990
TRIMBLE	TRIMBLE	0.0328	Confirmed LTF	0.0328
LAGN	LAGN	0.1435	Confirmed LTF	0.1435
CATAWBA	CATAWBA	0.0178	Confirmed LTF	0.0178
CBM-W1	CBM-W1	5.4958	Confirmed LTF	5.4958

12.6 Contingency Descriptions - Secondary POI

Contingency Name	Contingency Definition
AEP_P1-2_#6388	CONTINGENCY 'AEP_P1-2_#6388' / 1728 OPEN BRANCH FROM BUS 243220 TO BUS 255105 CKT 1 / 243220 05E.ELKHART 345 255105 17HIPL 345 1 END
AEP_P1-2_#5509_1730-B	CONTINGENCY 'AEP_P1-2_#5509_1730-B' / 143 OPEN BRANCH FROM BUS 247433 TO BUS 965840 CKT 1 / 247433 05CHARGER 138 965840 AG1-453 TAP 138 1 END
Base Case	
AEP_P7-1_#11090	CONTINGENCY 'AEP_P7-1_#11090' OPEN BRANCH FROM BUS 243214 TO BUS 243231 CKT 1 / 243214 05COLNGW 345 243231 05ROB PK 345 1 OPEN BRANCH FROM BUS 243214 TO BUS 255105 CKT 1 / 243214 05COLNGW 345 255105 17HIPL 345 1 END
AEP_P7-1_#11092	CONTINGENCY 'AEP_P7-1_#11092' OPEN BRANCH FROM BUS 243220 TO BUS 255105 CKT 1 / 243220 05E.ELKHART 345 255105 17HIPL 345 1 OPEN BRANCH FROM BUS 247894 TO BUS 255105 CKT 1 / 247894 05E.ELKHA BP 345 255105 17HIPL 345 1 OPEN BRANCH FROM BUS 247894 TO BUS 256509 CKT 1 / 247894 05E.ELKHA BP 345 256509 18WEEDLK 345 1 END
AEP_P4_#24_05COLNGW 345_A	CONTINGENCY 'AEP_P4_#24_05COLNGW 345_A' / 66 OPEN BRANCH FROM BUS 243214 TO BUS 255105 CKT 1 / 243214 05COLNGW 345 255105 17HIPL 345 1 OPEN BRANCH FROM BUS 243214 TO BUS 247105 CKT 1 / 243214 05COLNGW 345 247105 05VARNER 345 1 END

13 Affected Systems

13.1 TVA

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

13.2 Duke Energy Progress

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

13.3 MISO

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

13.4 LG&E

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