



**Generation Interconnection
Feasibility Study Report
for
Queue Project AE1-245
HAVILAND 138 KV
19.5 MW Capacity / 150 MW Energy**

November, 2019

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Preface

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

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

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

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.

General

The Interconnection Customer has proposed to install PJM project # AE1-245, a Wind generating facility located in Paulding County, Ohio. The installed facilities will have a total capability of 150 MW with 19.5 MW of this output being recognized by PJM as Capacity. The Primary Point of Interconnection will be a direct connection to the Haviland 138 kV Bus #2. (See Figure 1.) The Secondary Point of Interconnection will be a direct connection to the Haviland 138 kV Bus #1.

The proposed in-service date for this project is June 30, 2021. This study does not imply AEP's commitment to this in-service date.

The objective of this Feasibility Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required for maintaining the reliability of the AEP transmission system.

The Feasibility Study includes Short Circuit and Peak Load steady state power flow analyses. The conduct of power flow studies at other load levels, stability analysis, and coordination with non-PJM Transmission Planners, as required under the PJM planning process, is not performed during the Generation Interconnection Feasibility Study phase of the PJM study process. Additional reinforcement requirements for this Interconnection Request may be defined during the conduct of these additional analyses which shall be performed following execution of the System Impact Study agreement.

Queue Number	AE1-245
Project Name	HAVILAND 138 KV
State	Ohio
County	Paulding
Transmission Owner	AEP
MFO	150
MWE	150
MWC	19.5
Fuel	Wind
Basecase Study Year	2022

Primary Point of Interconnection

AE1-245 will interconnect with the AEP transmission system at the Haviland 138 kV substation, Bus #2.

To accommodate the interconnection at the Haviland 138 kV substation, the substation will have to be expanded requiring the extension of the 138 kV bus, installation of one (1) 138 kV circuit breaker (see Figure 1). Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

Note: The Interconnection Customer may be required to go offline for routine circuit breaker maintenance.

Cost Summary

The AE1-245 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$250,000
Direct Connection Network Upgrade	\$0
Non Direct Connection Network Upgrades	\$1250,000
Total Costs	\$1,300,000

In addition, the AE1-245 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$27,650,400

Cost allocations for these upgrades will be provided in the System Impact Study Report.

Transmission Owner Scope of Work

Attachment Facilities

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

Description	Total Cost
138 kV Revenue Metering	\$250,000
Total Attachment Facility Costs	\$250,000

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
	\$0
Total Direct Connection Facility Costs	\$0

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
Installation of one (1) circuit breaker and associated protection and control equipment, 138 kV line risers, and SCADA equipment.	\$1,250,000
Review and update protection and control settings on adjacent facilities	\$50,000
Total Non-Direct Connection Facility Costs	\$1,300,000

Note: The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies.

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.

Interconnection Customer Requirements

It is understood that the Interconnection Customer is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP. The cost of the Interconnection Customer's generating plant and the costs for the line connecting the generating plant to the Elk 138 kV line are not included in this report; these are assumed to be the Interconnection Customer's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power 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.

Requirement from the PJM Open Access Transmission Tariff:

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.

Revenue Metering and SCADA Requirements

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.

AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

<http://www.pjm.com/~media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx>

Network Impacts – Option 1

The Queue Project AE1-245 was evaluated as a 150 MW (Capacity 19.5 MW) injection at the Haviland 138 kV substation, Bus #2 in the AEP area (See Figure 1.) Project AE1-245 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-245 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

Generation Deliverability

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

None

Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	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
907994	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	50.0	74.05	114.1	DC	20.02
909305	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P7-1_#11066	tower	50.0	78.89	118.93	DC	20.02
909306	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P7-1_#11065	tower	50.0	74.05	114.1	DC	20.02
907592	246352	05HAVILAND	AEP	243169	05HAVILND	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	90.0	83.47	113.12	DC	26.68
909367	246352	05HAVILAND	AEP	243169	05HAVILND	AEP	1	AEP_P7-1_#11066	tower	90.0	83.69	113.34	DC	26.68
909368	246352	05HAVILAND	AEP	243169	05HAVILND	AEP	1	AEP_P7-1_#10895	tower	90.0	83.69	113.34	DC	26.68
909369	246352	05HAVILAND	AEP	243169	05HAVILND	AEP	1	AEP_P7-1_#11065	tower	90.0	83.47	113.12	DC	26.68
907432	246950	05TIMBSS	AEP	243383	05TILLMA	AEP	1	AEP_P2-2_#10084_05HAVILN 138_1	bus	332.0	68.97	104.88	DC	119.22
908105	246950	05TIMBSS	AEP	243383	05TILLMA	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	332.0	68.97	104.88	DC	119.22

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	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
907711	243017	05HAVILN	AEP	243168	05HAVILND	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	86.0	102.07	138.3	DC	31.16
909213	243017	05HAVILN	AEP	243168	05HAVILND	AEP	1	AEP_P7-1_#11066	tower	86.0	103.23	139.46	DC	31.16
909214	243017	05HAVILN	AEP	243168	05HAVILND	AEP	1	AEP_P7-1_#10895	tower	86.0	102.29	138.53	DC	31.16
908102	243051	05NDELPH	AEP	242991	05E SIDE	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	167.0	101.92	105.61	DC	13.66
909429	243051	05NDELPH	AEP	242991	05E SIDE	AEP	1	AEP_P7-1_#11065	tower	167.0	101.92	105.61	DC	13.66
909430	243051	05NDELPH	AEP	242991	05E SIDE	AEP	1	AEP_P7-1_#10895	tower	167.0	101.87	105.56	DC	13.66
907342	243169	05HAVILND2	AEP	245866	05CAVETT	AEP	1	AEP_P2-2_#10084_05HAVILN 138_1	bus	50.0	106.9	119.89	DC	14.42
907944	243169	05HAVILND2	AEP	245866	05CAVETT	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	50.0	106.9	119.89	DC	14.42

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
907363	245866	05CAVETT	AEP	245912	05W VAN WR	AEP	1	AEP_P2-2_#10084_05HAVILN 138_1	bus	50.0	102.1	115.09	DC	14.42
907981	245866	05CAVETT	AEP	245912	05W VAN WR	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	50.0	102.1	115.09	DC	14.42
907550	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	40.0	122.07	172.12	DC	20.02
909139	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P7-1_#11066	tower	40.0	127.86	177.91	DC	20.02
909140	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P7-1_#11065	tower	40.0	122.07	172.12	DC	20.02
907545	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	40.0	131.32	181.37	DC	20.02
909134	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P7-1_#11066	tower	40.0	137.11	187.16	DC	20.02
909135	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P7-1_#11065	tower	40.0	131.07	181.12	DC	20.02
907201	246352	05HAVILAND 2	AEP	243169	05HAVILND 2	AEP	1	AEP_P2-2_#10084_05HAVILN 138_1	bus	90.0	120.3	154.46	DC	30.75
907591	246352	05HAVILAND 2	AEP	243169	05HAVILND 2	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	90.0	120.3	154.46	DC	30.75

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	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
908560	243017	05HAVILN	AEP	243168	05HAVILND1	AEP	1	AEP_P1-2_#7501	operation		86.0	101.02	137.65	DC	31.5
908563	243017	05HAVILN	AEP	243168	05HAVILND1	AEP	1	Base Case	operation		68.0	92.04	115.17	DC	15.73
908683	243017	05HAVILN	AEP	242989	05E LIMA	AEP	1	AEP_P1-2_#7501	operation		220.0	83.87	125.56	DC	91.72
908684	243017	05HAVILN	AEP	242989	05E LIMA	AEP	1	Base Case	operation		167.0	72.28	100.64	DC	47.35
908553	243169	05HAVILND2	AEP	245898	05PAULDING	AEP	1	AEP_P1-2_#7501	operation		50.0	99.45	139.02	DC	19.79
908994	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P1-2_#7501	operation		50.0	64.34	106.11	DC	20.88
908411	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P1-2_#7501	operation		40.0	109.92	162.13	DC	20.88
908390	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P1-2_#7501	operation		40.0	118.92	171.13	DC	20.88
908833	246352	05HAVILAND2	AEP	243169	05HAVILND2	AEP	1	AEP_P1-2_#7501	operation		90.0	83.26	112.97	DC	26.75
908496	247383	05N.VANWRTS S	AEP	245907	05VAN WERT	AEP	1	AEP_SUBT_P1-3_#698_05HAVILN 138_4	operation		54.0	106.48	147.61	DC	22.21

System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
907363,907981	7	05CAVETT 69.0 kV - 05W VAN WR 69.0 kV Ckt 1	AEP Description: 1) 3.8 miles of ACSR ~ 211.6 ~ 6/1 ~ PENGUIN (4/0) @ 320 deg- Conductor will need to be rebuilt/reconductored. Estimated cost: \$4.56 million. 2) 1.95 miles of COPPER ~ 4/0 ~ 19 ~ - Conductor will need to be rebuilt/reconductored. Estimated cost: \$2.34 million. Time Estimate : 24-36 Months Cost : \$6,900,000	\$6,900,000
907944,907342	6	05HAVILND2 69.0 kV - 05CAVETT 69.0 kV Ckt 1	AEP Description: Rebuild / reconductor 6 miles of ACSR ~ 211.6 ~ 6/1 ~ PENGUIN (4/0) @ 320 deg - Conductor Section 1. Estimated cost: \$7.2 million. Time Estimate : 24-36 Months Cost : \$7,200,000	\$7,200,000
907545,909134,909135	9	05VAN WERT 69.0 kV - 05N MID PT 69.0 kV Ckt 1	AEP Description: Rebuild / reconductor 5.3 miles of COPPER ~ 2/0 ~ 7 ~ - Conductor Section 1. Estimated Cost: \$6.36 million Time Estimate : 24-36 Months Cost : \$6,360,000	\$6,360,000
907432,908105	3	05TIMBSS 138.0 kV - 05TILLMA 138.0 kV Ckt 1	AEP Description: No Violation. Current AEP Rating: S/N: 283 S/E: 355	\$0
909213,909214,907711	4	05HAVILN 138.0 kV - 05HAVILND1 69.0 kV Ckt 1	AEP Description: Replace Havilland 1 69 kV Riser (Sub cond 300 MCM CU 37 Str): Estimated cost: \$100,000 Time Estimate : 24-36 Months Cost : \$100,000	\$100,000
909139,909140,907550	8	05N MID PT 69.0 kV - 05DELPHOS 69.0 kV Ckt 1	AEP Description: 1) Rebuild / Reconductor 5.41 miles of COPPER ~ 2/0 ~ 7 ~ - Conductor Section 1. Estimated Cost: \$6.492 million. 2) Rebuild / Reconductor 0.02 miles of COPPER ~ 4/0 ~ 19 ~ - Conductor Section 2. Estimated Cost: \$24,000. Time Estimate : 24-36 Months Cost : \$6,516,000	\$6,516,000
909305,907994,909306	1	05DELPHOS 69.0 kV - 05S DELPHO 69.0 kV Ckt 1	AEP Description: Replace 0.01 miles of ACSR ~ 211.6 ~ 6/1 ~ PENGUIN (4/0) @ 320 deg-Conductor Section 2 will need to be replaced. Estimated cost: \$12,000. Time Estimate : 24-36 Months Cost : \$12,000	\$12,000
907201,907591,907592,909367,909368,909369	2	05HAVILAND2 138.0 kV - 05HAVILND2 69.0 kV Ckt 1	AEP Description: Replace 600A Switch. Estimated cost: \$500,000 Time Estimate : 24-36 Months Cost : \$500,000	\$500,000

ID	Index	Facility	Upgrade Description	Cost
909430,909429,9081 02	5	05NDELPH 138.0 kV - 05E SIDE 138.0 kV Ckt 1	<u>AEP</u> Description: A sag study will be required on the 15.6 miles of ACSR ~ 397.5 ~ 30/7 ~ LARK - Conductor to mitigate the overload. Depending on the sag study results, the cost for this upgrade is expected to be between \$62,400 (no remediation required, just sag study) and \$23.4 million (complete line reconductor/rebuild). New rating after sag study: S/N: 167 S/E: 245. 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. Time Estimate : 6-12 Months Cost : \$62,400	\$62,400
			TOTAL COST	\$27,650,400

Flow Gate Details

The following appendices contain additional information about each flow gate presented in the body of the report. For each appendix, a description of the flow gate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flow gate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

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
909305	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P7-1_#11066	tower	50.0	78.89	118.93	DC	20.02

Bus #	Bus	MW Impact
246953	05TIMB G C	0.61
247607	V1-011 C	0.27
247911	05TIMB G E	16.12
247959	V1-011 E	11.61
926811	AC1-167 C O1	1.78
926812	AC1-167 E O1	0.86
926901	AC1-176 C	1.01
926902	AC1-176 E	6.82
934901	AD1-119 C O1	2.89
934902	AD1-119 E O1	4.72
940031	AE1-245 C	2.6
940032	AE1-245 E	17.42
CARR	CARR	0.01
CATAWBA	CATAWBA	0.0
CBM-S1	CBM-S1	0.03
CBM-W1	CBM-W1	0.39
CBM-W2	CBM-W2	0.75
CIN	CIN	0.1
G-007	G-007	0.02
HAMLET	HAMLET	0.01
IPL	IPL	0.06
LGEE	LGEE	0.0
MEC	MEC	0.29
MECS	MECS	0.22
O-066	O-066	0.08
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.05

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 DC	MW IMPACT
90759 1	24635 2	05HAVILAND 2	AEP	24316 9	05HAVILND 2	AEP	1	AEP_P4_#10084_05HAVI LN 138_I	breaker	90.0	120.3	154.46	DC	30.75

Bus #	Bus	MW Impact
246953	05TIMB G C	0.6
247607	V1-011 C	0.41
247911	05TIMB G E	15.7
247959	V1-011 E	17.83
926901	AC1-176 C	0.99
926902	AC1-176 E	6.64
940031	AE1-245 C	4.0
940032	AE1-245 E	26.75
CARR	CARR	0.02
CBM-S1	CBM-S1	0.18
CBM-S2	CBM-S2	0.02
CBM-W1	CBM-W1	0.34
CBM-W2	CBM-W2	2.03
CIN	CIN	0.28
CPLE	CPLE	0.0
DEARBORN	DEARBORN	0.14
G-007	G-007	0.04
IPL	IPL	0.18
LGEE	LGEE	0.05
MEC	MEC	0.54
O-066	O-066	0.14
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.09

Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
908105	246950	05TIMBS	AEP	243383	05TILLM	AEP	1	AEP_P4_#10084_05HAVILAN 138_I	breaker	332.0	68.97	104.88	DC	119.22

Bus #	Bus	MW Impact
246953	05TIMB G C	4.0
247607	V1-011 C	1.58
247911	05TIMB G E	105.07
247959	V1-011 E	69.15
926811	AC1-167 C O1	8.17
926812	AC1-167 E O1	3.96
926901	AC1-176 C	6.61
926902	AC1-176 E	44.45
934741	AD1-101 C O1	2.16
934742	AD1-101 E O1	3.53
934901	AD1-119 C O1	3.73
934902	AD1-119 E O1	6.09
940031	AE1-245 C	15.5
940032	AE1-245 E	103.72
BAYOU	BAYOU	0.09
BIG_CAJUN1	BIG_CAJUN1	0.14
BIG_CAJUN2	BIG_CAJUN2	0.28
BLUEG	BLUEG	0.46
CALDERWOOD	CALDERWOOD	0.03
CANNELTON	CANNELTON	0.03
CATAWBA	CATAWBA	0.01
CBM-N	CBM-N	0.02
CHEOAH	CHEOAH	0.03
CHILHOWEE	CHILHOWEE	0.01
CHOCTAW	CHOCTAW	0.09
COFFEEN	COFFEEN	0.07
COTTONWOOD	COTTONWOOD	0.37
DUCKCREEK	DUCKCREEK	0.17
EDWARDS	EDWARDS	0.08
ELMERSMITH	ELMERSMITH	0.05
FARMERCITY	FARMERCITY	0.05
G-007A	G-007A	0.04
GIBSON	GIBSON	0.03
HAMLET	HAMLET	0.04
MECS	MECS	0.19
NEWTON	NEWTON	0.18
NYISO	NYISO	0.07
O-066A	O-066A	0.02
PRAIRIE	PRAIRIE	0.32
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.09

Bus #	Bus	MW Impact
TILTON	TILTON	0.09
TRIMBLE	TRIMBLE	0.05
TVA	TVA	0.14
UNIONPOWER	UNIONPOWER	0.06
VFT	VFT	0.1

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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
909213	243017	05HAVILN	AEP	243168	05HAVILND1	AEP	1	AEP_P7-1_#11066	tower	86.0	103.23	139.46	DC	31.16

Bus #	Bus	MW Impact
246953	05TIMB G C	0.96
247607	V1-011 C	0.41
247911	05TIMB G E	25.09
247959	V1-011 E	18.07
926901	AC1-176 C	1.58
926902	AC1-176 E	10.62
940031	AE1-245 C	4.05
940032	AE1-245 E	27.11
BAYOU	BAYOU	0.05
BIG_CAJUN1	BIG_CAJUN1	0.07
BIG_CAJUN2	BIG_CAJUN2	0.15
BLUEG	BLUEG	0.24
CALDERWOOD	CALDERWOOD	0.01
CANNELTON	CANNELTON	0.02
CATAWBA	CATAWBA	0.0
CBM-N	CBM-N	0.02
CHEOAH	CHEOAH	0.01
CHILHOWEE	CHILHOWEE	0.0
CHOCTAW	CHOCTAW	0.05
COFFEEN	COFFEEN	0.04
COTTONWOOD	COTTONWOOD	0.2
DUCKCREEK	DUCKCREEK	0.12
EDWARDS	EDWARDS	0.06
ELMERSMITH	ELMERSMITH	0.03
FARMERCITY	FARMERCITY	0.03
G-007A	G-007A	0.06
GIBSON	GIBSON	0.01
HAMLET	HAMLET	0.01
NEWTON	NEWTON	0.11
NYISO	NYISO	0.09
O-066A	O-066A	0.03
PRAIRIE	PRAIRIE	0.19
SANTEETLA	SANTEETLA	0.0
SMITHLAND	SMITHLAND	0.01
TATANKA	TATANKA	0.06
TILTON	TILTON	0.06
TRIMBLE	TRIMBLE	0.03
TVA	TVA	0.07
UNIONPOWER	UNIONPOWER	0.03
VFT	VFT	0.16

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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
909430	243051	05NDELPH	AEP	242991	05E SIDE	AEP	1	AEP_P7-1_#10895	tower	167.0	101.87	105.56	DC	13.66

Bus #	Bus	MW Impact
247521	T-131 C	3.38
247911	05TIMB G E	11.0
247925	T-131 E	88.09
247959	V1-011 E	7.92
926811	AC1-167 C O1	3.23
926812	AC1-167 E O1	1.57
926861	AC1-173 C	7.27
926862	AC1-173 E	48.45
926901	AC1-176 C	0.69
926902	AC1-176 E	4.65
934741	AD1-101 C O1	4.14
934742	AD1-101 E O1	6.76
934901	AD1-119 C O1	2.04
934902	AD1-119 E O1	3.33
940031	AE1-245 C	1.78
940032	AE1-245 E	11.89
BLUEG	BLUEG	0.08
CALDERWOOD	CALDERWOOD	0.01
CARR	CARR	0.01
CATAWBA	CATAWBA	0.01
CBM-W1	CBM-W1	0.5
CBM-W2	CBM-W2	0.47
CHEOAH	CHEOAH	0.01
CHILHOWEE	CHILHOWEE	0.0
CIN	CIN	0.07
G-007	G-007	0.04
HAMLET	HAMLET	0.03
IPL	IPL	0.04
MEC	MEC	0.27
MECS	MECS	0.45
O-066	O-066	0.13
RENSSELAER	RENSSELAER	0.01
SANTEETLA	SANTEETLA	0.0
TRIMBLE	TRIMBLE	0.01
TVA	TVA	0.01
WEC	WEC	0.06

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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
907944	243169	05HAVILND2	AEP	245866	05CAVET T	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	50.0	106.9	119.89	DC	14.42

Bus #	Bus	MW Impact
247911	05TIMB G E	7.37
247959	V1-011 E	8.36
926901	AC1-176 C	0.46
926902	AC1-176 E	3.12
940031	AE1-245 C	1.87
940032	AE1-245 E	12.54
CARR	CARR	0.01
CBM-S1	CBM-S1	0.1
CBM-S2	CBM-S2	0.01
CBM-W1	CBM-W1	0.29
CBM-W2	CBM-W2	1.18
CIN	CIN	0.16
DEARBORN	DEARBORN	0.05
G-007	G-007	0.03
IPL	IPL	0.1
LGEE	LGEE	0.02
MEC	MEC	0.34
O-066	O-066	0.09
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.06

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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
907981	245866	05CAVETT	AEP	245912	05W VAN WR	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	50.0	102.1	115.09	DC	14.42

Bus #	Bus	MW Impact
247911	05TIMB G E	7.37
247959	V1-011 E	8.36
926901	AC1-176 C	0.46
926902	AC1-176 E	3.12
940031	AE1-245 C	1.87
940032	AE1-245 E	12.54
CARR	CARR	0.01
CBM-S1	CBM-S1	0.1
CBM-S2	CBM-S2	0.01
CBM-W1	CBM-W1	0.29
CBM-W2	CBM-W2	1.18
CIN	CIN	0.16
DEARBORN	DEARBORN	0.05
G-007	G-007	0.03
IPL	IPL	0.1
LGEE	LGEE	0.02
MEC	MEC	0.34
O-066	O-066	0.09
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.06

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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
909139	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P7-1_#11066	tower	40.0	127.86	177.91	DC	20.02

Bus #	Bus	MW Impact
246953	05TIMB G C	0.61
247607	V1-011 C	0.27
247911	05TIMB G E	16.12
247959	V1-011 E	11.61
926811	AC1-167 C O1	1.78
926812	AC1-167 E O1	0.86
926901	AC1-176 C	1.01
926902	AC1-176 E	6.82
934901	AD1-119 C O1	2.89
934902	AD1-119 E O1	4.72
940031	AE1-245 C	2.6
940032	AE1-245 E	17.42
CARR	CARR	0.01
CATAWBA	CATAWBA	0.0
CBM-S1	CBM-S1	0.03
CBM-W1	CBM-W1	0.39
CBM-W2	CBM-W2	0.75
CIN	CIN	0.1
G-007	G-007	0.02
HAMLET	HAMLET	0.01
IPL	IPL	0.06
LGEE	LGEE	0.0
MEC	MEC	0.29
MECS	MECS	0.22
O-066	O-066	0.08
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.05

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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
909134	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P7-1_#11066	tower	40.0	137.11	187.16	DC	20.02

Bus #	Bus	MW Impact
246953	05TIMB G C	0.61
247607	V1-011 C	0.27
247911	05TIMB G E	16.12
247959	V1-011 E	11.61
926811	AC1-167 C O1	1.78
926812	AC1-167 E O1	0.86
926901	AC1-176 C	1.01
926902	AC1-176 E	6.82
934901	AD1-119 C O1	2.89
934902	AD1-119 E O1	4.72
940031	AE1-245 C	2.6
940032	AE1-245 E	17.42
CARR	CARR	0.01
CATAWBA	CATAWBA	0.0
CBM-S1	CBM-S1	0.03
CBM-W1	CBM-W1	0.39
CBM-W2	CBM-W2	0.75
CIN	CIN	0.1
G-007	G-007	0.02
HAMLET	HAMLET	0.01
IPL	IPL	0.06
LGEE	LGEE	0.0
MEC	MEC	0.29
MECS	MECS	0.22
O-066	O-066	0.08
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.05

Affected Systems

Affected Systems

LG&E

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

MISO

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

TVA

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

Duke Energy Progress

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

NYISO

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

Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#7501	CONTINGENCY 'AEP_P1-2_#7501' OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 OPEN BRANCH FROM BUS 246264 TO BUS 247877 CKT 1 / 246264 05ST R14 8 34.5 247877 05ST.RD14 SS34.5 1 END
AEP_P2-2_#10084_05HAVILN 138_1	CONTINGENCY 'AEP_P2-2_#10084_05HAVILN 138_1' OPEN BRANCH FROM BUS 242989 TO BUS 243017 CKT 1 / 242989 05E LIMA 138 243017 05HAVILN 138 1 OPEN BRANCH FROM BUS 243017 TO BUS 243168 CKT 1 / 243017 05HAVILN 138 243168 05HAVILND1 69.0 1 END
AEP_P4_#10140_05ALLEN 138_H	CONTINGENCY 'AEP_P4_#10140_05ALLEN 138_H' OPEN BRANCH FROM BUS 243242 TO BUS 247864 CKT 1 / 243242 05ALLEN 138 247864 05LOGTOWN 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 OPEN BRANCH FROM BUS 246264 TO BUS 247877 CKT 1 / 246264 05ST R14 8 34.5 247877 05ST.RD14 SS34.5 1 END
AEP_P7-1_#10895	CONTINGENCY 'AEP_P7-1_#10895' OPEN BRANCH FROM BUS 243242 TO BUS 243877 CKT 1 / 243242 05ALLEN 138 243877 05DAWKNS 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 243330 CKT 1 / 243242 05ALLEN 138 243330 05LINCOL 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 247864 CKT 1 / 243242 05ALLEN 138 247864 05LOGTOWN 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 243877 TO BUS 243342 CKT 1 / 243877 05DAWKNS 138 243342 05MILAN 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 END

Contingency Name	Contingency Definition
AEP_SUBT_P1-3_#698_05HAVILN 138_4	CONTINGENCY 'AEP_SUBT_P1-3_#698_05HAVILN 138_4' / (MODIFIED) OPEN BRANCH FROM BUS 246352 TO BUS 246950 CKT 1 / 246352 05HAVILAND2 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 246352 TO BUS 243169 CKT 1 / 246352 05HAVILN 138 243169 05HAVILND2 69.0 1 OPEN BRANCH FROM BUS 245866 TO BUS 243169 CKT 1 / 245866 05CAVETT 69.0 243169 05HAVILND2 69.0 1 OPEN BRANCH FROM BUS 243169 TO BUS 245898 CKT 1 / 243169 05HAVILND2 69.0 245898 05PAULDING 69.0 1 END
Base Case	
AEP_P4_#10084_05HAVILN 138_I	CONTINGENCY 'AEP_P4_#10084_05HAVILN 138_I' OPEN BRANCH FROM BUS 242989 TO BUS 243017 CKT 1 / 242989 05E LIMA 138 243017 05HAVILN 138 1 OPEN BRANCH FROM BUS 243017 TO BUS 243168 CKT 1 / 243017 05HAVILN 138 243168 05HAVILND1 69.0 1 END
AEP_P7-1_#11065	CONTINGENCY 'AEP_P7-1_#11065' OPEN BRANCH FROM BUS 243242 TO BUS 247864 CKT 1 / 243242 05ALLEN 138 247864 05LOGTOWN 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 END
AEP_P7-1_#11066	CONTINGENCY 'AEP_P7-1_#11066' OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 247864 TO BUS 243051 CKT 1 / 247864 05LOGTOWN 138 243051 05NDELPH 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 END

Short Circuit

Short Circuit

The following Breakers are overduty

Bus Number	Bus Name	BREAKER	Type	Capacity (Amps)	Duty Percentage Post Queue	Duty Percentage Pre Queue

None

Secondary Point of Interconnection

AE1-245 will interconnect with the AEP transmission system at the Haviland 138 kV substation, Bus #1. (See Figure 3.)

To accommodate the interconnection at the Haviland 138 kV substation, the substation will have to be expanded requiring the installation of one (1) 138 kV circuit breaker (see Figure 3). Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

Note: The Interconnection Customer may be required to go offline for routine circuit breaker maintenance.

Network Impacts

The Queue Project AE1-245 was evaluated as a 150 MW (Capacity 19.5 MW) injection at the Haviland 138 kV substation, Bus #1 in the AEP area. Project AE1-245 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-245 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

Generation Deliverability

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

None

Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	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
879139	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	50.0	74.05	114.09	DC	20.02
880362	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P7-1_#11066	tower	50.0	78.89	118.92	DC	20.02
880363	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P7-1_#11065	tower	50.0	74.05	114.09	DC	20.02
878787	246352	05HAVILAND	AEP	243169	05HAVILND	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	90.0	83.47	113.07	DC	26.64
880420	246352	05HAVILAND	AEP	243169	05HAVILND	AEP	1	AEP_P7-1_#11066	tower	90.0	83.69	113.29	DC	26.64
880421	246352	05HAVILAND	AEP	243169	05HAVILND	AEP	1	AEP_P7-1_#10895	tower	90.0	83.69	113.29	DC	26.64
880422	246352	05HAVILAND	AEP	243169	05HAVILND	AEP	1	AEP_P7-1_#11065	tower	90.0	83.47	113.07	DC	26.64
878640	246950	05TIMBSS	AEP	243383	05TILLMA	AEP	1	AEP_P2-2_#10084_05HAVILN 138_1	bus	332.0	68.97	104.88	DC	119.22
879255	246950	05TIMBSS	AEP	243383	05TILLMA	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	332.0	68.97	104.88	DC	119.22

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	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
878883	243017	05HAVILN	AEP	243168	05HAVILND	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	86.0	102.07	138.33	DC	31.19
880288	243017	05HAVILN	AEP	243168	05HAVILND	AEP	1	AEP_P7-1_#11066	tower	86.0	103.23	139.49	DC	31.18
880289	243017	05HAVILN	AEP	243168	05HAVILND	AEP	1	AEP_P7-1_#10895	tower	86.0	102.29	138.55	DC	31.18
879246	243051	05NDELPH	AEP	242991	05E SIDE	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	167.0	101.92	105.61	DC	13.66
880478	243051	05NDELPH	AEP	242991	05E SIDE	AEP	1	AEP_P7-1_#11065	tower	167.0	101.92	105.61	DC	13.66
880479	243051	05NDELPH	AEP	242991	05E SIDE	AEP	1	AEP_P7-1_#10895	tower	167.0	101.87	105.56	DC	13.66
878563	243169	05HAVILND2	AEP	245866	05CAVETT	AEP	1	AEP_P2-2_#10084_05HAVILN 138_1	bus	50.0	106.9	119.89	DC	14.42
879085	243169	05HAVILND2	AEP	245866	05CAVETT	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	50.0	106.9	119.89	DC	14.42

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
878585	245866	05CAVETT	AEP	245912	05W VAN WR	AEP	1	AEP_P2-2_#10084_05HAVILN 138_1	bus	50.0	102.1	115.09	DC	14.42
879125	245866	05CAVETT	AEP	245912	05W VAN WR	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	50.0	102.1	115.09	DC	14.42
878740	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	40.0	122.07	172.12	DC	20.02
880217	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P7-1_#11066	tower	40.0	127.86	177.9	DC	20.02
880218	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P7-1_#11065	tower	40.0	122.07	172.12	DC	20.02
878735	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P4_#10140_05ALLEN 138_H	breaker	40.0	131.32	181.37	DC	20.02
880212	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P7-1_#11066	tower	40.0	137.11	187.15	DC	20.02
880213	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P7-1_#11065	tower	40.0	131.07	181.12	DC	20.02
878437	246352	05HAVILAND 2	AEP	243169	05HAVILND 2	AEP	1	AEP_P2-2_#10084_05HAVILN 138_1	bus	90.0	120.3	154.46	DC	30.75
878786	246352	05HAVILAND 2	AEP	243169	05HAVILND 2	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	90.0	120.3	154.46	DC	30.75

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	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
879672	243017	05HAVILN	AEP	243168	05HAVILND1	AEP	1	AEP_P1-2_#7501	operation	86.0	101.02	137.68	DC	31.53
879675	243017	05HAVILN	AEP	243168	05HAVILND1	AEP	1	Base Case	operation	68.0	92.04	115.23	DC	15.77
879780	243017	05HAVILN	AEP	242989	05E LIMA	AEP	1	AEP_P1-2_#7501	operation	220.0	83.87	125.57	DC	91.73
879781	243017	05HAVILN	AEP	242989	05E LIMA	AEP	1	Base Case	operation	167.0	72.28	100.67	DC	47.41
879665	243169	05HAVILND2	AEP	245898	05PAULDING	AEP	1	AEP_P1-2_#7501	operation	50.0	99.45	138.99	DC	19.77
880057	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P1-2_#7501	operation	50.0	64.34	106.1	DC	20.88
879548	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P1-2_#7501	operation	40.0	109.92	162.12	DC	20.88
879527	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P1-2_#7501	operation	40.0	118.92	171.12	DC	20.88
879900	246352	05HAVILAND2	AEP	243169	05HAVILND2	AEP	1	AEP_P1-2_#7501	operation	90.0	83.26	112.93	DC	26.7
879630	247383	05N.VANWRTS	AEP	245907	05VAN WERT	AEP	1	AEP_SUBT_P1-3_#698_05HAVILN 138_4	operation	54.0	106.48	147.61	DC	22.21

Flow Gate Details

The following appendices contain additional information about each flow gate presented in the body of the report. For each appendix, a description of the flow gate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flow gate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

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
880362	245871	05DELPHOS	AEP	245902	05S DELPHO	AEP	1	AEP_P7-1_#11066	tower	50.0	78.89	118.92	DC	20.02

Bus #	Bus	MW Impact
246953	05TIMB G C	0.61
247607	V1-011 C	0.27
247911	05TIMB G E	16.12
247959	V1-011 E	11.61
926811	AC1-167 C O1	1.78
926812	AC1-167 E O1	0.86
926901	AC1-176 C	1.01
926902	AC1-176 E	6.82
934901	AD1-119 C O1	2.89
934902	AD1-119 E O1	4.72
940031	AE1-245 C O2	2.6
940032	AE1-245 E O2	17.41
CARR	CARR	0.01
CATAWBA	CATAWBA	0.0
CBM-S1	CBM-S1	0.03
CBM-W1	CBM-W1	0.39
CBM-W2	CBM-W2	0.75
CIN	CIN	0.1
G-007	G-007	0.02
HAMLET	HAMLET	0.01
IPL	IPL	0.06
LGEE	LGEE	0.0
MEC	MEC	0.29
MECS	MECS	0.22
O-066	O-066	0.08
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.05

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 DC	MW IMPACT
878786	246352	05HAVILAND2	AEP	243169	05HAVILND2	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	90.0	120.3	154.46	DC	30.75

Bus #	Bus	MW Impact
246953	05TIMB G C	0.6
247607	V1-011 C	0.41
247911	05TIMB G E	15.7
247959	V1-011 E	17.83
926901	AC1-176 C	0.99
926902	AC1-176 E	6.64
940031	AE1-245 C O2	4.0
940032	AE1-245 E O2	26.75
CARR	CARR	0.02
CBM-S1	CBM-S1	0.18
CBM-S2	CBM-S2	0.02
CBM-W1	CBM-W1	0.34
CBM-W2	CBM-W2	2.03
CIN	CIN	0.28
CPLE	CPLE	0.0
DEARBORN	DEARBORN	0.14
G-007	G-007	0.04
IPL	IPL	0.18
LGEE	LGEE	0.05
MEC	MEC	0.54
O-066	O-066	0.14
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.09

Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
879255	246950	05TIMBS	AEP	243383	05TILLM	AEP	1	AEP_P4_#10084_05HAVILAN 138_I	breaker	332.0	68.97	104.88	DC	119.22

Bus #	Bus	MW Impact
246953	05TIMB G C	4.0
247607	V1-011 C	1.58
247911	05TIMB G E	105.07
247959	V1-011 E	69.15
926811	AC1-167 C O1	8.17
926812	AC1-167 E O1	3.96
926901	AC1-176 C	6.61
926902	AC1-176 E	44.45
934741	AD1-101 C O1	2.16
934742	AD1-101 E O1	3.53
934901	AD1-119 C O1	3.73
934902	AD1-119 E O1	6.09
940031	AE1-245 C O2	15.5
940032	AE1-245 E O2	103.72
BAYOU	BAYOU	0.09
BIG_CAJUN1	BIG_CAJUN1	0.14
BIG_CAJUN2	BIG_CAJUN2	0.28
BLUEG	BLUEG	0.46
CALDERWOOD	CALDERWOOD	0.03
CANNELTON	CANNELTON	0.03
CATAWBA	CATAWBA	0.01
CBM-N	CBM-N	0.02
CHEOAH	CHEOAH	0.03
CHILHOWEE	CHILHOWEE	0.01
CHOCTAW	CHOCTAW	0.09
COFFEEN	COFFEEN	0.07
COTTONWOOD	COTTONWOOD	0.37
DUCKCREEK	DUCKCREEK	0.17
EDWARDS	EDWARDS	0.08
ELMERSMITH	ELMERSMITH	0.05
FARMERCITY	FARMERCITY	0.05
G-007A	G-007A	0.04
GIBSON	GIBSON	0.03
HAMLET	HAMLET	0.04
MECS	MECS	0.19
NEWTON	NEWTON	0.18
NYISO	NYISO	0.07
O-066A	O-066A	0.02
PRAIRIE	PRAIRIE	0.32
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.09

Bus #	Bus	MW Impact
TILTON	TILTON	0.09
TRIMBLE	TRIMBLE	0.05
TVA	TVA	0.14
UNIONPOWER	UNIONPOWER	0.06
VFT	VFT	0.1

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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
880288	243017	05HAVILN	AEP	243168	05HAVILND1	AEP	1	AEP_P7-1_#11066	tower	86.0	103.23	139.49	DC	31.18

Bus #	Bus	MW Impact
246953	05TIMB G C	0.96
247607	V1-011 C	0.41
247911	05TIMB G E	25.09
247959	V1-011 E	18.07
926901	AC1-176 C	1.58
926902	AC1-176 E	10.62
940031	AE1-245 C O2	4.05
940032	AE1-245 E O2	27.13
BAYOU	BAYOU	0.05
BIG_CAJUN1	BIG_CAJUN1	0.07
BIG_CAJUN2	BIG_CAJUN2	0.15
BLUEG	BLUEG	0.24
CALDERWOOD	CALDERWOOD	0.01
CANNELTON	CANNELTON	0.02
CATAWBA	CATAWBA	0.0
CBM-N	CBM-N	0.02
CHEOAH	CHEOAH	0.01
CHILHOWEE	CHILHOWEE	0.0
CHOCTAW	CHOCTAW	0.05
COFFEEN	COFFEEN	0.04
COTTONWOOD	COTTONWOOD	0.2
DUCKCREEK	DUCKCREEK	0.12
EDWARDS	EDWARDS	0.06
ELMERSMITH	ELMERSMITH	0.03
FARMERCITY	FARMERCITY	0.03
G-007A	G-007A	0.06
GIBSON	GIBSON	0.01
HAMLET	HAMLET	0.01
NEWTON	NEWTON	0.11
NYISO	NYISO	0.09
O-066A	O-066A	0.03
PRAIRIE	PRAIRIE	0.19
SANTEETLA	SANTEETLA	0.0
SMITHLAND	SMITHLAND	0.01
TATANKA	TATANKA	0.06
TILTON	TILTON	0.06
TRIMBLE	TRIMBLE	0.03
TVA	TVA	0.07
UNIONPOWER	UNIONPOWER	0.03
VFT	VFT	0.16

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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
880479	243051	05NDELPH	AEP	242991	05E SIDE	AEP	1	AEP_P7-1_#10895	tower	167.0	101.87	105.56	DC	13.66

Bus #	Bus	MW Impact
247521	T-131 C	3.38
247911	05TIMB G E	11.0
247925	T-131 E	88.09
247959	V1-011 E	7.92
926811	AC1-167 C O1	3.23
926812	AC1-167 E O1	1.57
926861	AC1-173 C	7.27
926862	AC1-173 E	48.45
926901	AC1-176 C	0.69
926902	AC1-176 E	4.65
934741	AD1-101 C O1	4.14
934742	AD1-101 E O1	6.76
934901	AD1-119 C O1	2.04
934902	AD1-119 E O1	3.33
940031	AE1-245 C O2	1.78
940032	AE1-245 E O2	11.88
BLUEG	BLUEG	0.08
CALDERWOOD	CALDERWOOD	0.01
CARR	CARR	0.01
CATAWBA	CATAWBA	0.01
CBM-W1	CBM-W1	0.5
CBM-W2	CBM-W2	0.47
CHEOAH	CHEOAH	0.01
CHILHOWEE	CHILHOWEE	0.0
CIN	CIN	0.07
G-007	G-007	0.04
HAMLET	HAMLET	0.03
IPL	IPL	0.04
MEC	MEC	0.27
MECS	MECS	0.45
O-066	O-066	0.13
RENSSELAER	RENSSELAER	0.01
SANTEETLA	SANTEETLA	0.0
TRIMBLE	TRIMBLE	0.01
TVA	TVA	0.01
WEC	WEC	0.06

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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
879085	243169	05HAVILND2	AEP	245866	05CAVET T	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	50.0	106.9	119.89	DC	14.42

Bus #	Bus	MW Impact
247911	05TIMB G E	7.37
247959	V1-011 E	8.36
926901	AC1-176 C	0.46
926902	AC1-176 E	3.12
940031	AE1-245 C O2	1.87
940032	AE1-245 E O2	12.54
CARR	CARR	0.01
CBM-S1	CBM-S1	0.1
CBM-S2	CBM-S2	0.01
CBM-W1	CBM-W1	0.29
CBM-W2	CBM-W2	1.18
CIN	CIN	0.16
DEARBORN	DEARBORN	0.05
G-007	G-007	0.03
IPL	IPL	0.1
LGEE	LGEE	0.02
MEC	MEC	0.34
O-066	O-066	0.09
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.06

Index 7

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
879125	245866	05CAVETT	AEP	245912	05W VAN WR	AEP	1	AEP_P4_#10084_05HAVILN 138_I	breaker	50.0	102.1	115.09	DC	14.42

Bus #	Bus	MW Impact
247911	05TIMB G E	7.37
247959	V1-011 E	8.36
926901	AC1-176 C	0.46
926902	AC1-176 E	3.12
940031	AE1-245 C O2	1.87
940032	AE1-245 E O2	12.54
CARR	CARR	0.01
CBM-S1	CBM-S1	0.1
CBM-S2	CBM-S2	0.01
CBM-W1	CBM-W1	0.29
CBM-W2	CBM-W2	1.18
CIN	CIN	0.16
DEARBORN	DEARBORN	0.05
G-007	G-007	0.03
IPL	IPL	0.1
LGEE	LGEE	0.02
MEC	MEC	0.34
O-066	O-066	0.09
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.06

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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
880217	245891	05N MID PT	AEP	245871	05DELPHOS	AEP	1	AEP_P7-1_#11066	tower	40.0	127.86	177.9	DC	20.02

Bus #	Bus	MW Impact
246953	05TIMB G C	0.61
247607	V1-011 C	0.27
247911	05TIMB G E	16.12
247959	V1-011 E	11.61
926811	AC1-167 C O1	1.78
926812	AC1-167 E O1	0.86
926901	AC1-176 C	1.01
926902	AC1-176 E	6.82
934901	AD1-119 C O1	2.89
934902	AD1-119 E O1	4.72
940031	AE1-245 C O2	2.6
940032	AE1-245 E O2	17.41
CARR	CARR	0.01
CATAWBA	CATAWBA	0.0
CBM-S1	CBM-S1	0.03
CBM-W1	CBM-W1	0.39
CBM-W2	CBM-W2	0.75
CIN	CIN	0.1
G-007	G-007	0.02
HAMLET	HAMLET	0.01
IPL	IPL	0.06
LGEE	LGEE	0.0
MEC	MEC	0.29
MECS	MECS	0.22
O-066	O-066	0.08
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.05

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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
880212	245907	05VAN WERT	AEP	245891	05N MID PT	AEP	1	AEP_P7-1_#11066	tower	40.0	137.11	187.15	DC	20.02

Bus #	Bus	MW Impact
246953	05TIMB G C	0.61
247607	V1-011 C	0.27
247911	05TIMB G E	16.12
247959	V1-011 E	11.61
926811	AC1-167 C O1	1.78
926812	AC1-167 E O1	0.86
926901	AC1-176 C	1.01
926902	AC1-176 E	6.82
934901	AD1-119 C O1	2.89
934902	AD1-119 E O1	4.72
940031	AE1-245 C O2	2.6
940032	AE1-245 E O2	17.41
CARR	CARR	0.01
CATAWBA	CATAWBA	0.0
CBM-S1	CBM-S1	0.03
CBM-W1	CBM-W1	0.39
CBM-W2	CBM-W2	0.75
CIN	CIN	0.1
G-007	G-007	0.02
HAMLET	HAMLET	0.01
IPL	IPL	0.06
LGEE	LGEE	0.0
MEC	MEC	0.29
MECS	MECS	0.22
O-066	O-066	0.08
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.05

Affected Systems

Affected Systems

LG&E

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

MISO

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

TVA

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

Duke Energy Progress

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

NYISO

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

Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#7501	CONTINGENCY 'AEP_P1-2_#7501' OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 OPEN BRANCH FROM BUS 246264 TO BUS 247877 CKT 1 / 246264 05ST R14 8 34.5 247877 05ST.RD14 SS34.5 1 END
AEP_P2-2_#10084_05HAVILN 138_1	CONTINGENCY 'AEP_P2-2_#10084_05HAVILN 138_1' OPEN BRANCH FROM BUS 242989 TO BUS 243017 CKT 1 / 242989 05E LIMA 138 243017 05HAVILN 138 1 OPEN BRANCH FROM BUS 243017 TO BUS 243168 CKT 1 / 243017 05HAVILN 138 243168 05HAVILND1 69.0 1 END
AEP_P4_#10140_05ALLEN 138_H	CONTINGENCY 'AEP_P4_#10140_05ALLEN 138_H' OPEN BRANCH FROM BUS 243242 TO BUS 247864 CKT 1 / 243242 05ALLEN 138 247864 05LOGTOWN 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 OPEN BRANCH FROM BUS 246264 TO BUS 247877 CKT 1 / 246264 05ST R14 8 34.5 247877 05ST.RD14 SS34.5 1 END
AEP_P7-1_#10895	CONTINGENCY 'AEP_P7-1_#10895' OPEN BRANCH FROM BUS 243242 TO BUS 243877 CKT 1 / 243242 05ALLEN 138 243877 05DAWKNS 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 243330 CKT 1 / 243242 05ALLEN 138 243330 05LINCOL 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 247864 CKT 1 / 243242 05ALLEN 138 247864 05LOGTOWN 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 243877 TO BUS 243342 CKT 1 / 243877 05DAWKNS 138 243342 05MILAN 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 END

Contingency Name	Contingency Definition
AEP_SUBT_P1-3_#698_05HAVILN 138_4	CONTINGENCY 'AEP_SUBT_P1-3_#698_05HAVILN 138_4' / (MODIFIED) OPEN BRANCH FROM BUS 246352 TO BUS 246950 CKT 1 / 246352 05HAVILAND2 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 246352 TO BUS 243169 CKT 1 / 246352 05HAVILN 138 243169 05HAVILND2 69.0 1 OPEN BRANCH FROM BUS 245866 TO BUS 243169 CKT 1 / 245866 05CAVETT 69.0 243169 05HAVILND2 69.0 1 OPEN BRANCH FROM BUS 243169 TO BUS 245898 CKT 1 / 243169 05HAVILND2 69.0 245898 05PAULDING 69.0 1 END
Base Case	
AEP_P4_#10084_05HAVILN 138_I	CONTINGENCY 'AEP_P4_#10084_05HAVILN 138_I' OPEN BRANCH FROM BUS 242989 TO BUS 243017 CKT 1 / 242989 05E LIMA 138 243017 05HAVILN 138 1 OPEN BRANCH FROM BUS 243017 TO BUS 243168 CKT 1 / 243017 05HAVILN 138 243168 05HAVILND1 69.0 1 END
AEP_P7-1_#11065	CONTINGENCY 'AEP_P7-1_#11065' OPEN BRANCH FROM BUS 243242 TO BUS 247864 CKT 1 / 243242 05ALLEN 138 247864 05LOGTOWN 138 1 OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 END
AEP_P7-1_#11066	CONTINGENCY 'AEP_P7-1_#11066' OPEN BRANCH FROM BUS 243242 TO BUS 243383 CKT 1 / 243242 05ALLEN 138 243383 05TILLMA 138 1 OPEN BRANCH FROM BUS 247864 TO BUS 243051 CKT 1 / 247864 05LOGTOWN 138 243051 05NDELPH 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246950 CKT 1 / 243383 05TILLMA 138 246950 05TIMBSS 138 1 OPEN BRANCH FROM BUS 243383 TO BUS 246265 CKT 1 / 243383 05TILLMA 138 246265 05TILLMAN 34.5 1 END

Short Circuit

Short Circuit

The following Breakers are overduty

Bus Number	Bus Name	BREAKER	Type	Capacity (Amps)	Duty Percentage Post Queue	Duty Percentage Pre Queue

None